Eurostat-OECD Methodological Manual on Purchasing Power Parities (PPPs)

Overview

What does the Eurostat-OECD PPP Programme do?

1. The purpose of the Eurostat-OECD PPP Programme is to compare on a regular and timely basis the GDPs of three groups of countries: EU Member States, OECD Member Countries and associate non-member countries (countries that have an association other than membership with the European Union or the OECD). More precisely, the Programme's objective is to compare the price and volume levels of GDP and its component expenditures across the three groups of countries. To make such comparisons, it is first necessary to express the GDPs and the component expenditures - which are in national currencies and valued at national price levels - in a common currency at a uniform price level. Purchasing power parities (PPPs) are used to effect this double conversion. The PPPs are calculated by Eurostat and the OECD with the price and expenditure data that countries participating in the Programme supply specifically for the calculation.

2. The prices and expenditures that participating countries report has to be comparable with those of other participating countries and available at the same time. Eurostat's and the OECD's initial task is therefore to organise, co-ordinate and oversee the provision of data by participating countries and to ensure that they follow established methodology and procedures and adhere to the timetable when collecting, reporting and validating their data. The second task for Eurostat and the OECD is to compute the PPPs with the validated price and expenditure data provided by countries and use the PPPs to derive the price and volume measures with which the GDPs and component expenditures of EU Member States, OECD Member Countries and associate non-member countries can be compared. A third task is to disseminate the price and volume measures and to explain them to users.

Why is GDP compared from the expenditure side?

3. GDP values can be estimated from the production side, the expenditure side and the income side. The values are made up of a price component and a volume component (value = price x volume). To make price and volume comparisons of GDP, it is necessary to split the values into these two components. Unlike GDP values estimated from the production side and the expenditure side, GDP values from the income side cannot be split into meaningful price and volume components. Price and volume comparisons of GDP can only be made from the production side or the expenditure side. Eurostat and OECD comparisons are made from the expenditure side which identifies the components of final demand: consumption, investment and net exports.

4. The reasons for this are: the inherent usefulness of making comparisons from the expenditure or demand side; the difficulties of organising comparisons from the production or supply side which require data for both intermediate consumption and gross output in order to effect double deflation; and the generally better comparability among countries of their detailed breakdowns of GDP expenditures. The disadvantage of the expenditure side is that, although it enables levels and structures of consumption and investment to be compared, it does not identify individual industries and productivity comparisons can be made only at the level of the whole economy. To compare productivity at the industry level, comparisons have to be made from the production side.

What are PPPs?

5. PPPs serve both as currency convertors and as spatial price deflators. They convert different currencies to a common currency and, in the process of conversion, equalise their purchasing power by eliminating the differences in price levels between countries. Thus, when the GDPs and component expenditures of countries are converted to a common currency with PPPs, they are valued at the same price level and so reflect only differences in the volumes of goods and services purchased in the countries.

6. In their simplest form, PPPs are nothing more than price relatives that show the ratio of the prices in national currencies of the same good or service in different countries. For example, if the price of a litre of Coca Cola is 2.30 euros in France and 2.00 dollars in the United States, then the

PPP for Coca Cola between France and the United States is the ratio 2.30 euros to 2.00 dollars or 1.15 euros to the dollar. This means that for every dollar spent on Coca Cola in the United States, 1.15 euros would have to be spent in France to obtain the same quantity and quality – or, in other words, the same volume - of Coca Cola.

7. In their more complex form, PPPs refer to the various levels of aggregation that make up GDP. But they are still price relatives. It is just that in moving up the hierarchy of aggregation the price relatives refer to increasingly elaborate assortments of goods and services. Therefore, if the PPP for GDP between France and the United States is 0.97 euros to the dollar, it can be inferred that for every dollar spent on the GDP in the United States, 0.97 euros would have to be spent in France to purchase an equivalent volume of goods and services.

What are PPPs used for?

8. PPPs are used to generate the price and volume indices needed for economic research and policy analysis that involves inter-country comparisons of GDP and GDP expenditures. The volume indices are used to compare the size of economies and their levels of material well-being, consumption, investment, government expenditure and overall productivity. The price indices are used to compare price levels, price structures, price convergence and competitiveness.

9. In addition to research and analysis, PPPs and the real expenditures they produce are used for statistical compilation. International organisations aggregate real GDP and its components across countries to provide totals for groups of countries, such as the European Union or the OECD. They also use the country shares in these totals as weights when economic indicators, such as price indices or growth rates, are combined to obtain averages for groups of countries.

10. PPPs are employed for administrative purposes as well. The European Commission uses them when allocating the structural funds to Member States and the International Monetary Fund (IMF) uses them when deciding the quota subscriptions of its members. The structural funds were set up to reduce economic disparities between and within Member States. The principal indicator determining the allocation is PPP-deflated intra-country regional GDP per capita. A country's quota subscription determines among other things the financial resources it is obliged to provide the IMF. The weight of real GDP in the quota formula is 20 per cent.

What are the price and volume indices that PPPs generate?

11. PPPs are used to derive price level indices, volume indices and per capita volume indices for each of the various levels of aggregation comprising GDP. The indices for GDP are the most important, but the indices below the level of GDP are also useful in their own right as they enable inter-country comparisons of price and volume levels to be made for product groups and aggregates as well as for GDP.

12. The volume indices and per capita volume indices are based on real expenditures. Real expenditures are national expenditures – that is, expenditures expressed in national currencies and valued at national price levels – that have been converted to a common currency and valued at a uniform price level with PPPs. The expenditures are real because, being at the same price level, they reflect only differences in the volume of goods and services purchased in countries. Both indices are indicative of the relative magnitudes of the component expenditure being compared with the per capita indices also taking into account the differences in the size of populations between countries. At the level of GDP, the volume indices are used to compare the economic size of countries and the per capita volume indices the material well-being of their residents.

13. The price level indices (PLIs) are the ratios of PPPs to exchange rates. As such, they provide a measure of the differences in price levels between countries by indicating for a given component expenditure the number of units of common currency needed to buy the same volume of the component expenditure in each country. At the level of GDP, PLIs provide a measure of the differences in the general price levels of countries.

14. For example, if the PPP for GDP between the European Union and the United States is 1.28

dollars per euro and between the European Union and Japan it is 150 yen per euro, it can be inferred that a given volume of GDP that costs 1.00 euro in the European Union will cost 1.28 dollars in the United States and 150 yen in Japan. By converting these costs to a common currency with exchange rates (1 euro = 1.47 dollars =151 yen), they can be compared. After conversion, the costs are 1.00 euro in the European Union, 0.87 euro in the United States and 0.99 euro in Japan from which It can be seen that the given volume of GDP costs more in the European Union and Japan than in United States and that it costs almost the same in the European Union and Japan. From this it can be concluded that the general price level of the European Union is higher than that of the United States but only marginally higher than that of Japan.

Why not to use exchange rates to make international comparisons of GDP?

15. Before PPPs became available, exchange rates were used to make international comparisons of GDP. This was partly because there was no alternative, but the use of exchange rates was also underpinned by the theory of purchasing power parity in international economics. In its simplest form, the theory suggests that national price levels converted to a common currency using exchange rates should be equal. Arbitrage will ensure that the price of an individual good will be the same in all countries in which it is traded - the law of one price. Thus, when the individual goods are taken together, there will be high correlation in general price levels – at least in the medium and long term. The two principle assumptions underlying the theory are that the demand and supply for currency is driven entirely by international trade and that all goods (and services) are internationally tradable.

16. In reality, the supply and demand for currencies are influenced principally by factors such as currency speculation, interest rates, government intervention and capital flows between countries and not by the currency requirements of international trade. Furthermore, many goods and services, such as buildings, all government services and most market services, are not traded internationally. In other words, the two principle assumptions underlying the theory do not hold: exchange rates do not reflect the relative purchasing powers of currencies in their national markets. Hence, while exchange rates provide GDPs that are expressed in the same currency unit, they do not provide GDPs that are valued at the same price level. The GDPs remain valued at national price levels and, as a result, they reflect not only differences in the volumes produced in the countries being compared, but also differences in the price levels of these countries.

17. One consequence of this is that exchange rate converted GDPs are usually misleading on the relative sizes of economies. Price levels are typically higher in high-income countries than they are in low-income countries. If no account is taken of this when converting the GDPs of countries to a common currency, then the size of high-income countries will be overstated and the size of low-income countries will be understated. Exchange rate converted GDPs do not take account of the price level differences between countries and therefore overstate the size of economies with relatively high price levels and understate the size of economies with relatively low price levels. It is for this reason that exchange rates should not be used to make international comparisons of GDP.

Are PPPs necessary if countries share a common currency?

18. PPPs serve two functions. They are used to convert the GDP expenditures of the countries being compared to a common currency when the countries have different national currencies and, because the GDP expenditures of the countries are valued at national price levels, they are used to revalue the expenditures at a uniform price level. The two functions are independent of each other. If countries have a common currency, as do countries in the euro area, it does not mean that they have a common price level. The purchasing power of the common currency will vary from country to country in line with national price levels. Hence, although PPPs are not needed to convert the GDP expenditures to a common currency when countries share a common currency, they are still needed to value the GDP expenditures at a uniform price level. In other words, PPPs are employed as spatial price deflators only and not as both currency convertors and spatial deflators.

Can PPPs be used to determine whether a currency is undervalued or overvalued?

19. PPPs appear in international trade theory in the context of equilibrium exchange rates where they are defined as the underlying rates of exchange to which actual exchange rates will converge in the long term. Hence, the ratios of the GDP PPPs to exchange rates - that is, the price level indices (PLIs) for GDP – will indicate whether or not currencies are undervalued or overvalued with respect to a reference currency. A PLI above 100 indicates that the currency is undervalued; a PLI below 100 indicates that the currency is overvalued. But this only holds true if the PPPs on which the PLIs are based refer solely to domestically-produced tradable goods and services valued at export prices and this is not the case with the PPPs being considered here.

20. These PPPs have been calculated specifically to enable international price and volume comparisons to be made for GDP. They refer to the entire range of goods and services which make up GDP – both domestically produced and imported - and include many items that are not traded internationally. In addition, except for net foreign trade, they are valued at domestic market prices and are calculated using expenditure weights that reflect domestic demand. As such, they provide PLIs for GDP which allow the general price levels of countries to be compared with that of a reference country. In doing so, they also indicate the degree to which a country's exchange rate reflects its general price level vis-à-vis the general price level of the reference country. Hence, a PLI more than 100 indicates a higher general price level and one that is understated by the exchange rate; a PLI less than 100 indicates a lower general price level and one that is overstated by the exchange rate. This is not the same as saying a currency is undervalued or overvalued.

Should PPPs always be used to make international comparisons?

21. The purpose of the PPPs produced by Eurostat and the OECD is to make international price and volume comparisons of GDP and GDP expenditures. They are designed specifically to compare the size or the price levels of these expenditures between countries and should always be used to effect such comparisons. They are not designed, however, to make international comparisons of monetary flows, such as aid and foreign direct investment, or trade flows. For such comparisons, exchange rates should be used. Note that many international comparisons require neither PPPs nor exchange rates. For example, to compare real growth rates of GDP between countries, each country's own published growth rate can be used. Similarly, for a comparison of government debt as a ratio of GDP, the ratios are calculated in each country's own currency.

How are PPPs calculated?

22. PPPs are calculated in three stages. The first stage is at the product level, where price relatives are calculated for individual goods and services. The second stage is at the product group level, where the price relatives calculated for the products in the group are averaged, usually without weights, to obtain PPPs for the group. And the third is at the aggregation levels, where the PPPs for the product groups covered by the aggregation level are weighted and averaged to obtain weighted PPPs for the aggregation level. The weights used to aggregate the PPPs in the third stage are the expenditures on the product groups as estimated in the national accounts.

23. Eurostat and the OECD apply the Èltetö-Köves-Szulc (EKS) method first to calculate PPPs for product groups (stage 2) and then to aggregate product group PPPs (stage 3).

What products are used to calculate PPPs?

24. The sample of products used to calculate PPPs is drawn from the whole range of final goods and services comprising GDP. Countries collect prices for consumer goods and services, government services and capital goods. The final product list from which countries select items to price covers around 2500 consumer goods and services (including housing, pharmaceuticals, and

other medical goods and services), 26 occupations in government services, 230 types of equipment goods and 8 construction projects. Prices are not collected for education, and in some countries for housing, because the PPPs are derived indirectly with volume measures. The volume measures are computed with the quantity and quality data that countries report instead of prices.

What prices are used to calculate PPPs?

25. The prices that countries collect are broadly consistent with the prices used to estimate their GDP and its component expenditures. If the prices are not consistent, the volume indices are likely to be biased. The prices that countries use to estimate GDP and GDP expenditures are, in principle, national annual purchasers' prices of actual market transactions. Ideally, such prices would be collected nationwide throughout the reference year from purchasers. In practice, countries tend to collect prices from sellers for a specified survey month. In some cases the prices collected are national prices in others they are capital city prices. Capital city prices are only collected for consumer goods and services and these are converted to national prices with spatial adjustment factors prior to the calculation of PPPs.

26. The prices at which sellers offer their products for sale are not necessarily actual transaction prices and, before they are recorded as such, it has to be established whether or not they include elements such as delivery and installation costs (if applicable), VAT and other indirect tax on products, discounts, surcharges and rebates, and, in the case of certain services, invoiced service charges and voluntary gratuities. If they do not, the offer prices of sellers are converted to proxies for actual transaction prices by adding on the missing elements. Subsequently, the transaction prices are converted to annual prices with temporal adjustment factors. This adjustment is only made for consumer goods and services. Mid-year national prices are collected for capital goods and annual national prices are collected for housing and government services.

In what circumstances could PPPs be biased?

27. The prices that countries collect for the calculation of PPPs have to meet three criteria. They have to be consistent with the prices underlying the estimates of GDP and its component expenditures; they have to be for products that are comparable across countries; they have also to be for products that are representative of their expenditures. Failure to observe any of these three requirements can lead to biased PPPs resulting in an overestimation of price levels and a corresponding underestimation of volumes or an underestimation of price levels and a corresponding overestimation of volumes.

28. Consistency is essential because the basis of a comparison is the identity: expenditure = price x volume. Volumes are obtained by dividing expenditures by prices. To estimate the volumes correctly, the prices collected should be consistent with those used to derive the expenditures. Deflating with prices that are not consistent with those underlying the expenditure values can result in volumes being underestimated if the prices are too high or overestimated if the prices are too low.

29. Comparability requires countries to price products that have the same or similar technical parameters and price determining properties. The pricing of comparable products ensures that differences in prices between countries for a product reflect actual price differences and are not influenced by differences in quality. If products are not comparable, quality differences will be mistaken for apparent price differences and the consequent underestimation or overestimation of price levels.

30. Countries are required to price a selection of representative products (that is, products that are representative of their own pattern of expenditure) and a selection of unrepresentative products (that is, products that are representative of the expenditure patterns of other countries). Products that are representative generally have a lower price level than products that are unrepresentative and, unless this is taken into account when calculating the PPPs, the PPPs can be biased. There is a risk that price levels for countries pricing a smaller number of representative products will be overestimated and that price levels for countries pricing a larger number of representative products will be underestimated.

31. In principle, this bias is avoided because the method of calculating PPPs used by Eurostat and the OECD takes account of representativity of products in a way that disparities in the number of representative products priced between countries is not an issue. However, the method requires countries to identify which of the products they have priced are representative. This can be difficult because usually explicit expenditure weights are not available for products. Their representativity has to be determined by other means. If countries fail to identify correctly the representative products among those they price, the bias described above may not be avoided.

What has to be considered when comparing PPP derived price and volume measures over time?

32. Indices of real GDP provide a snapshot of the relative volume levels of GDP among participating countries for a given reference year. When placed side by side, the indices of consecutive reference years appear to provide a moving picture of relative GDP volume levels over the reference years. This apparent time series of volume measures is actually equivalent to a time series of value indices. This is because the volume indices for each reference year are calculated using the prices and expenditures of that year. Year-to-year changes in the volume indices are thus due to changes in relative price levels as well as changes in relative volume levels. As a result, the rates of relative growth derived from the indices are not consistent with those obtained from GDP volumes estimated by countries.

33. To trace the evolution of relative GDP volume levels between countries over time, it is necessary to select one of the reference years as a base year and to extrapolate its relative GDP volume levels over the other years. Extrapolation is done by applying the relative rates of GDP volume growth observed in the different countries. This provides a time series of volume indices at a constant uniform price level that replicates exactly the relative movements of GDP volume growth of each country. Underlying this method is the assumption that price structures do not change over time. But relative prices do change over time and, if such changes are ignored over long periods, a biased picture of the relative economic developments of countries can result. The choice of base year can also influence the picture that emerges.

34. The convergence or divergence of prices among countries is of interest in a number of contexts such as competition policy and consumer protection. PLIs provide a means of observing the movement of price levels over time, but they have to be used with caution. First, except within the euro area, they are influenced by exchange rate fluctuations (being the ratios between PPPs and exchange rates). Second, independently of exchange rates, they are volatile. This is generally so at the lower aggregation levels where sample sizes are small. Usually such volatility diminishes, if not disappears, with aggregation. Volatility particularly arises when the basket of goods and services to be priced changes from one price survey to another in order to accommodate market developments. For example, in this respect, the basket for food and non-alcoholic beverages is relatively stable, while that for electronic goods is altered substantially each time it is surveyed. Volatility of this type also diminishes with aggregation. For these reasons, PLIs are better suited to monitoring price convergence at higher levels of aggregation over long periods of time.

Who is responsible for calculating PPPs and who is responsible for the quality and accuracy of PPP results?

35. Eurostat and OECD comparisons involve close collaboration between three parties: Eurostat, the OECD and the NSIs of participating countries. Each party has its own set of responsibilities which, in the case of Eurostat and countries participating in Eurostat comparisons, are set out in the PPP Regulation. Responsibility for the calculation of PPPs and for the quality and accuracy of PPP results is shared.

36. Eurostat is responsible for the calculation, aggregation and validation of the PPPs for countries participating in its annual comparisons and the OECD is responsible for the calculation, aggregation and validation of the PPPs for those countries participating in the three-yearly joint comparisons that are not covered by Eurostat comparisons. The OECD is responsible as well for

including the countries coordinated by Eurostat in the joint comparison in a way that ensures that the PPPs for the Eurostat countries are not affected. Eurostat and the OECD are also responsible for ensuring the accuracy, relevance and timeliness of the PPPs and of the price and volume indices to which they give rise.

37. For their part, the NSIs of participating countries are responsible for providing the national annual purchasers' prices and the detailed breakdown of GDP expenditures required to calculate and aggregate the PPPs according to the commonly agreed timetable. The prices should conform to the standards that are set by Eurostat and the OECD in consultation with the NSIs. Similarly, the detailed expenditures should conform to the classification agreed by Eurostat, the OECD and the NSIs. The NSIs are also responsible for validating price and expenditure data together with Eurostat and the OECD. They are required to give written approval of the validated data for which they are responsible.

38. In addition, the NSIs of countries participating in Eurostat comparisons are required to supply Eurostat with all the detail necessary to evaluate the quality of the basic information reported for a comparison. Specifically, countries are expected to provide Eurostat with an inventory of their sources and methods which will allow Eurostat to assess whether the procedures used by the NSIs meet minimum quality standards and are comparable across countries. Countries are also expected to prepare a report after each price survey that will enable Eurostat to assess the quality of the price collection and the subsequent validation of the prices collected.

How often are comparisons made and the results updated?

39. Eurostat comparisons are made every year (t, t+1, t+2, etc.) and cover 37 countries. Results are disseminated through the Eurostat public database. Joint Eurostat-OECD comparisons are made every three years (t, t+3, t+6, etc.) and cover 47 countries. Results are disseminated through the OECD public database.

40. For the years between joint comparisons (t+1, t+2, t+4, etc.) and for joint comparison years (t, t+3, t+6, etc.) before comparison results are available, the OECD uses global extrapolation to estimate PPPs for GDP, actual individual consumption and individual consumption expenditure by households for the ten countries that participate in the joint comparisons but are not covered in the Eurostat comparisons. The extrapolated PPPs are linked to the PPPs calculated by Eurostat for the three aggregates to provide annual PPPs for the aggregates for all countries covered by the joint comparison. These annual PPPs, and the PLIs and volume measures to which they give rise, are disseminated through the OECD public database.

41. Eurostat first estimates and releases PPPs for the reference year t in June of t+1. Later in t+1, these preliminary PPPs are recalculated with updated price and expenditure data to provide provisional PPPs for t. The provisional PPPs are released in December of t+1. Subsequently, in t+2, the provisional PPPs are recalculated, with updated data to obtain intermediate PPPs for t. The intermediate PPPs are released in December of t+2. They, in their turn, are recalculated with updated data in t+3 to produce the final PPPs for t. The final PPPs are released in December of t+3. They are not recalculated even when the data on which they are based have been revised.

42. The OECD calculates and releases provisional estimates of joint comparison PPPs for the reference year t in December of t+1. These provisional PPPs are recalculated with updated and revised price and expenditure data during t+2 to produce final PPPs for t. The final PPPs are released in December of t+2. They are not recalculated, but they are adjusted to accommodate the final PPPs for t that Eurostat releases in December of t+3.

What data are published?

43. Results of Eurostat comparisons are disseminated through the Eurostat public database and results of joint Eurostat-OECD comparisons are disseminated through the OECD public database. Eurostat comparisons are conducted annually, cover 37 countries, have the European Union as reference and purchasing power standards (PPS) as numéraire. Joint comparisons are carried out

every three years, cover 47 countries, have the OECD as reference and the OECD dollar as numéraire. Results are presented both for individual participating countries and for groups of countries such as the euro area, the European Union and the OECD.

44. For the presentation of results, GDP expenditures are broken down into analytical categories. The aggregation level of an analytical category varies. For example, main aggregates such as GDP and actual individual consumption are analytical categories, but so too are expenditure groups such as food, clothing and transport, and expenditure classes such as meat, alcoholic beverages and personal transport equipment. Eurostat uses 60 analytical categories, the OECD 49 (of which 46 are the same as Eurostat). The level of detail at which the results are published is determined inter alia on the basis of an assessment of the reliability of the data.

45. Results presented by analytical categories include: PPPs, national expenditures at national price levels in national currencies, PLIs, real expenditures and real expenditure per capita in PPS and OECD dollars, indices of real expenditure and real expenditure per capita levels, and PLIs.

46. Eurostat and OECD both maintain on their websites dedicated pages to PPPs in which links to the latest data, publications, metadata and other material, including product lists, can be found:

- http://epp.eurostat.ec.europa.eu/portal/page/portal/purchasing_power_parities/introduction
- http://www.oecd.org/std/prices-ppp

Which measure to use to compare material well-being?

47. GDP is a measure of production but it can also be defined as the sum of all final expenditures incurred by the country's resident institutional sectors during the accounting period which, in the case of Eurostat and OECD comparisons, is a year. GDP is widely used to compare the economic size of countries and GDP per capita is frequently used to compare the material well-being of their resident households. While GDP is a good indicator of the level of economic activity, it is not an accurate measure of material well-being, when material well-being is defined in terms of individual goods and services consumed by households (that is, the goods and services that households consume to satisfy their individual needs). This is because GDP covers not only individual goods and services but also collective services provided to the community by government, capital goods and net exports.

48. Individual consumption expenditure by households is defined as the final consumption expenditure incurred by households on individual goods and services. In other words, it covers only the goods and services that households purchase to satisfy their individual needs. Even so, it is not a good measure for comparing material well-being between countries because it covers only the purchase of individual services by households and does not include the provision of individual services, particularly health and education services, to households by government and NPISHs.

49. In some countries, government and NPISHs provide the greater part of health and education services and these expenditures are included in the individual consumption expenditure of government and the individual consumption expenditure of NPISHs. In other countries, households purchase nearly all health and education services from market producers and these expenditures are included in the individual consumption expenditure of households. Under these circumstances, individual consumption expenditure by households is not the correct measure with which to compare the volumes of individual goods and services actually consumed by households in different countries. Households in countries where government and NPISHs are the main providers of individual services will appear to consume a smaller volume of goods and services than households in countries where the households themselves pay directly for the bulk of these services. This can be avoided by comparing the actual individual consumption of countries.

50. Actual individual consumption is defined as individual consumption expenditure by households plus individual consumption expenditure by government plus individual consumption expenditure by NPISHs. Of the three national accounting aggregates discussed, it is the best measure of material well-being. This it because it comprises only the goods and services that households actually consume to satisfy their individual needs. It covers all such goods and services irrespective of whether they are purchased by the households themselves or are provided as social transfers in kind by government and NPISHs.

What are purchasing power standards (PPS) and OECD dollars?

51. PPS and OECD dollars are the artificial reference currency units in which the PPPs and real expenditures for the European Union and the OECD are expressed.

52. PPS are euros valued at average EU price levels, that is, they are euros that have the same purchasing power over the whole of the European Union. Their purchasing power is a weighted average of the purchasing power of the national currencies of EU Member States. They reflect the average price level in the European Union or, more precisely, the weighted average of the price levels of Member States. PPS are defined by equating the total real expenditure of the European Union on a specific basic heading, aggregation level or analytical category to the total nominal expenditure of the European Union on the same basic heading, aggregation level or analytical category.

53. Similarly, OECD dollars are US dollars valued at average OECD price levels. In other words, they are US dollars that have the same purchasing power over the whole of the OECD. Their purchasing power is a weighted average of the purchasing power of the national currencies of OECD Member Countries. They reflect the average price level in the OECD or, more precisely, the weighted average of the price levels of Member Countries. OECD dollars are defined by equating the total real expenditure of the OECD on a specific basic heading, aggregation level or analytical category to the total nominal expenditure of the OECD on the same basic heading, aggregation level or analytical category.

How to get access to more data?

54. Eurostat and the OECD disseminate comparison results – that is, the PPPs, PLIs, volume indices and expenditure weights for analytical categories – through their public databases. All users have free access to these data.

55. Underlying the comparison results are other data that users would like to access. Data such as the average prices used to calculate the PPPs, the individual price observations from which the average prices are derived, the detailed definitions of the products for which the price observation were collected and the PPPs, PLIs, volume measures and expenditure weights for basic headings (the lowest aggregation level for which PPPs are calculated).

56. Only Eurostat has access to individual price observations. There are no exceptions to this, as individual price observations are covered by confidentiality restrictions. Only Eurostat, the OECD and the NSIs of participating countries have unrestricted access to average prices, detailed product definitions and basic heading data, but other users can obtain special access rights under certain conditions.

57. The users that can obtain special access rights are those in Commission services (other than Eurostat), in OECD directorates (other than the Statistics Directorate), in government departments of participating countries and in research institutes. Special access rights have to be applied for. This involves providing a project description to Eurostat or the OECD that specifies the data requested and how they will be used and then, if the project is considered worthwhile, signing a declaration that states that the data will not be made public in any form and that the results of the research will not be published in more detail than the analytical category level.

58. The responsibility for granting special access rights is shared between the NSIs of participating countries, Eurostat and the OECD depending on the number of countries involved and on whether the countries are coordinated by Eurostat or by the OECD.

1

Purpose of the Eurostat-OECD PPP Programme

1.1 Introduction

1.1 The Eurostat-OECD PPP Programme was established in the early 1980s to compare on a regular and timely basis the GDPs of the Member States of the European Union and the Member Countries of the OECD. This remains the purpose of the Programme, although its coverage has been broadened to include countries that are not members of either the European Union or the OECD. These are either countries that have applied to join the European Union or the OECD or countries with which Eurostat and the OECD have programmes of technical cooperation in statistics. A brief history of the Programme can be found in Annex I.

1.2 The object of the Programme is to compare the price and volume levels of GDP and its component expenditures across participating countries. Before such comparisons can be made, it is first necessary to express the GDPs – which are in national currencies and valued at national price levels - in a common currency at a uniform price level. Eurostat and the OECD use purchasing power parities (PPPs) to effect this double conversion.

1.3 This chapter sets out the background to the international comparisons of GDP organised by Eurostat and the OECD. It opens with a discussion on GDP as a measure of well-being and then describes the approach to GDP comparisons followed by Eurostat and the OECD. It explains what PPPs are and why they and not exchange rates are employed to make the comparisons. It closes with a review of the uses and users of PPPs and of the points to remember when applying the price and volume measures to which they give rise.

1.2 General approach

1.2.1 Gross domestic product (GDP)

1.4 GDP is a measure of production. It is the sum of the value added generated by producers residing in the economic territory of a country during the accounting period which is usually a calendar year or a quarter.[1] GDP is widely used by academics, policy-makers, politicians, journalists, businessmen, financiers and the general public as an indicator of economic activity. When placed on a per capita basis, it is also used as an indicator of economic welfare or material well-being despite the caveats of its compilers.[2] Historically there has tended to be a positive correlation between what is measured by the GDP and other measures of economic and social welfare both over time and across socio-economic groups - wealthier has usually meant healthier, better educated and a less inequitable income distribution – and GDP has become to be regarded as a proxy for a society's well-being and development.

1.5 GDP is a summary measure. It does not say anything about the distribution of income within a country. Nor does it show whether growth is the result of increased spending on defence or police or increased spending on education or health. In addition, the coverage of GDP is continually being debated. For instance, should it include housework and other services produced by households for their own consumption and should it be reduced because of environment deterioration and the depletion of subsoil assets. GDP, while a good indicator of economic performance, is not an accurate measure of economic welfare.[3] To be so, it either needs to be adapted, thereby possibly reducing its usefulness as a measure of economic activity, or to be complemented with indicators that are better suited to the measurement of well-being. The preferred option of most users, and the focus of international initiatives to bring it about, is the development of complementary measures.[4]

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1 For international price and volume comparisons of GDP the accounting period is generally a calendar year.

2 See, for example, paragraphs 1.68 to 1.82 of the SNA 93 or paragraphs 1.75 to 1.84 of the SNA 2008 on the system of national accounts and measures of welfare.

3 For a recent overview of the limitations of GDP see Report by the Commission on the Measurement of Economic Performance and Social Progress, Stiglitz/Sen/Fitoussi, 2008, http://www.stiglitz-sen-fitoussi.fr/en/index.htm.

4 See the communication of the European Commission GDP and Beyond: Measuring Progress in a Changing World, 2009, http://www.beyond-gdp.eu/.

1.6 GDP can be seen as one of a family of indicators that are to be developed to monitor overall social progress as well as the specific elements that constitute well-being. But it is not necessarily the best national accounting aggregate for this purpose. Not only does it cover the goods and services that resident households consume to satisfy their individual needs, it also includes services, such as defence, police and fire protection, that government produces to meet the collective requirements of the community, as well as gross capital formation and net exports neither of which constitute final consumption. A better measure of material well-being is the aggregate actual individual consumption (AIC).[5] This comprises only the goods and services that households actually consume to satisfy their individual needs. It covers all such goods and services irrespective of whether they are purchased by the households themselves or are provided as social transfers in kind by government and non-profit institutions serving households (NPISHS). Eurostat and OECD comparisons are organised so that both the GDP and the AIC of participating countries can be compared.

1.7 GDP can be estimated using three alternative approaches which yield the same result in theory. These can broadly be described as: the production approach – which sums all the value added generated by the country's resident institutional sectors[6] during the accounting period; the expenditure approach – which sums all the final expenditures incurred by the country's resident institutional sectors during the accounting period; and the income approach – which sums all the factor incomes paid by the country's resident institutional sectors engaged in domestic production during the accounting period. Price and volume comparisons of GDP are based on the identity: **value = price x volume**. The values of income aggregates, unlike the values of production and expenditure aggregates, cannot be split into meaningful price and volume components. Price and volume comparisons of GDP can only be made from the production side or the expenditure side.

1.2.2 Eurostat-OECD approach

1.8 Eurostat and OECD comparisons are made from the expenditure side which identifies the components of final demand: consumption, investment and net exports. The reasons for this are: the inherent usefulness of making comparisons from the expenditure or demand side; the difficulties of organising comparisons from the production or supply side which require data for both intermediate consumption and gross output in order to effect double deflation; and the generally better comparability among countries of their detailed breakdowns of GDP expenditures. The disadvantage of the expenditure approach is that, although it enables levels and structures of consumption and investment to be compared, it does not identify individual industries and productivity comparisons can be made only at the level of the whole economy. To compare productivity at the industry level, international comparisons of GDP have to be made from the production side.[7]

1.9 GDP expenditure values are made up of two components: price and volume. Comparing the expenditure values of countries will not provide a comparison of the volumes of goods and services purchased in countries unless the price level differences that exist between them have been eliminated. This is exactly the same problem faced in making comparisons over time for a single country where changes in values due to price movements are removed by using a *constant* set of prices. Differences in price levels between countries can be removed either by observing the volumes directly or by deriving them indirectly using a measure of relative prices to place the expenditures of all the countries on the same price level. Prices are easier to observe than volumes and direct measures of relative prices usually have a smaller variability than direct measures of relative volumes. In Eurostat and OECD comparisons volumes are mostly estimated indirectly. The exceptions are the volumes for education and, for some countries, housing.

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5 This concept, or its equivalent, has been used in international comparisons of GDP based on PPPs since the 1950s. It was not until the 1990s that it was adopted by national accountants and included in the international system of national accounts.

6 These are non-financial corporations, financial corporations, general government, households and NPISHS.

7 Such as those made for the EU KLEMS Project to compare productivity at the industry level in the European Union. The project ran from 2003 to 2008. For methodology and results consult http://www.euklems.net/. See also "Purchasing Power Parity Measurement for Industry of Origin Analysis", B. Van Ark, A. Maddison and M. P. Timmer, *The ICP Bulletin*, Volume 5, Number 1, pages 29-34, March 2008 at: http://siteresources.worldbank.org/ICPINT/Resources/270056-1208272795236/ICP_bulletin_03-04_web.pdf

1.10 International volume comparisons of GDP depend on four conditions being met. These are:

- the definition of GDP is the same;
- the measurement of GDP is the same;
- the currency unit in which GDP is expressed is the same; and
- the price level at which GDP is valued is the same.

GDP estimates of countries participating in Eurostat and OECD comparisons generally meet the first condition as they are compiled in line with one of the two complementary international systems of national accounts: the SNA 93[8] or the ESA 95[9]. Both systems have been updated without affecting their compatibility. Most, if not all, participating countries will have switched to one of the revised versions - either the SNA 2008[10] or the ESA 2010[11] - by 2014.

1.11 Whether the second condition is met depends on the degree in which countries are successful in measuring the non-observed economy.[12] Obtaining exhaustive estimates of GDP from all participating countries has to be a long-term endeavour. To this end, Eurostat has worked successfully over the last thirty years with EU Member States to improve the comparability of their GDP estimates. And the OECD published a handbook[13] in 2002 that provides national accountants with guidelines on how to measure the non-observed economy. It draws heavily on the experience of Eurostat among others.

1.12 The third condition of a common currency unit is not met other than by the countries in the euro area. The GDP estimates of the majority of participating countries are expressed in different national currencies. Nor is the fourth condition met as the GDP estimates of participating countries, including those of the countries in the euro area, are valued at national price levels. To meet these last two conditions it is necessary to have conversion rates that both convert to a common currency and equalise the purchasing power of different currencies in the process of conversion. Such conversion rates are called purchasing power parities or PPPs. Eurostat and OECD comparisons are made using PPPs.

8 *System of National Accounts 1993,* Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

9 *European System of Accounts 1995,* Eurostat, Luxembourg, 1996.

10 *System of National Accounts 2008,* Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, New York, 2009. http://unstats.un.org/unsd/nationalaccount/sna2008.asp

11 European System of Accounts 2010, Eurostat, Luxembourg, 2011.

12 The non-observed economy comprises activities that are hidden because they are illegal or because they are legal but carried out clandestinely or because they are undertaken by households for their own use. It also covers activities that are missed because of deficiencies in the statistical system. Such deficiencies include out-of-date survey registers, surveys having too high reporting thresholds or high rates of non-response, poor survey editing procedures, no surveying of informal activities such as street trading, etc.

13 *Measuring the Non-Observed Economy – A Handbook*, Organisation for Economic Co-operation and Development, International Labour Organisation, International Monetary Fund, Statistical Committee of the Commonwealth of Independent States, Paris, 2002.

1.3 Exchange rates and PPPs

1.3.1 Exchange rates

1.13 Exchange rates were used to make international comparisons of GDP before PPPs became available. Their use was underpinned by the theory of purchasing power parity in international economics. In its simplest form, the theory suggests that national price levels converted to a common currency using exchange rates should be equal. Arbitrage will ensure that the price of an individual good will be the same in all countries in which it is traded – *the law of one price*. Hence, when the individual goods are taken together, there will be high correlation in general price levels – at least in the medium and long term. The two principle assumptions underlying the theory are that all goods are internationally tradable and that the demand and supply for currency is driven entirely by international trade in goods.

1.14 Exchange rates are determined by the supply and demand for different currencies. But the supply and demand for currencies are influenced by factors such as currency speculation, interest rates, government intervention and capital flows between countries rather than by the currency requirements of international trade. Moreover, many goods and services, such as buildings, all government services and most market services, are not traded internationally. For these reasons, exchange rates do not reflect the relative purchasing powers of currencies in their national markets. Hence, while exchange rates provide GDP estimates that satisfy the third condition of being expressed in the same currency unit, they do not provide GDP estimates that satisfy the fourth condition of being valued at the same price level.

Box 1.1: Exchange rates or PPPs

1. The ratio of the GDPs of two countries when both GDPs are valued at national price levels and expressed in national currencies has three component ratios:

   GDP ratio = price level ratio x volume ratio x currency ratio (or exchange rate) (1)

2. When converting the GDP ratio in (1) to a common currency using exchange rates – that is, by dividing through by the currency ratio – the resulting GDP_{XR} ratio remains with two component ratios:

   GDP_{XR} *ratio = price level ratio x volume ratio* (2)

   The GDP ratio in (2) is expressed in a common currency, but it reflects both the price level differences and the volume differences between the two countries.

3. A PPP is defined as both a currency converter and a spatial price deflator. It comprises two component ratios:

   PPP = price level ratio x currency ratio (or exchange rate) (3)

4. When converting the GDP ratio in (1) to a common currency using a PPP – that is, by dividing through by (3) – the resulting GDP_{PPP} ratio has only one component ratio:

   GDP_{PPP} *ratio = volume ratio* (4)

   The GDP ratio in (4) is expressed in a common currency, is valued at a uniform price level, and reflects only volume differences between the two countries.

5. When the GDPs of two countries are valued at national price levels but expressed in a common currency, as, for example, in the euro area, the GDP ratio still has three component ratios one of which, the currency ratio, equals 1:

   GDP ratio = price level ratio x volume ratio x currency ratio or 1

   Similarly, the PPP still has two component ratios:

   PPP = price level ratio x currency ratio or 1

   But, as the currency ratio equals 1, the PPP is, in effect, simply a spatial price deflator.

1.15 Consequently, as explained in Box 1.1, GDPs of countries converted to a common currency with exchange rates reflect not only differences in the volumes produced in the countries, but also differences in the price levels of the countries. In other words, though shown in the same currency, they remain valued at national price levels. As such, they are nominal measures and measures of value. PPPs, on the other hand, are conversion rates that are both currency converters and price deflators. Therefore, as shown in Box 1.1, GDPs of countries converted to a common currency using PPPs are also valued at a uniform price level. They reflect only differences in the volumes of goods and services produced in countries. As such they are real measures and measures of volume.

1.16 Box 1.2 illustrates why PPPs rather than exchange rates should be used for international comparisons of volume. It shows the GDPs of the United States and Japan expressed as a percentage of the GDP for the 27 countries that are members of the European Union – the EU27 - for the reference years 1996, 1999, 2002, 2005 and 2008. There are two sets of percentages: one based on exchange rate converted data, the other based on PPP converted data. It also gives the average annual volume growth rates for five periods: 1996-2008, 1996-1999, 1999-2002, 2002-2005 and 2005-2008.

Box 1.2: GDP levels and growth rates of the United States, Japan and the EU27

Percentage with exchange rate converted GDPs	**1996**	**1999**	**2002**	**2005**	**2008**
- EU27	100	100	100	100	100
- United States	83	102	113	91	78
- Japan	50	48	42	33	27
Percentage with PPP converted GDPs	**1996**	**1999**	**2002**	**2005**	**2008**
- EU27	100	100	100	100	100
- United States	89	94	91	95	89
- Japan	34	31	29	29	27
Average annual volume growth rates	**1996-2008**	**1996-1999**	**1999-2002**	**2002-2005**	**2005-2008**
- EU27	2.3	2.7	2.5	1.8	2.2
- United States	3.0	4.4	3.0	2.7	1.9
- Japan	1.1	0.5	0.8	1.6	1.3

1.17 It appears from the exchange rate converted data that in 1996 the GDP of the EU27 was 17 per cent larger than that of the United States and 50 per cent larger than that of Japan. The PPP converted data show the GDP of the EU27 to have been only 11 per cent larger than the GDP of the United States, but 66 per cent larger than the GDP of Japan. Similar contrary differences between the two sets of percentages exist for 1999, 2002, 2005 and 2008. For example, the exchange rate converted data show the GDP of the United States to have been bigger than that of the EU27 in 1999 and 2002, yet the PPP converted data continue to show it as being smaller, which is in line with the average annual volume growth rates for 1996-1999 and 1999-2002.

1.18 The average annual volume growth rates for 1996-2008 show that the economy of the United States grew faster than that of the EU27, except in the last three years, 2005-2008. Yet from the exchange rate converted data, it seems that the GDP of the United States became smaller relative to the GDP of the EU27: in 1996, the GDP of the United States was 83 per cent of that of the EU27, in 2008 it was 78 per cent. The PPP converted data show the relative sizes of the two economies as remaining unchanged. From 2002 to 2005, the average annual volume growth rates for Japan and the EU27 were much the same being 1.6 and 1.8 per cent respectively. Yet the exchange rate converted data show Japan's GDP relative to that of the EU27 as having fallen from 42 per cent to 33 per cent. The PPP converted data reflect that the GDPs of Japan and the EU27 grew at similar rates. The changes in the relative sizes of the three economies over the five periods as measured by exchange rate converted data are not consistent with their relative growths for the same periods, whereas the changes as measured by PPP converted data generally are.

1.19 Exchange rate converted data are usually misleading on the relative sizes of economies. Price levels are usually higher in high-income countries than they are in low-income countries. If no account is taken of this when converting the GDPs of countries to a common currency, then the size of high-income countries will be overstated and the size of low-income countries will be understated. This is called the Penn effect.[14] It can be explained by the Harrod-Balassa-Samuelson hypothesis[15] and the distinction between tradable products and non-tradable products. The prices of tradable products will basically be determined by the law of one price because if a country prices its tradables too high they will not be sold. Prices for non-tradable products are determined by local circumstances, in particular productivity, which is generally higher in high-income countries. Price level differences between countries are therefore greater for non-tradables than they are for tradables.

1.20 Currency conversions made with exchange rates do not take account of the larger price level differences between countries for non-tradable products. Hence, as demonstrated in Box 1.3, they overstate the size of economies with relatively high price levels and understate the size of economies with relatively low price levels.

[14] The economic finding associated with the Penn World Tables. See "The Penn World Table (Mark 5): An expanded set of international comparisons, 1950-1988", R. Summers and A. Heston, *Quarterly Journal of Economics*, Volume 106, Number 2, pages 327-368, May 1991. The Penn World Tables can be found at: http://pwt.econ.upenn.edu/php_site/pwt_index.php

[15] See *International Economics*, R. Harrod, Cambridge University Press, 1939; "The Purchasing Power Doctrine: A Reappraisal", B. Balassa, *Journal of Political Economy*, Volume 72, Number 6, pages 584-596, 1964; and "Theoretical Notes on Trade Problems", P. A. Samuelson, *Review of Economics and Statistics*, Volume 46, Number 2, pages 145-154, 1964.

Box 1.3: Price levels and indices of nominal and real GDP for the 27 EU countries in 2008

Country (27)	Price levels	Nominal GDP (%)	Real GDP (%)	Nominal GDP per capita	Real GDP per capita
Denmark	138	1.9	1.4	170	123
Ireland	122	1.4	1.2	162	133
Finland	118	1.5	1.3	139	118
Sweden	117	2.7	2.3	144	122
Luxembourg	116	0.3	0.3	324	280
France	114	15.6	13.7	121	107
Belgium	112	2.8	2.5	129	115
Austria	109	2.3	2.1	136	124
Netherlands	108	4.8	4.4	145	134
Germany	104	19.9	19.1	121	116
United Kingdom	103	14.5	14.1	118	115
Italy	101	12.5	12.4	105	104
EU27	**100**	**100**	**100**	**100**	**100**
Spain	92	8.7	9.4	95	103
Greece	90	1.9	2.1	84	93
Cyprus	89	0.1	0.2	87	97
Portugal	83	1.4	1.7	65	78
Slovenia	81	0.3	0.4	74	91
Malta	72	0.0	0.1	56	77
Latvia	72	0.2	0.3	41	56
Estonia	71	0.1	0.2	48	68
Czech Republic	70	1.2	1.7	57	81
Poland	68	2.9	4.3	38	56
Slovakia	66	0.5	0.8	48	72
Hungary	66	0.9	1.3	42	64
Lithuania	63	0.3	0.4	38	61
Romania	56	1.1	2.0	26	47
Bulgaria	43	0.3	0.7	19	44

- Price levels are the PPPs divided by exchange rates. The indices of nominal GDP and nominal GDP per capita are based on exchange rate converted data. The indices of real GDP and real GDP per capita are based on PPP converted data.
- When the price level is above 100, the indices of nominal GDP and nominal GDP per capita are higher than the indices of real GDP and real GDP per capita. When the price level is below 100, the indices of nominal GDP and nominal GDP per capita are lower than the indices of real GDP and real GDP per capita.
- The differences between the per capita indices of nominal and real GDP are even more marked. There are changes in ranking. The relative difference between countries also changes. The gap between high income countries and low income countries is much smaller with the per capita indices of real GDP.

Notes on Trade Problems, P. A. Samuelson, *Review of Economics and Statistics*, Volume 46, Number 2, pages 145-154, 1964.

1.3.2 Purchasing power parities (PPPs)

1.21 In their simplest form PPPs are nothing more than price relatives that show the ratio of the prices in national currencies of the same good or service in different countries.16 For example, if the price of a hamburger in France is 2.84 euros and in the United States it is 2.20 dollars, the PPP for hamburgers between France and the United States is 2.84 euros to 2.20 dollars or 1.29 euros to the dollar. In other words, for every dollar spent on hamburgers in the United States, 1.29 euros would have to be spent in France to obtain the same quantity and quality – or volume - of hamburgers.17 To compare the volumes of hamburgers purchased in the two countries, either the expenditure on hamburgers in France can be converted to dollars by dividing it by 1.29 or the expenditure on hamburgers in the United States can be converted to euros by multiplying it by 1.29.

1.22 PPPs are not only calculated for individual goods and services, they are also calculated for product groups and for each of the various levels of aggregation up to and including GDP.18 The calculation is made in three stages. The first is at the product level, where price relatives are calculated for individual goods and services. The second is at the product group level, where the price relatives calculated for the products in the group are averaged, usually without weights, to obtain PPPs for the group. And the third is at the aggregation levels, where the PPPs for the product groups covered by the aggregation level are weighted and averaged to obtain weighted PPPs for the aggregation level. The weights used to aggregate the PPPs in the third stage are the expenditures on the product groups. In principle, it would be desirable to weight the price relatives within product groups, but the expenditure data required to do this are not available generally.

1.23 PPPs are still price relatives whether they refer to a product group, an aggregation level or to GDP. It is just that in moving up the hierarchy of aggregation the price relatives refer to increasingly complex assortments of goods and services. Thus, if the PPP for GDP between France and the United States is 0.97 euros to the dollar, it can be inferred that for every dollar spent on the GDP in the United States, 0.97 euros would have to be spent in France to purchase the same volume of goods and services. Purchasing the “same volume of goods and services” does not mean that identical baskets of goods and services will be purchased in both countries. The composition of the baskets will vary between countries and reflect differences in tastes, cultures, climates, price structures, product availability and income levels, but both baskets will, in principle, provide equivalent satisfaction or utility.

1.24 PPPs are defined throughout this manual as being both currency converters and spatial price deflators as this is the definition that applies for the majority of countries participating in Eurostat and OECD comparisons. When countries share a common currency, as do the countries of the euro area, there is no need to convert to a common currency and, as explained in Box 1.1, PPPs can be defined simply as spatial price deflators. This definition also applies to PPPs calculated for regions within a country. It is important to recognise that having the same currency does not necessarily mean having the same price level.19 PPPs are still required.

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16 A well-known example of a one product PPP is that underlying the BigMac currency index of *The Economist*. Presented by the journal as *burgernomics*, the BigMac PPP is defined as “the exchange rate that would mean hamburgers cost the same in America as abroad”. The PPPs calculated by Eurostat and the OECD include hamburgers but also the prices of several hundred other goods and services. As might be expected, burgernomics provides a poor guide to overall price levels as measured by the Eurostat-OECD PPP Programme.

17 The link between quantity, quality and volume is explained in paragraphs 16.11 and 16.12 of the SNA 93.

18 For example, from *hamburgers* to *restaurant services,* from *restaurant services* to *catering services*, from *catering services* to *catering and accommodation services*, from *catering and accommodation services* to *individual consumption expenditure by households* and from *individual consumption expenditure by households* to *GDP*.

19 See “Does One Currency Mean One Price? An Analysis of the Euro Effect on Price Dispersion and Convergence”, Joanna Wolszczak-Derlacz, *Eastern European Economics*, Volume 28, Issue 2, pages 87-114, 2010.

1.3.3 Price, volume and value measures

1.25 PPPs are used to convert national expenditures[20] on product groups, aggregates and GDP of different countries into real expenditures. The expenditures are real because, as explained earlier, in the process of being converted to a common currency, they are valued at a uniform price level and so reflect only differences in the volumes purchased in countries. They are the spatial equivalent of a time series of GDP for a single country expressed in prices of a fixed reference year or in constant prices. PPPs and real expenditures provide the price and volume measures required for international comparisons. The PPPs and real expenditures for GDP are undoubtedly the most important, but the PPPs and real expenditures below the level of GDP are also useful in their own right. With them international comparisons of price and volume levels can be made for product groups and aggregates as well as for GDP.

Box 1.4: Price, volume and value measures for the EU27, the United States and Japan, GDP, 2008

Row	Series	EU27	United States	Japan
1	GDP at national price levels in national currencies (billions)	12493	14297	505112
2	Population (millions)	498.7	304.8	127.5
3	Exchange rate (1 euro = ... units of national currency)	1.00	1.46	151
4	PPPs for GDP (1 euro = ... units of national currency)	1.00	1.28	150
5	Real GDP at a uniform price level in euros (billions)	12493	11156	3373
6	Real GDP per capita at a uniform price level in euros	25051	36598	26455
7	Indices of real GDP (EU27 = 100)	100	89	27
8	Indices of real GDP per capita (EU27 = 100)	100	146	106
9	PLIs for GDP (EU27 = 100)	100	87	99
10	Nominal GDP at national price levels in euros (billions)	12493	9760	3336
11	Nominal GDP per capita at national price levels in euros	25051	32018	26164
12	Indices of nominal GDP (EU27 = 100)	100	78	27
13	Indices of nominal GDP per capita (EU27 = 100)	100	128	104

Figures have been rounded.

- Row 5: The GDPs in row 1 divided by the corresponding PPP for GDP in row 4.
- Row 6: The real GDPs in row 5 divided by the corresponding population in row 2.
- Row 7: The real GDPs in row 5 divided by the real GDP for EU27 in row 5.
- Row 8: The real GDPs per capita in row 6 divided by the real GDP per capita for EU27 in row
- Row 9: The PPPs for GDP in row 4 divided by the corresponding exchange rate in row 3.
- Row 10: The GDPs in row 1 divided by the corresponding exchange rate in row 3.
- Row 11: The nominal GDPs in row 10 divided by the corresponding population in row 2.
- Row 12: The nominal GDPs in row 10 divided by the nominal GDP for EU27 in row 10.
- Row 13: The nominal GDPs per capita in row 11 divided by the nominal GDP per capita for

[20] Final expenditures valued at national price levels and expressed in national currencies.

1.26 Box 1.4 shows estimates of GDP expenditures at national price levels in national currencies for the EU27[21], the United States and Japan in 2008. It also shows the estimates after they have been converted to real expenditures and the PPPs used to convert them. Three sets of indices have been derived using these data, the population data and the exchange rates, namely:

- *Indices of real expenditure*: These are measures of volume. They reflect the relative magnitudes of the product groups or aggregates being compared. At the level of GDP they are used to compare the economic size of countries.
- *Indices of real expenditure per capita*: These are standardised measures of volume. They reflect the relative levels of the product groups or aggregates being compared after adjusting for differences in the size of populations between countries. At the level of GDP they are often used to compare the economic well-being of populations.
- *Price level indices* (PLIs): These are the ratios of PPPs to exchange rates. They provide a measure of the differences in price levels between countries by indicating for a given product group or aggregate the number of units of common currency needed to buy the same volume of the product group or aggregate in each country.[22] At the level of GDP they provide a measure of the differences in the general price levels of countries.

1.27 The indices have the EU27 as base or reference country[23] - that is, the EU27 = 100. But they are not affected by the choice of reference country and can be rebased on the United States or on Japan. The method used by Eurostat and the OECD to calculate and aggregate PPPs provides PPPs that are invariant to the country, or group of countries, chosen as base country. The base country serves as a point of reference only. The PPPs are also transitive. Transitivity is the property where the direct PPP between each pair of countries is equal to the indirect PPP derived via any third country. For example, in the case of the three countries A, B and C, the ratio of the PPP between A and B and the PPP between C and B is equal to the PPP between A and C: in other words, $PPP_{A/B} / PPP_{C/B} = PPP_{A/C}$.

1.28 If exchange rates are used instead of PPPs, the estimates of GDP expenditures at national price levels in national currencies for the EU27, the United States and Japan in row 1 of Box 1.4 are converted to the nominal expenditures shown in row 10 of the Box. Although these nominal expenditures are expressed in a common currency, the euro, they are still valued at *national price levels* and continue to reflect the differences in price levels between the EU27, the United States and Japan. They are the spatial equivalent of a time series of GDP for a single country expressed in *current prices*. Nominal expenditures give rise to two sets of indices, namely: *indices of nominal expenditure* and *indices of nominal expenditure per capita*. The indices are measures of value. They are not measures of volume and should not be used as such.

[21] By convention the euro is the "national" currency for the EU27. As only seventeen Member States use the euro as their national currency, the GDPs of the other ten Member States, which are in national currencies, have first to be converted into euros using exchange rates before being added to the GDPs of the other seventeen countries to obtain GDP for the EU27 in euros.

[22] From the PPPs in Box 1.4, it can be seen that if a given volume of GDP costs 100 euros in the EU27, it costs 128 US dollars in the United States and 15,000 yen in Japan. To compare these prices, it is first necessary to express them in a common currency by converting them to euros using the exchange rates in Box 1.4. The PLIs so derived show that if a given volume of GDP costs 100 euros in the EU27, it costs 87 euros in the United States and 99 euros in Japan. In other words, the general price level of the EU27 is higher than that of the United States and Japan, but only marginally so in the case of Japan.

[23] The term *reference country*, as used in the manual, can refer to a single country such as the United States or to a group of countries such as the EU27 or the OECD.

1.4 Using PPPs

1.4.1 Uses and users of PPPs

1.29 PPPs are used for research and analysis, for statistical compilation and for administrative purposes. Their users include the European Commission, the International Monetary Fund (IMF), the OECD, the United Nations and the World Bank at the international level and government agencies, universities and research institutes, public and private enterprises, financial institutions, the press and individuals at the national level.

1.30 International organisations, government agencies, universities and research institutes use PPPs as inputs into economic research and policy analysis involving cross-country comparisons of macroeconomic aggregates. In such research and analysis, PPPs are employed either to generate volume measures with which to compare the size of economies and their levels of economic welfare, consumption, investment, government expenditure and overall productivity or to generate price measures with which to compare price levels, price structures, price convergence and competitiveness. Politicians and journalists use PPPs in both these ways in their commentaries on economic and social policy.

1.31 Public enterprises apply PPPs when comparing their prices and operating costs with those of similar public enterprises in other countries. Private firms operating in different countries apply PPPs for the purposes of comparative analysis involving prices, sales, market shares and production costs. Banks employ PPPs in economic analysis and in the monitoring of exchange rates. Individuals often refer to PPPs in salary negotiations when moving from one country to another (as do the personnel managers with whom they are negotiating).

1.32 International organisations use the real expenditures generated by PPPs for statistical purposes. Real GDP and its components are aggregated across countries to provide totals for groups of countries, such as the euro area, the European Union and the OECD. Country shares in these totals are used as weights when economic indicators, such as price indices or growth rates, are combined to obtain averages for groups of countries.

1.33 The European Commission and the IMF employ PPPs for administrative purposes. The European Commission uses the PPPs of Member States when allocating the structural funds. The overall aim of the fund is to gradually reduce economic disparities between Member States. The Funds account for some 30 per cent of the EU budget and the principal indicator determining the allocation is PPP-deflated intra-country regional GDP per capita. The IMF uses PPPs when deciding on the quota subscriptions of member countries.[24] A country's quota subscription determines the financial resources it is obliged to provide the IMF, the amount of financing that it can obtain from the IMF, its share in a general allocation of special drawing rights and its voting power in IMF decisions. The weight of GDP in the quota formula is 50 per cent and GDP is an average of GDP converted with exchange rates (with a weight of 60 per cent) and GDP converted with PPPs (with a weight of 40 per cent).[25]

[24] See Mick Silver, "IMF Applications of Purchasing Power Parity Estimates", IMF Working Paper, 2010, at: http://www.imf.org/external/pubs/ft/wp/2010/wp10253.pdf

[25] Both the European Commission and the IMF use a three-year average of GDP to limit the impact of single years.

1.4.2 Points to remember when using PPPs

1.34 PPPs are statistical constructs rather than precise measures. While they provide the best available estimate of the size of a country's economy and of its general price level in relation to the other countries in the comparison, they are, like all statistics, point estimates lying within a range of estimates – the *error margin* – that includes the true value. The error margins surrounding PPPs depend on the reliability of the expenditure weights and the price data as well as to the extent to which the particular goods and services selected for pricing by participating countries actually represent the price levels in each country. As with national accounts data generally, it is not possible to calculate precise error margins for PPPs or for the real expenditure levels and price levels derived from them.

1.35 The indices of real expenditure and real expenditure per capita and the PLIs at the level of GDP are the most reliable with smaller error margins. Experience suggests that differences between countries in these indices of over two percentage points are generally statistically significant. At the level of the main aggregates, error margins are larger and differences in the indices of real expenditure and real expenditure per capita and in the PLIs will also need to be larger to be statistically significant. Below the level of the main aggregates, error margins are compounded by differences in the national classifications used by participating countries in their national accounts. Because the margins of error increase as the level of aggregation gets lower, neither Eurostat nor the OECD publish results of their comparisons below a certain level of detail.

1.36 PLIs at the level of GDP allow the general price levels of countries to be compared with that of a reference country. A value over 100 indicates a higher general price level, a value under 100 indicates a lower general price level. PLIs at the level of GDP also indicate the degree to which a country's exchange rate reflects its general price level in relation to the general price level of the reference country. A value over 100 indicates that the exchange rate understates the general price level, a value under 100 indicates that the exchange rate overstates the general price level. This is not the same as saying a currency is undervalued or overvalued.

1.37 Although PPPs appear in international trade theory in the context of equilibrium exchange rates - that is, the underlying rates of exchange to which actual exchange rates are assumed to converge in the long term[26], the PPPs discussed here are not relevant for this purpose as they do not refer solely to domestically-produced tradable goods and services valued at export prices. They have been calculated specifically to enable international price and volume comparisons to be made for GDP and its component expenditures. As such, they refer to the entire range of goods and services which make up GDP as a whole including many items, such as buildings and government services, that are not traded internationally. In addition, except for net foreign trade, they are valued at domestic market prices and are calculated using expenditure weights that reflect domestic demand.

1.38 Indices of real GDP provide a "snapshot" of the relative volume levels of GDP among participating countries for a given point in time or reference year. When placed side by side, the indices of consecutive reference years appear to provide a "moving picture" of relative GDP volume levels over the years. This apparent time series of volume measures is actually equivalent to a time series of value indices. This is because the volume indices for each reference year are calculated using the prices and expenditures of that year. Year-to-year changes in the volume indices are thus due to changes in relative price levels as well as changes in relative volume levels. As a result, the rates of relative growth derived from the indices are not consistent with those obtained from GDP volumes estimated by countries.

1.39 To trace the evolution of relative GDP volume levels between countries over time, it is necessary to select one of the reference years as a base year and to extrapolate its relative GDP volume levels over the other years. Extrapolation is done by applying the relative rates of GDP volume growth observed in the different countries. This provides a time series of volume indices at a

[26] "As long as anything like free movement of merchandise and a somewhat comprehensive trade between two countries take place, the actual rate of exchange cannot deviate very much from the purchasing power parity." Gustav Cassels in "Abnormal deviations in international exchanges", *Economic Journal 28*, 1918. Equilibrium exchange rates are also referred to as *absolute PPPs*. See *International Economics: Theory and Policy,* Paul Krugman and Maurice Obstefeld, Pearson Higher Education, 2000.

constant uniform price level that replicates exactly the relative movements of GDP volume growth of each country. Underlying this method is the assumption that price structures do not change over time. But it is an economic fact of life that relative prices do change over time and, if such changes are ignored over long periods, a biased picture of the relative economic developments of countries can result. The choice of base year can also influence the picture that emerges.

1.40 Price convergence (or divergence) among countries is of interest in a number of contexts such as competition policy, consumer protection and the determination of real exchange rates[27]. PLIs provide a means of observing the movement of price levels over time, but they have to be used with caution. First, except within the euro area, they are influenced by exchange rate fluctuations. Second, independently of exchange rates, they are volatile. This is generally so at lower levels of aggregation where sample sizes are small. Usually such volatility diminishes, if not disappears, with aggregation. Volatility particularly arises when the basket of goods and services to be priced changes from one benchmark survey to another in order to accommodate market developments. For example, in this respect, the basket for food and non-alcoholic beverages is relatively stable, while that for electronic products is altered substantially each time it is surveyed. Volatility of this type also diminishes with aggregation. For these reasons, PLIs are better suited to monitoring price convergence at higher levels of aggregation and over long periods of time.

1.41 The PLIs for household final consumption expenditure are sometimes used to measure the differences in the cost of living between countries. This is correct to the extent that they indicate whether the overall price level for consumer goods and services faced by the average household in one country is higher or lower than the overall price level for consumer goods and services faced by the average household in another country. Households or individuals considering moving from one country to another for reasons of employment, retirement or even a holiday should exercise caution when attempting to infer from these measures of overall price levels how the change of country will affect their cost of living. The PLIs for household final consumption expenditure reflect the expenditure pattern of the average household which in all likelihood is different from that of the household or individual contemplating the move. Also, the PLIs are national averages and they do not reflect differences in the cost of living between specific locations such as London and Paris or the Côte d'Azur and the Costa del Sol.

1.42 Box 1.5 outlines the primary and recommended uses of PPPs. These are the uses for which PPPs are designed. It also provides some examples of applications of PPPs for which the results should be interpreted with care. Finally, the Box lists a selection of uses for which PPPs are not intended.

[27] See, for example, "What determines European real exchange rates?", M. Berka and M. B. Devereux, National Bureau of Economic Research Working Paper 15753, February 2010, http://www.nber.org/papers/w15753

Box 1.5: Examples of the use of Eurostat and OECD PPPs

PPPs are primarily designed for:	• Spatial volume comparisons of GDP, GDP per capita and GDP per hour worked • Spatial volume comparisons of the component expenditures of GDP above a certain level of aggregation (called "analytical categories") • Spatial comparisons of price levels at the level of GDP or analytical categories
Provided the results are interpreted with care, PPPs can also be used for:	• Spatial comparisons of economic data in national currencies other than analytical categories (in other words, using PPPs as an alternative to exchange rates) • Analysis of price convergence • Analysis of temporal change in volumes or price levels of GDP or analytical categories
PPPs are not designed for:	• Strict ranking of countries without taking statistical error margins into account • Calculating national growth rates • Industry-specific output and productivity comparisons • Cost-of-living comparisons for individuals • Assessing potential undervaluation or overvaluation of currencies or use as equilibrium exchange rates

Data requirements

2

2.1 Introduction

2.1 Eurostat and the OECD make international volume comparisons of GDP from the expenditure side. With the exception of education and a part of housing, the volumes are estimated indirectly with purchasing power parities (PPPs). PPPs are used because they are measures of relative prices. Prices are easier to observe directly than are volumes and measures of relative prices usually have a smaller variation than measures of relative volumes. Eurostat and OECD comparisons start as price collecting exercises, though other data, such as data on GDP expenditures, have also to be collected before they can be concluded. This chapter identifies the price and other data needed by Eurostat and the OECD to make their comparisons. It starts by defining the three principle concepts: consistency, comparability and representativity. It explains why volume comparisons are given priority over price comparisons and why the three concepts are not fully compatible in practice. It finishes by identifying the actual data that participating countries are required to supply.

2.2 The organisation of the comparisons and their data collections are not covered in the chapter. Nor are pricing guidelines included. Organisation and data collection are described in Chapter 3. Pricing guidelines are to be found in the chapters dealing with the pricing of specific types of products: Chapter 5 for consumer goods and services, Chapter 6 for housing, Chapters 7 and 8 for health and education, Chapter 9 for collective services and Chapters 10 and 11 for capital goods. Details of the expenditure classification are not presented here either. They are available in Chapter 4. For the moment, it is sufficient to know that the classification adheres to the definitions, concepts, classifications and accounting rules of the SNA 93[1] and the ESA 95[2], that it covers all the component expenditures of GDP, and that it comprises 206 product groups or basic headings.[3]

2.3 Note that, throughout this chapter and the rest of the manual, the term *product group*, which was used in Chapter 1, will be replaced by *basic heading*. The basic heading is defined as the lowest level of aggregation in the expenditure breakdown for which PPPs are calculated.[4] Ideally, a basic heading covers a group of similar well-defined goods or services. In practice, the coverage of a basic heading is often determined by the lowest level of final expenditure for which explicit expenditure weights can be estimated. Hence, a basic heading can comprise a cluster of diverse product groups instead of the theoretically-preferable group of similar products. In addition, the absence of weights below the basic heading level means that other ways have to be found to indicate the relative importance of the products priced for the basic heading.

2.4 To calculate PPPs from the expenditure side, it is necessary for each country participating in the comparison to provide a set of national annual purchasers' prices and a detailed breakdown of national expenditure. The prices should refer to a selection of products chosen from a common basket of precisely-defined goods and services. The expenditures should be broken down by basic heading according to a common classification. Both prices and expenditures should refer to the year of the comparison – the *reference year*. And both should cover the whole range of final goods and services included in GDP. Annual average exchange rates and the annual average resident populations for the reference year are also required.

2.5 The prices reported by participating countries are used to calculate price relatives, or PPPs, first at the product level, then at the basic heading level and finally at the various aggregation levels above the basic heading level. The PPPs for basic headings are usually unweighted averages because there are no weights at the product level. But the PPPs at the aggregation levels are weighted averages. They are obtained using the final expenditures that participating countries have

1 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

2 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

3 By 2014, most if not all participating countries will have switched to one of the later versions of these two complementary systems of national accounts: either the SNA 2008 or the ESA 2010. The expenditure classification will be revised to take account of the changes required by the later versions as well as the changes in the classifications underlying the expenditure classification and the changes in methodology that are being introduced into the PPP Programme. The revision will affect the coverage of the basic headings as well as their number.

4 See PPP Regulation, article 3(e) in Annex II.

supplied for the basic headings constituting the aggregates as weights. The PPPs for basic headings and aggregates are used to convert national expenditures into real expenditures. The exchange rates are used to derive comparative price levels. They are also used as proxies for the PPPs for exports and imports when calculating the PPPs for GDP.[5] The population data are used to compute real expenditures per head.

2.2 Consistency with national accounts

2.6 National expenditures are in national currencies at national price levels. Real expenditures are in a common currency at a uniform price level. PPPs, besides being currency converters, are also price deflators. For this reason, the prices supplied by participating countries should be *consistent* with the methods of valuation used to estimate their GDP and its component expenditures. Failure to observe this requirement will result in biased results. The basis of a comparison is the identity: **expenditure = price x volume**. Volumes are obtained by dividing expenditures by prices. To estimate the volumes correctly, the prices collected should be those used to derive the expenditures. Deflating with prices that are not consistent with those underlying the expenditure values will result in volumes being underestimated if the prices are too high or overestimated if the prices are too low.

2.7 In principle, the final expenditures that participating countries report for the reference year are estimated using national annual purchasers' prices of actual market transactions. Consistency requires participating countries to collect *national* prices – that is, prices that have been averaged over all localities of a country so as to take account of regional variations in prices. The national prices have to be *annual* prices – that is, prices that have been averaged over the days, weeks, months or quarters of the reference year so as to allow for seasonal variations in prices as well as general inflation and changes in price structures.

2.8 The national annual prices have to be *purchasers'* prices – where a purchaser's price is defined as the amount paid by the purchaser in order to take delivery of a unit of a good or service at the time and place required by the purchaser. It includes supplier's retail and wholesale margins, separately invoiced transport and insurance charges, non-deductible tax on products and sometimes, as in the case of certain items of machinery and equipment, installation costs. Finally, the national annual purchasers' prices have to be *market* or *transaction* prices – where a market price is defined as the actual amount of money a willing buyer pays to acquire a good or service from a willing seller. In other words, it is the actual price for a transaction agreed on by the transactors[6]. As such, it is the net price inclusive of all discounts, surcharges, rebates and, in the case of certain services, invoiced service charges and voluntary gratuities.[7]

2.9 Adherence to the consistency rule requires countries participating in Eurostat and OECD comparisons to provide national annual purchasers' prices of actual market transactions for the reference year. This is not an issue for most final expenditures, but there are two exceptions:

- The first exception concerns expenditures for which it is not always feasible to collect the price actually paid by purchasers. Discounts received on motor vehicles, voluntary gratuities or tips (as opposed to invoiced service charges) left in cafés and restaurants or given to taxi drivers and hairdressers, and VAT actually paid on capital goods are particularly difficult for price collectors to determine for individual transactions. To overcome this problem, participating countries are required to collect the prices that purchasers pay for the transaction specified before allowing for discounts in the case of motor vehicles, tips in the case of cafés, restaurants, taxi drivers and hairdressers, and

[5] Prices are not collected for exports and imports of goods and services, nor are they collected for purchases made by households abroad.

[6] From the seller's point of view, the market price is the basic price because that is the amount he will actually receive. From the buyer's point of view, the market price is the purchaser's price because that is the amount he will actually pay. The prices required for Eurostat and OECD comparisons are those from the buyers' viewpoint – that is, purchasers' prices.

[7] For completeness it should be noted that market prices do not include the cost of, or interest on, any credit obtained by the purchaser to facilitate the purchase even when the credit is provided by the seller.

non-deductible VAT in the case of capital goods. Subsequently, Eurostat adjusts the PPPs calculated with the prices reported by countries to make them consistent with the corresponding expenditure.[8] How this is done is explained later in the manual.[9]

- The second exception concerns final expenditures that include those social transfers in kind which involve two purchasers and two market prices. This can occur with housing and with medical goods and services when rents for dwellings and prices for medical products are paid partly by households and partly by government (or non-profit institutions serving households).

  For example, in many countries, payments for medical services are shared between households and government. Either households pay the medical practitioner in full and subsequently receive the government's share as a reimbursement or both households and government pay their share to the medical practitioner directly. Whatever the system, in the national accounts, the amounts actually paid by households (based on prices paid less any reimbursements) are recorded under household expenditure and the amounts actually paid by government (based on reimbursements paid to households and/or payments made directly to medical practitioners) are recorded under government expenditure. If households actually pay 20 euros per consultation and government actually pays 80 euros per consultation and 100 consultations take place, 2000 euros would be recorded under household expenditure and 8000 euros under government expenditure. To obtain the correct volume it is necessary to divide both household expenditure and government expenditure by the total or composite price of 100 euros ([2000 / 100] + [8000 / 100] = 100 consultations). Otherwise, if the expenditures are divided by the prices households and government actually paid, that is by 20 and 80 euros respectively, there would be double counting ([2000 / 20] + [8000 / 80] = 200 consultations). To avoid this, countries participating in Eurostat and OECD comparisons are required to report total or composite prices for all final expenditures to which they apply.

2.10 Both exceptions illustrate that it is not always possible to observe consistency and obtain both comparable volume measures and comparable price measures at the same time. In such cases, Eurostat and the OECD give primacy to comparable volume measures because achieving these are seen as the first objective. But, as explained in Chapter 1, PPPs are also used extensively to compare price levels across countries. Users should bear in mind that the data are not designed primarily for that purpose.

[8] The OECD follows a similar procedure for motor vehicles; countries provide list prices without discounts. Otherwise countries participating in OECD comparisons are required to report purchasers' prices that take account of discounts, tips and non-reimbursable VAT.

[9] See Chapter 5, Section 5.5.1, for tips and Chapter 10, Section 10.8, and Chapter 11, Section 11.8, for non-deductible VAT. No adjustment is made for discounts on motor vehicles.

2.3 Comparability and representativity

2.11 Besides being consistent with their final expenditures, the prices participating countries report must be for items that are *representative* of their expenditures and which are *comparable* between them. These requirements are not necessarily complementary. Consumption patterns can vary from country to country because of differences in tastes, cultures, climates, price structures, product availability and income levels. Products representative of the final expenditure of one country are not necessarily representative of the final expenditures of other countries, while products that are strictly comparable across countries are unlikely to be equally representative of them all. Failure to observe either of these two requirements can result in either an overestimation or underestimation of price levels and a corresponding underestimation or overestimation of volumes. Eurostat and OECD comparisons employ methods for selecting products and for calculating PPPs that are designed to respect both requirements.

2.3.1 Comparability

2.12 Comparability requires participating countries to price products that are identical or, if not identical, equivalent. Products are said to be comparable if they have identical or equivalent physical and economic characteristics – that is, if they have the same or similar technical parameters and price determining properties. In this context, equivalence or similarity between products is defined as meeting the same needs with equal efficiency so that purchasers are indifferent between them and are not prepared to pay more for one than for the other. The pricing of comparable products ensures that differences in prices between countries for a product reflect *actual* price differences and are not influenced by differences in quality.[10] Comparability involves pricing to constant quality to avoid quality differences being mistaken for *apparent* price differences and the consequent underestimation or overestimation of price levels.[11]

2.13 Comparability is obtained in Eurostat and OECD comparisons by participating countries pricing product specifications that fully define the products in terms of the principal characteristics that influence their market or transaction prices. The approach is called *specification pricing* and requires the characteristics of both the product and the transaction to be specified. Product specifications can be brand and model specific – that is, a specification in which a particular brand and model, or a cluster of comparable brands and models, is stipulated. Or they can be generic – that is, a specification where only the relevant technical parameters and other price determining characteristics are given and no brand or cluster of brands is designated. Generic specifications and, to a lesser extent, specifications with brand clusters are two of the ways of enabling countries to price items that are both comparable and representative. Another way is to permit countries to treat brand and model specifications as generic specifications – that is, countries price products that match all the characteristics specified other than those of brand and model which are considered to be indicative only.[12]

2.14 Ideally, all product specifications would be brand and model specific so that countries would price products of identical quality. In practice, this is not possible for reasons of availability and representativity. Generic specifications have to be employed as well and inevitably some variability in quality between the products priced by countries will occur. Quality differences can arise as a result of countries pricing items that do not match exactly the product specifications. Participating countries are required to state if the items they have priced deviate from the product specifications and how they deviate when reporting their prices.[13] Quality differences can also arise because, although the

[10] Actual or real price differences arise when identical or equivalent products are sold in the same market or in different markets at different prices. They are the differences in price that, among other things, are due to imperfections in the market with purchasers having neither the knowledge nor the mobility to buy at the lowest price.

[11] Apparent or false price differences arise when products that are neither identical nor equivalent are considered to be comparable and the differences in their prices are treated as actual price differences and not, as they should be, as price differences caused by differences in quality.

[12] Countries participating in Eurostat and OECD comparisons may treat specified brands and models as indicative when they price equipment goods. Otherwise, as a general rule, they are expected to price the brand and model specified.

[13] When matching products and deciding whether or not the one observed is a close substitute to the one specified, it is not just the number of parameters not matching that needs to be taken into account, but also their importance and the degree to which they differ.

items priced appear to match the product specifications exactly, the product specifications are not precise enough to ensure that countries price items of the same quality. These differences are generally identified when the price data are edited. Neither Eurostat nor the OECD adjusts prices to compensate for differences in quality. Mismatches in quality are dealt with either by rematching the prices reported - an ex post refining of the specifications - or by discarding them.

2.15 Product specifications for Eurostat and OECD comparisons are defined using structured product descriptions (SPDs). These standardise the product specifications for different types of products so that all specifications for a specific product type are uniformly defined and list the same technical and transactional characteristics that price collectors have to match. SPDs can cover individual products such as refrigerators or groups of products such as vegetables. Their purpose is to improve the precision of the specifications and to simplify price collection. The principal characteristics listed in the SPDs are based on the experience of previous surveys substantiated by the pre-surveys carried out to update product lists. SPDs are described in more detail in Chapter 5, Section 5.4.4.

2.3.2 Representativity

2.16 Representativity is a concept that relates to the relative importance of individual products within a basic heading where a product's importance is determined by its share of expenditure on the basic heading. It is a necessary concept because there are usually no explicit expenditure weights below the basic heading level and without such expenditure weights the relative importance of the various products priced for a basic heading has to be determined by other means. Products that are representative generally have a lower price level than products that are unrepresentative and, unless this is taken into account when calculating the PPPs for a basic heading, the PPPs can be biased. To avoid this, countries participating in Eurostat and OECD comparisons are required to do three things. The first is to ensure that there are representative products they can price in each basic heading when the product list[14] is being finalised prior to price collection. The second is to price both representative products and unrepresentative products for a basic heading. The third is to identify which of the products they have priced within a basic heading are representative when reporting their prices.[15]

2.17 Representativity is defined in terms of an individual country within a basic heading. A product is either representative or unrepresentative of the price level in country A for a given basic heading. It is representative, if in country A, it is among the most important items purchased, in terms of relative total expenditure within the basic heading[16]. Usually, this implies that its price level is close to the average for all products within the basic heading. Basic headings can cover a heterogeneous mixture of goods or services, but this only becomes a consideration if there are significant disparities in their price levels. In these circumstances, representativity is considered in two stages. First in terms of the product types comprising the basic heading – representative product types are those that account for the bulk of the expenditure on the basic heading. And then in terms of products within the representative product types – representative products are those whose price level is close to the average for all products of its type.

2.18 The decision as to whether or not a product is representative of the price level of a basic heading is made independently of the relative importance of the basic heading with respect to other basic headings. For example, assume that in country A the expenditure shares of the three basic headings that comprise the expenditure group *alcoholic beverages* are: *beer* 60 per cent, *wine* 35 per cent and *spirits* 5 per cent. The fact that beer and wine are considerably more representative of the type of alcoholic beverages consumed in country A than are spirits does not mean that all spirits sold in country A are to be treated as unrepresentative. If vodka has the largest market share of the spirits sold in country A, it is likely to representative of the price level for spirits in country A and this

[14] The common list of well-defined goods and services from which participating countries make a selection of products to price. The "common basket of precisely-defined goods and services" referred to in paragraph 2.4.

[15] For the history on the introduction of the representativity concept in the Eurostat-OECD exercise, see "On the estimation of purchasing power parities on the basic heading level", Hugo Krijnse Locker, Eurostat, *Review of Income and Wealth*, 1984, http://www.roiw.org/1984/135.pdf

[16] See PPP Regulation, article 3(k) in Annex II.

should be recognised when calculating the PPPs for spirits. Vodka is probably not representative of the price level of alcoholic beverages, but this is reflected by the 5 per cent expenditure share of spirits that will be used in the calculation of PPPs for alcoholic beverages. If alcoholic beverages consisted of a single basic heading, with no breakdown into beer, wine and spirits, it is unlikely that vodka would be considered a representative product.

2.19 Furthermore, a distinction has to be made between the products in the universe covered by the basic heading and the products in the sample selected for its product list. The products in the sample represent a wider group of products in the universe. They have been chosen to represent the price level of the wider group. It is the wider group of products that need to have an important share of expenditures within the basic heading. It is not required that the individual products of the sample are among the volume sellers for the group, even though they often are. It is just necessary that they are sold in sufficient quantities for their price levels to be typical for the product group they represent. For this reason it is possible that they can appear to be unrepresentative when their volume of sales is compared to the volume of sales of other products in the sample.

2.20 For example, take the basic heading *wine*. It consists of three product groups - *still wine*, *sparkling wine* and *fortified wine*. Assume that the shares of household expenditure on these three product groups in a country are 75 per cent, 20 per cent and 5 per cent respectively. Assume as well that the country has elected to price two still wines and one sparkling wine from the sample of wines selected for the basic heading's product list. It is not inconceivable that the sparkling wine priced could have considerably larger sales than either of the two still wines priced, thereby suggesting that it, and not the still wines, should be designated as representative. Clearly this is incorrect when the universe of the basic heading is considered. Still wine accounts for 75 per cent of household expenditure on the basic heading, and providing the price levels of the still wines selected are representative of the average price level for still wine, it is the still wines and not the sparkling wine that should be identified as being representative. The sparkling wine priced could also be representative, but that is not the point being made here. Representativity should be considered within the wider perspective of the basic heading's universe and not within the narrower context of the sample selected for its product list.

2.21 Representativity is thus based on two criteria: the importance of a product in terms of its share of expenditure on the basic heading and the closeness of its price level to the average for all products within the basic heading. Identifying representative products by either one of these criteria is not easy in practice. The criterion, "its price level is close to the average for all products within the basic heading", is difficult to apply unless the average price level for the basic heading is known. Usually it is not known until the PPPs for the basic heading are calculated. But representative products have to be identified before the PPPs are available. Participating countries are required to propose representative products for the product lists, they are required to price a mixture of representative and non-representative product during price surveys and, prior to the calculation of the PPPs, they are required to indicate which of the products they priced are representative. The other criterion - that representative products are typically volume sellers and, depending on the product, generally available – appears easier to apply initially but it too has problems such as the absence of ready access to information on market shares. Moreover, defining a product as representative by one of these criteria alone is not correct. The two should be considered in parallel but with different emphasis at different phases of the comparison. Importance has priority when establishing the product list and selecting products to price. Closeness to the average price level of the basic heading has priority when prices are validated. These issues are considered in more detail in Chapter 5, Sections 5.5.6 and 5.6.2.

2.3.3 Equi-representativity

2.22 It has been mentioned already that the price levels of representative products are usually lower than the price levels of unrepresentative products. When putting together the product list for a comparison, it is important to ensure that it is equally representative – or *equi-representative* - of all participating countries for each basic heading identified in the expenditure classification. A comparison based on a list of products that is not equally representative of all participating countries may result in biased price relatives. There is a risk that price levels for countries pricing a smaller number of representative products will be overestimated and that price levels for countries pricing a larger number of representative products will be underestimated. This does not mean that each country should have the same number of representative products for each basic heading because the method used by Eurostat and the OECD to calculate PPPs for a basic heading ensures that any imbalance between countries in the number of representative products priced does not produce biased PPPs. The method requires each country to price a minimum of one representative product per basic heading. While this produces unbiased PPPs, it is unlikely to produce reliable PPPs. For that, each country needs to price that number of representative products which is commensurate with the heterogeneity of the products and price levels covered by the basic heading and its expenditure on the basic heading.

2.23 The responsibility that the product list is equi-representative is shared by participating countries on the one hand and by Eurostat and the OECD on the other. Each country has to ensure that it is able to price the appropriate number of representative products for each basic heading by proposing products it wishes to see added to the list. Products proposed by one country may not be available or, if available, not representative in other countries. At least one other country has to agree to price them if they are to be included on the list. Eurostat and the OECD have to oversee the negotiations and compromises that will be necessary between countries if the list is to be equi-representative. At the same time, they have to guard against the product list becoming too large and unmanageable. It is important that countries, when proposing products for the list, use SPDs to define them precisely so that other countries can identify them correctly in their markets and price comparable products.

2.4 Actual data requirements

2.24 The range of final goods and services included in GDP covers consumer goods and services, capital goods, government services, inventories, valuables, exports and imports. Countries participating in Eurostat and OECD comparisons are required to provide detailed expenditure data on all these types of products, but they are only required to price consumer goods and services, capital goods and government services. They do not have to price inventories, valuables, exports and imports.[17] There are overlaps between consumer services and government services. Hospital services and education are purchased by households as well as being provided by government. For this reason they are treated separately in Eurostat and OECD comparisons. Housing is also treated separately because the data sources are different from other consumer services. Specifically, participating countries are required to price consumer products (other than housing, hospital services and education), capital goods, government services (or, more precisely, hospital services and collective services but not education), and housing (countries also have to provide quantity and quality data on the housing stock in addition to prices). Prices are not required for education, quantity and quality indicators are needed instead.

2.25 As explained earlier, the prices that countries collect should be national annual purchasers' prices of actual market transactions in the reference year, but, in practice, they are not. This means that in addition to the prices countries have to supply additional data to enable Eurostat and the OECD to adjust the prices reported to national annual purchasers' prices.

- *Consumer goods and services* (other than housing, hospital services and education): Participating countries are required to report purchasers' prices for consumer products. The prices are to be collected from a variety of outlets - corner shops, markets, supermarkets, specialist shops and shop chains, departmental stores, service establishments, etc. - located in the capital city. This is the practice followed by the majority of countries. But some countries do not limit their price collections to capital cities and collect prices in other cities and towns as well. When averaged, these prices are considered to be national prices.

  When reporting their prices for consumer goods and services, countries are required to indicate which of the products they priced are representative.

  To reduce the response burden that national statistical institutes would have to shoulder if they were required to price the full set of consumer products in a single year, prices are collected over a period of three years. The product list is divided into six parts. Two parts are surveyed each year: one part in the first half of the year, the other in the second half of the year. For the reference year t, one third of the prices that countries report for consumer products will refer to the previous year t-1, one third to the reference year t and one third to the subsequent year t+1.

  In most cases, these prices are not national because they refer to the capital city. In all cases, they are not annual because they refer to the month they were surveyed. Countries that collect capital city prices are required to provide spatial adjustment factors with which to convert their capital city prices to national prices. All countries are required to provide monthly temporal adjustment factors with which to convert their survey prices to annual prices. These monthly temporal factors are subsequently averaged to provide yearly temporal adjustment factors with which to centre the prices collected in the years t-1 and t+1 on the reference year t.

  Spatial adjustment factors and temporal adjustment factors are to be supplied for each basic heading. Temporal adjustment factors are also to be supplied at the product level when the products are seasonal. Countries are only required to determine spatial adjustment factors once every six years as special surveys usually need to be

[17] PPPs are not calculated for inventories, valuables, exports and imports, reference PPPs are used instead. Reference PPPs are explained in Chapter 12, Section 12.3.4.

conducted to establish differences in price levels between the capital city and the country as a whole. Countries report the spatial adjustment factors that are relevant for a particular price survey one month after reporting the prices for the survey. The temporal adjustment factors, which are monthly and which countries extract from their consumer price index data bases, have to be reported after the end of each year.

For the services of cafés, restaurants and hairdressers, countries are required to report the price that purchasers pay for the service specified before allowing for tips. They are also required to provide the global tipping rates that their national accountants use to estimate total expenditures on these services.[18] The rates are used to adjust the PPPs calculated with the prices originally reported for these services.

- *Capital goods:* Participating countries are required to report national purchasers' prices for capital goods but without VAT. Later, after the prices have been collected, countries are required to report the global rate of VAT actually paid on capital goods during the year to which the prices refer. The global rate is to be taken from their national accounts. The rates are used to adjust the PPPs calculated with national purchasers' prices originally reported for individual capital items.

  There are two price surveys: one for equipment goods, the other for construction.

  Prices for equipment goods are to be collected once every two years between April and June of the survey year.[19] They are to be obtained from producers, importers, distributors or actual purchasers. The prices collected can be either purchasers' prices for actual market transactions or purchasers' prices for hypothetical market transactions – that is, what purchasers would pay if they made a purchase. PPPs for the non-survey year t are obtained by extrapolating the PPPs for t-1 and retropolating the PPPs for t+1 and taking the geometric mean of the two.

  When reporting their prices for equipment goods, countries are required to indicate which of the items they priced are representative.

  Prices for construction are to be collected every year between May and July.[20] Prices are to be compiled for eight standard construction projects covering different types of buildings and structures. Each project is defined by a bill of quantities and each bill of quantities has two versions: a complete version specifying all the items making up the project and a reduced version specifying only the key items. Each year, four projects are priced using the complete version of their bill of quantities and four projects are priced using the reduced version of their bill of quantities. There is a two-year pricing cycle and the version priced for a project alternates from year to year. Prices for the projects are to be at the level of prevailing tender prices – that is, the prices of tenders that have been accepted by purchasers.

- *Collective services:* The collective services produced by government are non-market services and have no economically-significant market price. Because there are no market prices, the convention is to value non-market services in the national accounts at cost. The prices that countries are to collect for collective services are the prices of the inputs used in their production. Not all inputs are priced. Only the most important – labour – is priced. Participating countries are required to provide every year the annual compensation of employees that government pays to a cross-section of occupations in collective services.[21] The compensation of employees collected for an occupation is to

[18] Formerly, countries were also required to report a global rate for discounts on motor vehicles and a global rate for tips to taxi drivers. This practice was discontinued. Countries found it difficult to supply global rates for discounts on motor vehicles and, as PPPs are not calculated specifically for taxis but for passenger transport by road in general, an adjustment could not be made.

[19] Mid-year (July) prices are collected for OECD comparisons once every three years.

[20] Mid-year (July) prices are collected for OECD comparisons once every three years.

[21] Every three years for OECD comparisons.

be the average compensation paid for the occupation for a standardised number of working hours.

- *Hospital services:* The hospital services produced by government are also non-market services. They are valued at cost in the national accounts and countries are expected to price the most important input used in their production – labour. Each year participating countries are required to provide the annual compensation of employees that government pays to a cross-section of occupations in hospitals.[22] As for collective services, the compensation of employees collected for an occupation is to be the average compensation paid for the occupation for a standardised number of working hours.[23]

- *Housing:* Participating countries are required to report actual rents and imputed rents for a selection of apartments and houses every year. The rents reported are to be national annual averages. If their rent market is too small or unrepresentative, countries are required to provide details of their housing stock instead. The data on the quantity and quality of the housing stock are used to estimate volumes for housing services directly.

- *Education:* Participating countries are not required to collect prices for education as volumes are estimated directly. These are obtained using student numbers per educational level that Eurostat and OECD extract from the Eurostat-OECD-UNESCO education data base each year.[24] There are six levels: pre-primary, primary, lower-secondary, upper-secondary, post-secondary non-tertiary, and tertiary. PISA[25] results are used to make quality adjustments at the primary and lower-secondary levels. No quality adjustments are made at other levels.

2.26 In addition to the prices, quantities and adjustment factors enumerated above, participating countries are required to report expenditure weights for the reference year. These are discussed in Chapter 4. Also required for the reference year are each country's annual average exchange rates and annual average resident population. These data are extracted by Eurostat or the OECD from in-house data bases. The exchange rates are the annual averages of daily market or central rates compiled by the European Central Bank or the International Monetary Fund. The average annual resident populations refer to the economic territories covered by the GDPs of the participating countries.

2.27 The complete set of data that is required for Eurostat and OECD comparisons is itemised in Box 2.1 overleaf. Nineteen surveys are identified: ten to collect prices and nine to collect a miscellany of data other than price data. The surveys have different frequencies of collection. These and other details are explained in Chapter 3.

22 Every three years for OECD comparisons.

23 The PPPs calculated for government-produced hospital services are also applied to hospital services purchased by households from market producers. The input-price approach currently employed for hospital services is considered unsatisfactory and an output-price approach is under development as explained in Chapter 7, Section 7.6.

24 Every three years for OECD comparisons.

25 Programme of International Student Assessment, http://www.pisa.oecd.org

Box 2.1: Data requirements of Eurostat and OECD comparisons[1]

Data	Survey	Frequency of collection	
		Eurostat	OECD
Prices	01. Food, drinks and tobacco	Every three years	Every three years
	02. Personal appearance	..	..
	03. House and garden	..	..
	04. Transport, restaurants and hotels	..	..
	05. Services	..	..
	06. Furniture and health[2]	..	..
	07. Equipment goods	Every two years	..
	08. Construction projects	Every year	..
	09. Compensation of government employees[3]	..	..
	10 A. Housing	..	..
Quantity and quality indicators	10 B. Housing[4]	..	..
	11. Education	..	..
Expenditures	12. GDP expenditure weights	..	..
Other	13. Spatial adjustment factors[5]	Every six years[6]	
	14. Temporal adjustment factors	Every year	Every year
	15. Global rate for VAT paid on capital goods[5]	..	
	16. Global rate for tips to waiters and hairdressers[5]	..	
	17. Annual average exchange rates	..	Every three years
	18. Annual average resident population	..	..

[1] Eurostat comparisons are made every year while OECD comparisons are made every three years.

[2] Pharmaceutical products, medical goods, therapeutic appliances and out-patient medical services but not inpatient medical services.

[3] Collective services and government-produced hospital services.

[4] Countries with small or unrepresentative rent markets provide data on the housing stock instead of prices.

[5] Not required from countries participating in OECD comparisons as they report national prices with non-deductible VAT and tips as appropriate.

[6] Spatial adjustment factors are reported each year but only for the consumer price surveys conducted in that year. They have to be updated at least once every six years.

Organisation

3

3.1 Introduction

3.1 When the Eurostat-OECD PPP Programme was established in the early 1980s, only OECD Member Countries were covered, benchmark comparisons were made every five years and all data were collected over an 18 month period centred on the reference year. Organisation was straightforward. Eurostat was responsible for those OECD Member Countries that were also Members of the European Union and the OECD was responsible for those OECD Member Countries that were not. This division of responsibilities has changed with time mainly as the result of the enlargement of the European Union[1] (and, but to a lesser extent, of the OECD) and the sizeable jump in the number of countries participating in the Programme that occurred during the second half of the 1990s[2]. The evolution of Eurostat and OECD responsibilities is charted in Annex I which provides a brief history of the Programme.

3.2 The frequency of data collections and comparisons has changed as well. After the 1990 comparison, Eurostat and the OECD adopted the *rolling survey approach* for consumer goods and services. With this approach, data collection is continuous, but cyclical, with each cycle taking three years. The advantages of the approach are that it reduces response burden on participating countries, it enables them to include the price surveys in their regular programme of data collection and it fosters continuity of expertise in their national statistical institutes (NSIs).[3] Also, by "rolling" data collected in one year back to the previous year or forward to the following year, it is possible to make comparisons annually. Since 1990, Eurostat has been making comparisons every year, while the OECD, for reasons explained later, has been making comparisons every three years. The next joint comparison will be for reference year 2011.

3.3 This chapter describes the institutional framework and survey organisation in which the 2011 and subsequent comparisons will be carried out. It takes account of all the developments that have taken place since 1999. These include the division of participating countries into groups for the pricing of consumer goods and services, the two EU regulations relating to Eurostat comparisons (and, to a much lesser degree and only implicitly, OECD comparisons), the drafting and publication of a methodological manual and its subsequent revision, and the establishment of an integrated information technology (IT) system which facilitates the preparation of product lists, data entry and transmission, intra-country and inter-country validation, and the calculation and aggregation of basic heading purchasing power parities (PPPs).

3.2 Institutional framework

3.2.1 PPP Regulation

3.4 An important use to which the European Commission puts the PPPs for EU Member States involves the allocation of the Structural Funds. The overall aim of the Funds is to gradually reduce economic disparities between and within EU Member States. They account for some 30 per cent of the EU budget. The principal indicator determining allocation is PPP-converted regional GDP per capita. Thus, it is both politically and statistically important that the methods and procedures employed by the PPP Programme to produce PPPs for EU Member States are both harmonised and transparent. Methodological manuals and legislation are two ways of promoting harmonised and transparent statistics across countries within the European Union.[4]

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1 Since 1990, eight OECD Member Countries have left OECD comparisons for Eurostat comparisons, either because they became candidates for EU membership - Finland, Sweden, Czech Republic, Hungary, Slovakia and Turkey - or because they decided to harmonise their statistics with those of the European Union – Norway and Iceland. Currently, 25 of the 34 Member Countries of the OECD are co-ordinated by Eurostat. All but four – Iceland, Norway, Switzerland and Turkey - are EU Member States, although Iceland and Turkey are candidates for EU membership.

2 The Eurostat and OECD comparisons of 1993, 1996 and 1999 covered 24, 32 and 43 countries respectively.

3 The approach also has advantages for new countries joining the Programme. Either they can ease themselves in gradually over three years or they can adopt a "catch up" strategy by completing the survey cycle over a shorter period.

4 Another important use of PPP data is determining the correction coefficients for the salaries of EU officials as required by Article 64 of the Staff Regulations.

3.5 In 2006, Eurostat and the OECD published a manual explaining the methods and procedures employed by the Programme at the time.[5] The manual was prepared because there was no single document covering the Programme in detail from start to finish and those directly involved in the implementation of the Programme frequently complained about the lack of such a document. The timing of the manual's preparation and publication coincided with the drafting of the *PPP Regulation* which, if adopted by the European Parliament and the Council of Europe, would require Eurostat to provide a manual describing the methods applied at various stages of PPP compilation including the methods employed to estimate missing basic information and missing parities.

3.6 The European Parliament and Council of the European Union formerly approved the PPP Regulation in December 2007.[6] The Regulation establishes the rules for the collection and validation of data for PPPs as well as for the calculation and dissemination of PPPs and related price and volume measures. Eurostat comparisons are now supported by a legal instrument which clearly defines the roles and responsibilities of Eurostat and the EU Member States as well as the methods and procedures to be followed. The Regulation requires Eurostat not only to provide a methodological manual but also to revise it whenever a significant change to the methodology is made. Since publication of the manual in 2006, there has been significant advancement in the methodology employed for education[7] as well as important revisions introduced to the methods used for collective services and construction. There have also been changes in procedures. A new survey process for consumer goods and services is in place as are the tools of the new integrated IT system. These changes are described in this version of the manual which has been revised as required by the Regulation.

3.7 The Regulation can be found in Annex II. It consists of fifteen articles and two annexes. The articles cover topics such as objective, scope, definitions, roles and responsibilities, transmission of basic information, quality criteria, periodicity, dissemination and financing. The first annex describes methodology, principally: data requirements, collection, validation and transmission; PPP calculation, publication and correction. The second annex lists the basic headings for which PPPs are to be calculated. It is not shown in Annex II to avoid duplication with Annex III where basic headings are not only listed but defined as well.

3.2.2 Responsibilities

3.8 Eurostat and OECD comparisons are a co-operative endeavour between Eurostat, the OECD and the NSIs of participating countries. Eurostat and the OECD are responsible for:

- Managing, organising and coordinating the Eurostat-OECD PPP Programme overall;
- Coordinating the provision and validation of the basic data required to calculate PPPs;
- Calculating, aggregating and validating PPPs for GDP and its component expenditures;
- Ensuring the accuracy, relevance and timeliness of results (PPPs and price and volume indices);
- Ensuring that participating countries have the opportunity to comment on results prior to dissemination and that due account is taken of any such comment;
- Disseminating of results, including explaining results and how to use them to users and potential users;
- Developing methodology in consultation with participating countries;
- Drafting, updating and disseminating the methodological manual and other documentation on methods and procedures;

[5] Eurostat-OECD Methodological Manual on Purchasing Power Parities, 2005 edition, European Communities and the OECD, 2006.

[6] Regulation (EC) No 1445/2007 of the European Parliament and of the Council of 11 December 2007 establishing common rules for the provision of basic information on Purchasing Power Parities and their calculation and dissemination.

[7] And also in health. The output-price approach being developed for hospital services is expected to be introduced in 2013.

- Developing and updating the IT tools used by practitioners for item list management, data entry, validation and aggregation;
- Providing support to users of the IT tools;
- Convening meetings with participating countries to discuss results, methodology, work programme, etc.

3.9 Participating countries are responsible for:

- Providing the national annual purchasers' prices required to calculate PPPs according to commonly agreed standards and timetable. This involves carrying out price surveys for consumer goods and services, actual and imputed rents, compensation paid to government employees producing collective services and hospital services, and capital goods.
- Validating survey data and providing written approval of the survey results for which they are responsible once the process of data validation has been completed;
- Providing the detailed breakdown of GDP expenditures required to calculate PPPs according to a common classification;
- Participating in the meetings convened by Eurostat and the OECD to discuss results, methodology, work programme, etc.

3.10 Eurostat outsources the co-ordination of the price surveys for consumer goods and services to *group leaders*. As explained later, the 37 countries participating in Eurostat comparisons are divided into four groups for organisational reasons. Group leaders prepare product lists (which includes carrying out market research), provide assistance to countries during pre-survey and survey phases of the price collection, make annual missions to their group members, validate the prices from their countries and convene group meetings twice a year. Eurostat also outsources the co-ordination of the capital goods surveys, because these surveys require specific technical expertise. Other tasks that Eurostat outsource include the collection and validation of data for housing and government services and the collection and validation of temporal adjustment factors and expenditure weights. In all cases, it should be remembered, that Eurostat is contracting out tasks not responsibilities: responsibility remains with Eurostat.

3.2.3 Quality control and compliance monitoring

3.11 The PPP Regulation requires EU Member States to provide Eurostat with all the detail necessary to evaluate the quality of the basic information supplied for a comparison. It also requires EU Member States to provide quality reports on the price and other surveys for which they are responsible. The Regulation sets out the minimum quality standards for the basic information and for the validation of price survey results, but it has proved necessary to further define the quality criteria and the structures of the quality reports. These have been defined in a second regulation that was adopted by the European Commission in March 2011[8].

3.12 The regulation is reproduced in Annex II. It specifies the structure and content of the inventory of sources and methods that EU Member States are required to prepare for Eurostat. They are also required to update their inventory in January of each year if there have been any changes to their sources and methods during the previous year. The inventories allow Eurostat to assess whether the methods and procedures used by EU Member States meet minimum quality standards and whether they are comparable across countries. The regulation also specifies the structure and content of the reports that EU Member States have to submit to Eurostat after each survey of consumer prices. The reports enable Eurostat to assess the quality of the pre-survey, the price collection, the intra-country validation and the inter-country validation carried out by EU Member States for each price survey.

[8] Commission Regulation (EU) No 193/2011 of 28 February 2011 implementing Regulation (EC) No 1445/2007 of the European Parliament and of the Council as regards the system of quality control used for Purchasing Power Parities.

3.3 Survey organisation

3.3.1 Schedule of surveys

3.13 The consumer goods price surveys are organised following a rolling survey approach. This comprises a cycle or round of six surveys which takes three years to complete. The approach involves continuous price collection with the product lists for around one third of household final consumption expenditure being priced each year. For Eurostat and the OECD to be able to calculate PPPs for a reference year, they also require regular reporting of temporal adjustment factors at the basic heading level (to extrapolate the PPPs of basic headings for which new PPPs could not be calculated because no prices were collected during the year). Participating countries generally have temporal adjustment factors of sufficient detail and reliability with which to extrapolate the PPPs for consumer goods and services, as these are available from consumer price indices.

3.14 The rolling survey approach for consumer goods and services facilitates annual comparisons as follows. Let the starting point be the matrix of basic heading PPPs by participating country for the reference year, t. In the subsequent reference year, t+1, some of the basic heading PPPs for t are replaced by new PPPs calculated with prices collected during t+1 or t+2. The basic heading PPPs for t that have not been replaced are advanced to t+1 using temporal adjustment factors specific to these basic headings. Similarly, the basic heading PPPs for t+2 are taken back to t+1 using temporal adjustment factors specific to these basic headings. All the basic heading PPPs in the matrix now refer to t+1. By continuing the cycle of replacement, extrapolation and retropolation through t+2, t+3, t+4, etc., comparisons can be made for the reference years t+2, t+3, t+4, etc.

Box 3.1A: Eurostat schedule of input data used for different reference years

Data	Survey	Reference year			
		2011	**2012**	**2013**	**2014**
Prices	01. Food, drinks and tobacco	*2012-1*	**2012-1**	*2012-1*	*2015-1*
	02. Personal appearance	*2012-2*	**2012-2**	*2012-2*	*2015-2*
	03. House and garden	*2010-1*	*2013-1*	**2013-1**	*2013-1*
	04. Transport, restaurants and hotels	*2010-2*	*2013-2*	**2013-2**	*2013-2*
	05. Services	**2011-1**	*2011-1*	*2014-1*	**2014-1**
	06. Furniture and health	**2011-2**	*2011-2*	*2014-2*	**2014-2**
	07. Equipment goods	**2011**	*2011, 2013*	**2013**	*2013, 2015*
	08. Construction projects	**2011**	**2012**	**2013**	**2014**
	09. Compensation of government employees	**2011**	**2012**	**2013**	**2014**
	10A. Housing	**2011**	**2012**	**2013**	**2014**
Quantity and quality indicators	10B. Housing	**2011**	**2012**	**2013**	**2014**
	11. Education	**2011**	**2012**	**2013**	**2014**
Expenditures	12. GDP expenditure weights	**2011**	**2012**	**2013**	**2014**
Other	13. Spatial adjustment factors	*2010,* **2011**, *2012*	*2011*, **2012**, *2013*	*2012,* **2013**, *2014*	*2013,* **2014**, *2015*
	14. Temporal adjustment factors	*2010,* **2011**, *2012*	*2011*, **2012**, *2013*	*2012*, **2013**, *2014*	2013, **2014**, *2015*
	15. Global rate for VAT paid on capital goods	**2011**	**2012**	**2013**	**2014**
	16. Global rate for tips to waiters, etc.	**2011**	**2012**	**2013**	**2014**
	17. Annual average exchange rates	**2011**	**2012**	**2013**	**2014**
	18. Annual average resident population	**2011**	**2012**	**2013**	**2014**

Box 3.1B: Eurostat schedule of input data used for different reference years (contd.)

1. The table shows the data on which the comparisons for 2011, 2012, 2013 and 2014 will be based. Each comparison uses either new data collected for the reference year or data "rolled over" from a previous reference year or "rolled back" from subsequent reference year. For example, the PPPs and real expenditures for 2011 will be calculated with:

   - The national or capital city prices for the consumer products covered by surveys 01 and 02 that were collected respectively in the first and second halves of 2012. The capital city prices have been converted to national prices with the spatial adjustment factors reported in 2012 for the two surveys. The national prices have been converted to annual prices with the temporal adjustment factors for 2012. The annual prices have been used to calculate PPPs for 2012 for the basic headings covered by the two surveys. These basic heading PPPs for 2012 have been taken back to 2011 with the temporal adjustment factors for 2011.
   - The national or capital city prices for the consumer products covered by surveys 03 and 04 that were collected respectively in the first and second halves of 2010. The capital city prices have been converted to national prices with the spatial adjustment factors reported in 2010 for the two surveys. The national prices have been converted to annual prices with the temporal adjustment factors for 2010. The annual prices have been used to calculate PPPs for 2010 for the basic headings covered by the two surveys. These basic heading PPPs for 2010 have been advanced to 2011 using the temporal adjustment factors for 2011.
   - The national or capital city prices for the consumer products covered by surveys 05 and 06 that were collected respectively in the first and second halves of 2011. The capital city prices have been converted to national prices with the spatial adjustment factors reported in 2011 for the two surveys. The national prices have been converted to annual prices using the temporal adjustment factors for 2011. The annual prices have been used to calculate PPPs for 2011 for the basic headings covered by the two surveys.
   - The national annual (2011) prices for the capital goods covered by surveys 07 and 08 that were collected in 2011. The prices are without VAT. They have been adjusted by the global rate for non-deductible VAT actually paid on capital goods in 2011 that was reported in 2012 (survey 15).
   - The national annual (2011) prices for compensation of government employees producing hospital services and collective services from survey 09 that were reported in 2012.
   - Either the national annual (2011) prices for rents from survey 10A or, if the rent market is small or unrepresentative, data on housing stock from survey 10B that were reported in 2012.
   - Data on student numbers by education level (survey 11) for 2011 extracted from the joint Eurostat-OECD-UNESCO education data base.
   - The GDP expenditure weights (survey 12) for 2011 that were reported in Q3 2012 for the preliminary calculation, in Q3 2013 for the intermediate calculation and in Q3 2014 for the final calculation.
   - The global rate for tips (survey 16) for 2011 reported in 2012. This has been used to adjust prices paid in restaurants and cafés (survey 04) and to hairdressers (survey 02), which were reported without tips.
   - Average annual exchange rates (survey 17) for 2011 compiled by the European Central Bank and the International Monetary Fund.
   - Average annual resident population (survey 18) for 2011 extracted from Eurostat and OECD population data bases.

2. The PPPs and real expenditures for 2012, 2013 and 2014 will be similarly calculated except that:

   - In 2012 and 2014, the basic heading PPPs for equipment goods will be estimated by extrapolation and retropolation using the basic heading PPPs for 2011 and 2013 for 2012 and the basic heading PPPs for 2013 and 2015 for 2014.

3.15 Of the other price surveys listed in Chapter 2, Box 2.1, the capital goods surveys are particularly expensive to conduct. To reduce this cost the OECD decided to price capital goods every three years. Eurostat adopted another solution – namely, the pricing of capital goods once every two years and estimating the PPPs for the interim year by extrapolation and retropolation. It has since returned to pricing construction projects annually using a rolling survey approach. Only equipment goods now are priced on a two-yearly basis. Eurostat organises the remaining surveys on an annual basis, the OECD every three years. A detailed description of how Eurostat uses the various price surveys in the calculation of PPPs is given Boxes 3.1A and 3.1B. In Box 3.1A, bold indicates data collected for the reference year; italics indicate data collected for a previous or a subsequent reference year.

3.3.2 The 2011 comparison

3.16 Together the Eurostat and OECD comparisons for 2011 will cover the 47 countries listed in Box 3.2. Eurostat is co-ordinating the collection of data in 37 countries: 27 EU Member States, three Member Countries of the European Free Trade Association (EFTA), four EU Candidate Countries and three Western Balkan countries. The OECD is co-ordinating the data collection in ten non-European countries of which nine are OECD Member Countries. The cycle of price surveys for the 2011 comparison started in 2010 and will finish in 2012. But data collection will not be complete until the third quarter of 2014 when countries report their final detailed expenditure estimates of GDP for 2011. Preliminary results of the comparison will be released at the end of 2012. Intermediate results will be released at the end of 2013 and final results at the end of 2014. The intermediate results will be included in the world comparison that the Global Office of the International Comparison Programme (ICP) in the World Bank will be publishing at the beginning of 2014.

Box 3.2: Countries participating in the 2011 round of price surveys

EUROSTAT (37 countries)	27 EU Member States	*Austria*, *Belgium*, Bulgaria, Cyprus*, *Czech Republic*, *Denmark*, *Estonia*, *Finland*, *France*, *Germany*, *Greece*, *Hungary*, *Ireland*, *Italy*, Latvia, Lithuania, *Luxembourg*, Malta, *Netherlands*, *Poland*, *Portugal*, Romania, *Slovakia*, *Slovenia*, *Spain*, *Sweden*, *United Kingdom*
	3 Members of EFTA	*Iceland*, *Norway*, *Switzerland*
	4 EU Candidate Countries	Croatia, FYR of Macedonia, Montenegro, *Turkey*
	3 Western Balkan Countries	Albania, Bosnia and Herzegovina, Serbia
OECD (10 countries)	10 Other countries	*Australia*, *Canada*, *Chile*, *Israel*, *Japan*, *Korea*, *Mexico*, *New Zealand*, Russian Federation, *United States*

- Although not shown, Kosovo (as defined by the United Nations Security Council Resolution 1244 of 10 June 1999) also participates in as much as it conducts the price surveys for consumer goods and services.
- The 34 OECD Member Countries are those in *italics*.
- Iceland is also a candidate country.

Footnote by Turkey: "The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the 'Cyprus issue'".
Footnote by all the European Union Member States of the OECD and the European Commission: "The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

3.3.3 Organisation of groups

3.17 Prior to 1999, a meeting was held before each price survey for consumer products at which participating countries, together with Eurostat and the OECD, selected the products to be priced during the survey. An essential input into the selection process was the pre-survey that participating countries were required to conduct to familiarise themselves with the situation in their domestic markets with regard to the products about to be surveyed. Experience showed that the effectiveness of these meetings depended on the number of products to be considered, the number of countries at the meeting and the thoroughness of the pre-survey conducted by countries prior to the meeting. The three variables interacted. As the number of countries increased, the number of products increased. As the number of products increased, the quality of pre-survey work decreased.

3.18 When the number of countries Eurostat co-ordinated rose from 21 to 31 in 1999, it was clear that meetings to select consumer products involving 31 countries reviewing some four to five hundred products per survey would be unmanageable and detrimental to the quality of the comparison. For the purposes of organising the surveys of consumer prices, Eurostat divided the 31 countries into three groups. Each group was headed by a group leader. The composition of the groups, the group leaders and their subsequent evolution is described in Annex I. Since 2010, countries co-ordinated by Eurostat have been divided into four groups with the countries co-ordinated by the OECD constituting a fifth group. Box 3.4 gives the composition of the five groups and the group leaders for the 2011 comparison. Note that group leaders are only involved in the six price surveys dealing with consumer goods and services.

3.19 The group meetings have also evolved. From being the place to decide on the products to be priced in the forthcoming survey, they have become meetings in which countries evaluate previous surveys, validate the prices collected in recent surveys, adopt the products list and survey guidelines for the forthcoming survey and discuss the way the future surveys should be organised. In addition, group members exchange experiences and discuss the problems they encounter in their daily work.

Box 3.3: Country groups and group leaders for 2011 comparison

EUROSTAT				OECD
Northern group	Western group	Eastern group	Southern group	OECD group
Denmark	Belgium	Austria	Albania	Australia
Estonia	Czech Republic	Bosnia and Herzegovina	Cyprus	Canada
Finland	France	Bulgaria	FYR of Macedonia	Chile
Iceland	Germany	Croatia	Greece	Israel
Latvia	Ireland	Hungary	Italy	Japan
Lithuania	Luxembourg	Montenegro	Malta	Korea
Norway	Netherlands	Romania	Portugal	Mexico
Poland	Switzerland	Serbia	Spain	New Zealand
Sweden	United Kingdom	Slovakia	Turkey	Russian Federation
		Slovenia		United States
Group leader	Group leader	Group leader	Group leader	
Finland	Netherlands	Austria	Portugal	

3.3.4 Integrated information technology system

3.20 Eurostat is responsible for developing and updating the information technology (IT) tools used for its comparisons. As a result of a major overhaul recently completed, all product selection, data collection and validation, and PPP calculation are carried out in one integrated set of IT tools. The most important tools are:

- *The Item List Management Tool* (ILMT): The on-line tool for the preparation of the item lists, the carrying out of the pre-survey by countries, and the translation of item lists by countries. Used for all surveys.

- *The Data Entry Tool* (DET): An off-line tool (meaning that it is installed in user's own PCs) for the recording and intra-country validation of the price observations and the preparation of the data file to be sent to Eurostat. Used for all surveys except the capital goods surveys.

- *The Validation Tool* (VT): The on-line tool for the inter-country validation of the price observations, primarily by means of Quaranta tables. Used for all surveys, including the capital goods surveys.

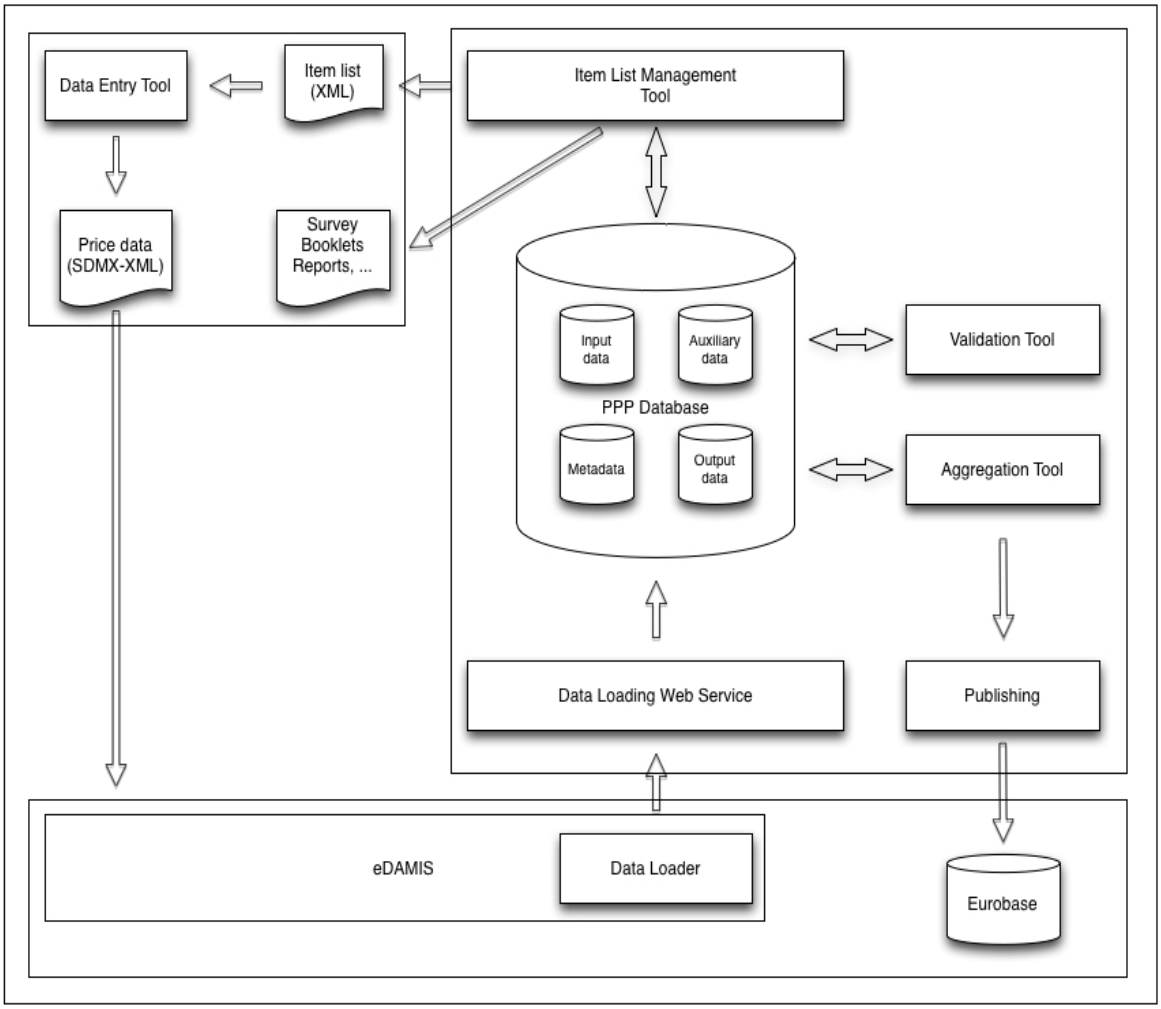
- *The Aggregation Tool* (AT): the on-line tool for the aggregation of basic heading PPPs, the estimation of reference PPPs, the extrapolation of survey PPPs to non-survey years and the preparation of dissemination files.

Eurostat is also responsible for providing participating countries with the support they need when employing these IT tools.

3.21 In addition, when reporting data to Eurostat, participating countries are required to do so via eDAMIS (electronic Data files Administration and Management Information System), Eurostat's central and secure data transmission system.

3.22 The diagram in Box 3.4 depicts the connections between the various IT tools described above and the way data flow through the system.

Box 3.4: Architecture and data flows of the integrated PPP system



4

Component expenditures on GDP

4.1 Introduction

4.1 Eurostat and OECD comparisons of GDP are made from the expenditure side. Each country participating in a comparison is required to provide either Eurostat or the OECD with a detailed breakdown of its expenditure estimate of GDP for the reference year. The detailed expenditures are used as weights in the calculation of PPPs and in the estimation of real expenditures. For this they need to be harmonised across participating countries that are required to report their final expenditures according to a common classification. This chapter explains the definitions and concepts underlying the common classification used for Eurostat and OECD comparisons. It describes the structure and presentation of the classification. The classification itself can be found in Annex III. The chapter also covers the reporting of expenditure data by countries and the subsequent validation of reported data by Eurostat or the OECD. It concludes by identifying those developments that will occur after publication of the manual and which will impact on the classification.

4.2 The expenditure approach to GDP

4.2 A prerequisite of international price and volume comparisons of GDP is that the definition of GDP and its expenditure components is the same for all participating countries. To this end, the Eurostat-OECD expenditure classification adheres to the definitions, concepts, classifications and accounting rules of the SNA 93[1] and the ESA 95[2]. Participating countries compile their estimates of final expenditure following one of these two international systems of national accounts. The two systems are fully consistent with each other. The ESA 95 is a version of the SNA 93 appropriate to the circumstances and needs of the European Union. The SNA 93 provides guidelines and recommendations for global implementation. The ESA 95 specifies how the guidelines and the recommendations should be applied by EU Member States. It has legal status within the European Union.

4.3 As mentioned in Chapter 1, both systems have been revised. Most, if not all, participating countries will have switched to either the SNA 2008[3] or the ESA 2010[4] by 2014. Changes between the original and revised versions that are relevant to the expenditure classification are listed at the end of the chapter.

4.4 The SNA 93 and the ESA 95 define GDP from the expenditure side as:

- total final expenditures at purchasers' prices[5]
- *plus* f.o.b. (free on board) value[6] of exports of goods and services
- *less* f.o.b. value of imports of goods and services.

4.5 Final expenditures are expenditures on goods and services purchased for final use - that is, for final consumption or for gross capital formation. Final consumption consists of the goods and services used up by individual households or the community to satisfy their individual or collective needs. Final consumption expenditures are incurred by households, non-profit institutions serving

1 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

2 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

3 *System of National Accounts 2008,* Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, New York, 2009. http://unstats.un.org/unsd/nationalaccount/sna2008.asp

4 European System of Accounts 2010, Eurostat, Luxembourg, 2011.

5 The purchaser's price is the amount paid by the purchaser in order to take delivery of a unit of a good or service at the time and place required by the purchaser. It includes supplier's retail and wholesale margins, separately invoiced transport and insurance charges, non-deductible tax on products and sometimes, as in the case of certain items of machinery and equipment, installation costs.

6 The f.o.b. (free on board) price is the price of a good delivered at the customs frontier of the exporting country. It includes the freight and insurance charges incurred to that point (including, when applicable, the cost of loading onto a carrier for onward transportation from that point) and any export duties or other taxes on exports levied by the exporting country.

households (NPISHs) and general government. Gross capital formation comprises gross fixed capital formation, change in inventories and acquisitions less disposals of valuables. Gross capital formation expenditures are incurred by resident producers of goods and services: incorporated enterprises, unincorporated enterprises (including households engaged in own-account production), general government and non-profit institutions. Final expenditures do not include expenditures on intermediate consumption – that is, the goods and services, other than fixed assets[7], that are used or consumed as inputs by a production process.

4.6 The difference between the f.o.b. value of exports of goods and services and the f.o.b. value of imports of goods and services is called the *balance of exports and imports* or *net exports*.

4.7 GDP is therefore:

total final consumption expenditure:

- final consumption expenditure of households
- final consumption expenditure of NPISHs
- final consumption expenditure of general government

plus gross capital formation:

- gross fixed capital formation
- change in inventories
- acquisitions less disposals of valuables

plus balance of exports and imports.

4.2.1 Actual and imputed expenditures

4.8 Final expenditure includes actual expenditures and imputed expenditures. Actual expenditures cover monetary transactions. They can be measured directly because for each transaction there is a price agreed between buyer and seller that is stated in monetary units. Imputed expenditures are non-monetary transactions. They cannot be measured directly because either the transaction is explicit, as in barter trade, but the price agreed is not stated in monetary units, or the transaction is implicit, as, for example, owner-occupiers "purchasing" housing services from themselves, and no price is involved. Expenditures on non-monetary transactions are obtained by estimating or imputing a value to them - hence, *imputed expenditures*.

4.9 Imputations are made for:

- *consumption of own-produced goods:* goods that households produce and consume themselves (agricultural produce, preserved foodstuffs, wine, spirits, clothing, furniture, etc.);
- *own-account production of fixed capital assets:* gross fixed capital formation carried out by producers on their own account (includes own-account construction, improvement and extension of dwellings by households);
- *imputed rentals of owner-occupiers:* housing services that owner-occupiers "sell" to themselves;
- *income in kind:* goods and services that employees receive free, or at very low prices, from their employers (meals, drinks, transportation to and from work, recreation facilities, company cars for personal use, etc.);
- *financial intermediation services indirectly measured* (FISIM): financial intermediation services that banks provide clients but for which they do not charge explicitly;

[7] Fixed assets provide capital services that are consumed over a number of years. Their consumption is recorded as consumption of fixed capital.

- *imputed social contributions:* unfunded social insurance schemes operated by employers (such as pension schemes for government employees that are funded out of general revenue);
- *barter trade;*
- *consumption of fixed capital by non-market producers,* that is, by NPISHs and general government.

4.10 The values to be imputed are defined by national accounting conventions. These vary from case to case and are described in the SNA 93 and the ESA 95. Generally, goods and services produced for own final use should be valued at the basic prices[8] at which they could be sold if offered for sale on the market or, failing that, as the sum of their costs of production. For example, the imputed rentals of owner-occupiers should be valued at the estimated rental that a tenant pays for a dwelling of the same size and quality in a comparable location with similar neighbourhood amenities. To do this requires the existence of a well-organised market for rented accommodation. In the absence of such a market, the value of imputed rentals will have to be derived by some other objective procedure such as the user-cost method[9].

4.2.2 Individual and collective consumption expenditures

4.11 The SNA 93 and the ESA 95 describe the components of final consumption expenditure as either *individual* or *collective*. Individual consumption expenditure comprises the expenditures made by households, NPISHs and general government on goods and services that benefit individual households. Such goods and services are called *individual goods and services*. Collective consumption expenditure comprises the expenditures made by general government on services that benefit households collectively. Such services are called *collective services*. Health, education and social protection are examples of individual services that households purchase for themselves and which NPISHs and general government provide to specific identifiable households. Defence, public order and safety, and environment protection are examples of collective services that general government provides to the community as a whole.

4.12 On the basis of this differentiation, final consumption expenditure breaks down into the following four main aggregates:

- *Individual consumption expenditure by households:* The actual and imputed final consumption expenditure incurred by households on individual goods and services. By definition, all final consumption expenditures of households are for the benefit of individual households so all such expenditure is classified as individual. Household final consumption expenditure covers a broad range of goods and services that includes food, beverages, tobacco, clothing, footwear, housing, heating and lighting, furniture and furnishings, household appliances, medical goods and services, transport equipment, transport and communication services, recreation and sporting equipment, recreation and sporting services, cultural services, education, services of hotels and restaurants, personal care services, social protection, insurance and financial services, etc. Imputations for consumption of own-produced goods, rentals of owner-occupiers, income in kind, FISIM and, possibly, barter transactions can be important components of household expenditure.
- *Individual consumption expenditure by NPISHs:* The actual and imputed final consumption expenditure incurred by NPISHs on individual goods and services. In practice, nearly all final consumption expenditures of NPISHs are individual in nature and so, for simplicity, all final consumption expenditures of NPISHs are treated by

[8] The amount received by the producer from the purchaser for a unit of good or service produced as output. It includes subsidies on products and other taxes on production. It excludes taxes on products, other subsidies on production, supplier's retail and wholesale margins and separately invoiced transport and insurance charges.

[9] This consists of summing the relevant cost items: intermediate consumption (current maintenance and repairs, insurance services), consumption of fixed capital, other taxes on production and net operating surplus (nominal rate of return on the capital invested in the dwelling and land).

convention as individual. Essentially, the final consumption expenditure of NPISHs relates to individual services – that is, housing, health, recreation, sport, culture, education and social protection. It also includes the collective services provided by religious and community organisations, political parties and political action groups, trade unions and professional associations operating as NPISHs.[10]

- *Individual consumption expenditure by government:* The actual and imputed final consumption expenditure incurred by general government on housing, health, recreation and culture, education, and social protection. Not all government expenditure on these services constitutes individual consumption expenditure. Expenditures on the overall policy-making, planning, budgetary, co-ordinating and monitoring responsibilities of ministries overseeing the services and on the research and development carried out for the services are classified as collective consumption expenditure because they cannot be identified with specific individual households and are considered to benefit households collectively.
- *Collective consumption expenditure by government:* The actual and imputed final consumption expenditure incurred by general government on collective services. It covers all government final consumption expenditure on general public services, defence, public order and safety, economic affairs, environment protection, and housing and community amenities. It includes as well government expenditure on the collective features of individual services mentioned in the previous bullet point.

Box 4.1: Moving from final consumption expenditure to actual final consumption

<table>
<tr><th>Who pays</th><th>Final consumption expenditure</th><th>Actual final consumption</th><th>Who consumes</th></tr>
<tr><td>Households</td><td>Individual consumption expenditure by households</td><td rowspan="3">Actual individual consumption</td><td rowspan="3">Households individually</td></tr>
<tr><td>NPISHs</td><td>Individual consumption expenditure by NPISHs</td></tr>
<tr><td rowspan="2">General government</td><td>Individual consumption expenditure by government</td></tr>
<tr><td>Collective consumption expenditure by government</td><td>Actual collective consumption</td><td>General government (households collectively)</td></tr>
</table>

[10] Had these services been provided by government they would normally be considered to be collective and not individual services.

4.2.3 Actual individual and collective consumption

4.13 Each of the four aggregates defined above clearly indicates, who is the beneficiary of the expenditure – individuals or the community – and who makes the expenditure – households, NPISHs or general government. The SNA 93 and the ESA 95 use the distinction between *who consumes* and *who pays* to derive two additional aggregates: actual individual consumption and actual collective consumption.

- *Actual individual consumption* is a measure of the goods and services that individual households actually consume as opposed to what they actually purchase. It is derived, as shown in Box 4.1, by adding individual consumption expenditure by NPISHs and individual consumption expenditure by government to individual consumption expenditure by households. In this context, the SNA 93 and the ESA 95 treat the individual consumption expenditures of NPISHs and government as *social transfers in kind*.
- *Actual collective consumption* is a measure of the services that general government provides to the community as a whole and which households consume collectively. It is obtained, as shown in Box 4.1, by deducting individual consumption expenditure by government from final consumption expenditure of general government. In other words, it is the same as collective consumption expenditure by government.

4.14 Countries following the SNA 93 or the ESA 95 estimate final expenditure by who pays. Thus the concept of actual individual consumption is of particular relevance to comparisons of the economic well-being of households (when well-being is measured by the volume of individual goods and services consumed) because of the different ways individual services, particularly health and education, are financed in countries.

4.15 In some countries, government (and/or NPISHs) provide the greater part of health and education services and these expenditures are included in the individual consumption expenditure of government (and/or NPISHs). In other countries, households purchase nearly all health and education services from market producers and these expenditures are included in the individual consumption expenditure of households. Under these circumstances, individual consumption expenditure by households is not the correct measure with which to compare the volumes of individual goods and services actually consumed by households in different countries. Households in countries where government (and/or NPISHs) are the main providers of individual services will appear to consume a smaller volume of goods and services than households in countries where the households themselves pay directly for the bulk of these services. This is avoided by comparing the actual individual consumption of countries as illustrated by Box 4.2.

Box 4.2: Individual consumption expenditure by households and actual individual consumption (by households)

Country	Per capita volume indices in 2008	
	Individual consumption expenditure by households	Actual individual consumption (by households)
Denmark	54	70
Finland	53	67
France	56	69
Germany	60	70
Iceland	60	75
Netherlands	58	73
Norway	65	81
Sweden	54	70
United Kingdom	67	79
United States	100	100

1. The table above gives the per capita volume indices from the 2008 Eurostat and OECD comparisons for individual consumption expenditure by households and actual individual consumption (by households) for nine European countries and the United States. The indices show that in 2008 households in the United States both spent and consumed more per capita than did households in the nine European countries. The differences are larger for individual consumption expenditure - 41 per cent on average – than they are for actual individual consumption – 27 per cent on average. But which measure better reflects relative economic well-being? Were households in the United States 27 per cent or 41 per cent "better off" than the European households in 2008?

2. In the nine European countries listed, individual services are mostly purchased by government and, following the who pays criterion, are included in government expenditure. In the United States, individual services are mainly purchased by households and, in accordance with the who pays principle, are recorded under household expenditure. A comparison of economic welfare based on the per capita volume indices of individual consumption expenditure by households is clearly misleading in this situation. The comparison has to be based on what households actually consumed – that is, on the value of the individual goods and services they purchased themselves plus the value of the individual goods and services provided to them by government. It is the per capita volume indices of actual consumption (by households) that provide a correct picture of relative economic well-being. Households in the United States were 27, not 41, per cent "better off" than the European households in 2008.

4.2.4 Market and non-market services

4.16 By definition, the collective services that government provides to households can only be produced by government. But the individual services that government provides to households can be either purchased by government from market producers or produced by government itself. The individual services that government purchases from market producers are *market services*. The individual and collective services that general government produces itself are mainly *non-market services*. The difference between market services and non-market services is that the former are sold at prices that are economically significant, while the latter are either provided free or sold at prices that are not economically significant. The SNA 93 defines economically-significant prices as prices that have a significant influence on the amounts producers are willing to supply and on the amounts purchasers wish to buy. The ESA 95 is more specific. It defines economically-significant prices as prices which cover over 50 per cent of the costs of production.

4.17 Because they are sold at economically-significant prices, expenditures on market services can be obtained by multiplying the quantities sold by the prices they are sold at. The same prices can also be used to calculate the PPPs for market services. The lack of economically-significant prices for non-market services precludes their expenditures and their PPPs being derived in the same

manner as they are for market services. Instead, following the convention adopted by national accountants, expenditures on non-market services are estimated by summing up their costs of production. Consistency with the prices underlying the expenditure estimates can be maintained by using the prices of inputs to calculate the PPPs for non-market services. This is referred to as the *input-price approach*. To implement the input-price approach, the expenditures on non-market services need to be broken down by cost components, namely: compensation of employees, intermediate consumption, consumption of fixed capital, net operating surplus, net taxes on production and receipts from sales. The disadvantage of the input-price approach is that differences in productivity across countries are not reflected in the resulting volume measures.

4.18 Formerly in Eurostat and OECD comparisons, PPPs for all individual and collective non-market services produced by general government were obtained by the input-price approach. Now, however, the input-price approach is only used for hospital services and collective services, although, once the output-price approach that is being developed for hospital services is introduced, it will be used solely for collective services. An output approach is already used for education. It involves calculating volume ratios with quality adjusted quantities first and then deriving PPPs indirectly as described in Chapter 8. This change in methodology reflects a trend in national accounts to measure the volume of individual services from the output rather than the input side as was the practice in the past.[11]

4.2.5 Gross capital formation

4.19 The SNA 93 and the ESA 95 define gross capital formation as comprising gross fixed capital formation, change in inventories and acquisitions less disposals of valuables, of which gross fixed capital formation is the most important. These three aggregates are defined as follows:

- *Gross fixed capital formation:* The acquisitions less disposals of fixed assets plus major improvements to non-produced assets.

  Fixed assets are assets that are produced by human production processes. They exclude land and subsoil assets which are produced by nature. Fixed assets are used repeatedly, or continuously, in processes of production for more than one year. Fixed assets are either tangible, such as buildings, machinery, etc., or intangible, such as mineral exploration[12], computer software[13], etc. They may be new or existing – that is, used or second-hand. Sales and purchases of existing fixed assets between residents cancel out over the economy as a whole and, except for the transfer of ownership costs which do not cancel out, can be ignored. Sales and purchases of existing fixed assets between residents and non-residents do not cancel each other out and cannot be ignored. They are recorded as investment by the importer and disinvestment by the exporter.[14] Imports of second-hand machinery and equipment can be a significant part of the gross fixed capital formation of some countries participating in Eurostat and OECD comparisons. An important element of gross fixed capital formation is own-account production of fixed capital assets (including the construction of new dwellings and the extension and modification of existing dwellings carried out by households on own account).

  Non-produced assets are assets that are needed for production and come into existence in ways other than through processes of production. Major improvements to non-produced assets must come about through productive activity. Land, for example, is a non-produced asset. Major improvements to land usually involve the construction of dykes, drainage ditches, irrigation channels, etc. for the purpose of reclaiming land from

[11] See, for example, *Handbook on price and volume measures in national accounts*, Eurostat, Luxembourg, 2001 http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-41-01-543 and *Towards measuring the volume output of education and health services: a handbook*, Paul Schreyer, Statistics Directorate Working Paper No 31, OECD, Paris, April 2010.

[12] Covers all expenditures on such exploration irrespective of whether or not new discoveries are made.

[13] Covers both purchases of ready-made software and the cost of software developed in house.

[14] Basic headings for machinery and equipment can have negative values when disinvestment by the exporter is greater than investment by the importer.

the sea, marshes, deserts, etc. The clearance of land to bring it into production for the first time is also a major improvement. Non-produced assets, like fixed assets may be both tangible, such as subsoil assets, land, etc., and intangible, such as leases, patented entities, etc.

- *Change in inventories:* The acquisition less disposals of stocks of raw materials, semi-finished goods and finished goods that are held by producer units prior to their being further processed or sold or otherwise used. Inventories also cover all raw materials and goods stored by government as strategic reserves. Semi-finished goods include work-in-progress - that is, goods and services that are only partially completed and whose production process will be continued by the same producer in a period following the accounting period. Work-in-progress is particularly important for production processes with long gestation periods, such as the construction of large-scale civil engineering works, the manufacture of ships and aeroplanes, and reforestation. Also covered by work-in-progress is the natural growth prior to harvest of agricultural crops and the natural growth in livestock raised for slaughter.
- *Acquisitions less disposals of valuables:* Changes in the stocks of goods that have been acquired primarily as stores of value because they are expected to appreciate - or at least not to decline - in value and do not deteriorate over time under normal conditions. Valuables include gold (other than monetary gold) and other precious metals, expensive jewellery and precious stones, works of art and antiques.

4.3 The expenditure classification

4.3.1 Structure of the classification

4.20 The Eurostat-OECD classification breaks down final expenditure into seven main aggregates:

- Individual consumption expenditure by households,
- Individual consumption expenditure by NPISHs,
- Individual consumption expenditure by government,
- Collective consumption expenditure by government,
- Gross fixed capital formation,
- Change in inventories and acquisitions less disposals of valuables,
- Balance of exports and imports.

4.21 These seven main aggregates are subsequently broken down first into expenditure categories, then into expenditure groups and expenditure classes and finally into basic headings. There are 31 expenditure categories, 66 expenditure groups, 143 expenditure classes and 206 basic headings.[15] The distribution of these aggregation levels by main aggregate is shown in Box 4.3.

[15] The OECD version of the classification has 196 basic headings to which the 206 basic headings in the Eurostat version sum exactly. The principal difference between the two versions is that the OECD version has just one basic heading for furniture and one basic heading for NPISHs, whereas the Eurostat version has four basic headings for furniture and six basic headings for NPISHs.

Box 4.3: Number of categories, groups, classes and basic headings by main aggregates

Main aggregates Categories	Categories	Groups	Classes	Basic headings
11.00 Individual consumption expenditure by households	**13**	**44**	**105**	**143**
- .01 Food and non-alcoholic beverages		2	11	34
- .02 Alcoholic beverages, tobacco and narcotics		3	5	5
- .03 Clothing and footwear		2	6	10
- .04 Housing, water, electricity, gas and other fuels		5	11	11
- .05 Furnishings, household equipment and maintenance		6	12	16
- .06 Health		3	7	7
- .07 Transport		3	14	18
- .08 Communication		3	3	3
- .09 Recreation and culture		6	20	22
- .10 Education		1	1	1
- .11 Restaurants and hotels		2	3	4
- .12 Miscellaneous goods and services		7	11	11
- .13 Net purchases abroad		1	1	1
12.00 Individual consumption expenditure by NPISHs	**6**	**6**	**6**	**6**
- .01 Housing		1	1	1
- .02 Health		1	1	1
- .03 Recreation and culture		1	1	1
- .04 Education		1	1	1
- .05 Social protection		1	1	1
- .06 Other services		1	1	1
13.00 Individual consumption expenditure by government	**5**	**6**	**11**	**21**
- .01 Housing		1	1	1
- .02 Health		2	7	17
- .03 Recreation and culture		1	1	1
- .04 Education		1	1	1
- .05 Social protection		1	1	1
14.00 Collective consumption expenditure by government	**1**	**1**	**5**	**7**
15.00 Gross fixed capital formation	**3**	**6**	**13**	**26**
- .01 Machinery and equipment		2	7	20
- .02 Construction		3	3	3
- .03 Other products		1	3	3
16.00 Change in inventories and acquisitions less disposals of valuables	**2**	**2**	**2**	**2**
-.01 Change of inventories		1	1	1
-.02 Acquisitions less disposals of valuables		1	1	1
17.00 Balance of exports and imports	**1**	**1**	**1**	**1**
GDP	**31**	**66**	**143**	**206**

4.3.2 Basic headings

4.22 The lowest level of aggregation is referred to as the *basic heading level*. Basic headings are the building blocks of Eurostat and OECD comparisons. It is at the level of the basic heading that expenditures are defined, products selected, prices collected, prices validated and PPPs first calculated and averaged. The PPP Regulation defines basic headings as the lowest level of aggregation in the expenditure breakdown for which PPPs are calculated.[16] Ideally a basic heading should consist of a group of similar well-defined goods or services, but in reality coverage is frequently determined by the lowest level of final expenditure for which explicit expenditure weights can be estimated. An actual basic heading can therefore include a broader range of products than is theoretically desirable. Examples of basic headings are given in Box 4.4. Their coverage varies. The basic headings for potatoes and men's footwear are relatively homogeneous, while those for major household appliances and maintenance and repair services for dwellings are distinctly heterogeneous with the latter being a mix of both goods and services.

Box 4.4: Examples of basic heading definitions

11.01.17.2	**Fresh or chilled potatoes (ND)** Fresh or chilled potatoes; *includes* other tuber vegetables (manioc, arrowroot, cassava, sweet potatoes, etc.).
11.03.21.1	**Men's footwear (SD)** All footwear for men including sports footwear suitable for everyday or leisure wear (shoes for jogging, cross-training, tennis, basket ball, boating, etc.); *includes* gaiters, leggings and similar articles; shoelaces; parts of footwear, such as heels, soles, etc., purchased by households with the intention of repairing footwear themselves; *excludes* shoe-trees, shoehorns and polishes, creams and other shoe-cleaning articles (11.05.61.1); orthopaedic footwear (11.06.13.1); game-specific footwear (ski boots, football boots, golfing shoes and other such footwear fitted with ice skates, rollers, spikes, studs, etc.) (11.09.32.1); shin-guards, cricket pads and other protective apparel for sport (11.09.32.1).
11.05.31.1	**Major household appliances whether electric or not (D)** Refrigerators, freezers and fridge-freezers; washing-machines, dryers, drying cabinets, dishwashers, ironing and pressing machines; cookers, spit roasters, hobs, ranges, ovens and micro-wave ovens; air conditioners, humidifiers, space heaters, water heaters, ventilators and extractor hoods; vacuum cleaners, steam-cleaning machines, carpet shampooing machines and machines for scrubbing, waxing and polishing floors; safes, sewing machines, knitting machines, water softeners, etc.; *includes* the delivery and installation of the appliances when applicable; *excludes* such appliances that are built into the structure of the building (capital formation).
11.04.32.1	**Services for the maintenance and repair of the dwelling (S)** Services of plumbers, electricians, carpenters, glaziers, painters, decorators, floor polishers, etc. engaged for minor maintenance and repair of the dwelling; *includes* total value of the service (that is, both the cost of labour and the cost of materials are covered); *excludes* separate purchases of materials made by households with the intention of undertaking the maintenance or repair themselves (11.04.31.1); services engaged for major maintenance and repair (intermediate consumption) or for extension and conversion of the dwelling (capital formation).

[16] See PPP Regulation, article 3(e) in Annex II.

4.3.3 Derivation of actual individual consumption

4.23 The Eurostat-OECD classification is first and foremost an expenditure classification. Individual consumption expenditure is clearly structured by who pays – households, NPISHs or general government. Participating countries are required to provide a breakdown of their final expenditure in line with this structure. Yet, for the reason explained in Box 4.2, one of the principal aims of Eurostat and OECD comparisons is to compare actual individual consumption (by households) at various levels of aggregation. And the results of comparisons are presented by who consumes – households or general government. The Eurostat-OECD classification is designed to allow the final consumption expenditures of households, NPISHs and government to be reclassified according to whether they benefit households individually or collectively.

4.24 This is achieved by using three functional classifications from the SNA 93: COICOP[17], COPNI[18] and COFOG 98[19]. These classify respectively the expenditures of households, NPISHs and general government by purpose – that is, by the ends that they wish to achieve through these expenditures. COICOP is designed to classify only a single outlay: individual consumption expenditure. COPNI and COFOG 98 are designed to classify a range of transactions of which the outlay on final consumption expenditure is one. In this respect, the main use of COPNI and COFOG 98 is to classify the individual consumption expenditures by NPISHs and government in a way that is consistent with the classification of individual consumption expenditure by households in COICOP.

4.25 Together, COICOP, COPNI and COFOG 98 ensure the harmonised treatment of individual consumption expenditures of households, NPISHs and government that is central to the Eurostat-OECD classification. The correspondence with the three classifications as it is to be found in the Eurostat-OECD classification is summarised in Box 4.5. The table shows the correspondence between the expenditure categories of the classification and how these are summed to obtain actual individual consumption at the category level. This correspondence carries through to the lower levels of aggregation for households and for government, but not for NPISHs because participating countries generally do not have the detailed expenditure data required.

[17] "Classification of Individual Consumption According to Purpose (COICOP)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

[18] "Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

[19] "Classification of the Functions of Government (COFOG)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

Box 4.5: Derivation of actual individual consumption for expenditure categories

Purpose of expenditure	Households [COICOP]	NPISHs [COPNI]	Government [COFOG 98]	Actual individual consumption
Food and non-alcoholic beverages	11.01			11.01
Alcoholic beverages, tobacco &narcotics	11.02			11.02
Clothing and footwear	11.03			11.03
Housing, water, electricity, gas & other fuels	11.04			11.04
of which Actual rentals for housing	11.04.1*	12.01	13.01	11.04.1*+ 12.01 + 13.01
Furnishings, household equip. & maintenance	11.05			11.05
Health	11.06	12.02	13.02	11.06 + 12.02 + 13.02
Transport	11.07			11.07
Communication	11.08			11.08
Recreation and culture	11.09	12.03	13.03	11.09 + 12.03 + 13.03
Education	11.10	12.04	13.04	11.10 + 12.04 + 13.04
Restaurants and hotels	11.11			11.11
Miscellaneous goods and services:	11.12			11.12
of which Social protection	11.12.4*	12.05	13.05	11.12.4*+ 12.05 + 13.05
Other services		12.06		12.06
Total individual consumption expenditure	11.00	12.00	13.00	11.00 + 12.00 + 13.00

* Expenditure group

4.3.4 Main aggregates

4.26 The main aggregates have already been defined. This paragraph describes how they are dealt with in the expenditure classification.

- *Individual consumption expenditure by households* is broken down by purpose in line with COICOP into 143 basic headings. Expenditures at the basic heading level are defined according to the domestic concept – that is, irrespective of whether the household making the purchase is resident or not. Hence, the expenditures will include purchases of goods and services in the domestic market by non-resident households and will exclude purchases of goods and services by resident households when travelling abroad. But total individual consumption expenditure by households is required by the national concept - that is, it should refer to expenditures by resident households only. To obtain this total, a global adjustment – *net purchases abroad* – is made. The adjustment comprises one basic heading in the classification and is defined as the difference between purchases by residential households in the rest of the world *less* purchases by non-residential households in the economic territory of the country.
- *Individual consumption expenditure by NPISHs* is broken down by purpose according to COPNI into six basic headings: housing, health, recreation and culture, education, social protection, and other services. Other services includes expenditure by NPISHs on religion, political parties, labour and professional organisations, environment protection, and research and development.
- *Individual consumption expenditure by government* is broken down into 21 basic headings. The initial breakdown is by purpose as defined by COFOG 98: housing, health, recreation and culture, education and social protection. Of these, only health is broken down further. First, by whether the expenditure is for the purchase of health services from market producers (in the form of benefits and reimbursements) or for the production of health services by government itself. The expenditure on government-produced health services is then broken down by cost components as required by the input-price approach. The breakdown is given in Box 4.6.

- *Collective consumption expenditure by government* is defined in line with COFOG 98. It is treated as a single aggregate and broken down by cost components into seven basic headings as required by the input-price approach. From Box 4.6, it can be seen that compensation of employees and intermediate consumption are broken down by type of service – that is, by whether they relate to defence or to collective services other than defence.
- *Gross fixed capital formation* is broken down by type of product following CPA 96[20] into 26 basic headings: twenty for machinery and equipment, three for construction and three for other products. Other products include products of agriculture, forestry, fisheries and aquaculture; computer software; land improvement, mineral exploration and other intangible fixed assets.
- *Change in inventories and acquisitions less disposals of valuables* is broken down into two basic headings: change in inventories[21] and acquisitions less disposals of valuables.
- *Balance of exports and imports* is one basic heading. It is defined as exports of goods and services *less* imports of goods and services. According to the SNA 93 and the ESA 95, both exports and imports should be valued at f.o.b. (free on board) prices – that is, the prices at the frontier of the exporting country. This is difficult to do in the case of imports, which are usually registered in customs records at the value at the frontier of the importing country – that is, at c.i.f. (cost, insurance and freight)[22] prices. If merchandise imports are adjusted to f.o.b. prices, the effect is to reduce the value of merchandise imports and to increase the value of net imports of freight and insurance services by exactly the same amount. Since only the balance – that is, the combined totals - of exports and imports of goods and services is required for the calculation of PPPs, the Eurostat-OECD classification, as a practical matter, calls for merchandised imports to be valued at c.i.f. prices.

[20] Statistical Classification of Products by Activity in the European Economic Community (CPA 1996), Eurostat, Luxembourg, 1998.

[21] For the purposes of Eurostat-OECD comparisons, change in inventories also includes the statistical discrepancies of those participating countries that report them in their estimates of final expenditure on GDP.

[22] The c.i.f. (cost, insurance and freight) price is the price of a good delivered at the customs frontier of the importing country. It includes any insurance and freight charges incurred to that point. It excludes any import duties or other taxes on imports and trade and transport margins within the importing country.

Box 4.6: Government final consumption expenditure by basic heading

INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT	
13.01.11.1	Housing
	Health benefits and reimbursements
13.02.11.1	Pharmaceutical products
13.02.11.2	Other medical products
13.02.11.3	Therapeutic appliances and equipment
13.02.12.1	Out-patient medical services
13.02.12.2	Out-patient dental services
13.02.12.3	Out-patient paramedical services
13.02.12.4	Hospital services
	Production of health services
13.02.21.1	Compensation of employees: Physicians
13.02.21.2	Compensation of employees: Nurses and other medical staff
13.02.21.3	Compensation of employees: Non-medical staff
13.02.22.1	Intermediate consumption: Pharmaceutical products
13.02.22.2	Intermediate consumption: Other medical goods
13.02.22.3	Intermediate consumption: Therapeutic appliances and equipment
13.03.22.4	Intermediate consumption n.e.c.
13.02.23.1	Gross operating surplus
13.02.24.1	Net taxes on production
13.02.25.1	*less* Receipts from sales
13.03.11.1	Recreation and culture
13.04.11.1	Education
13.05.11.1	Social protection
COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT	
14.01.11.1	Compensation of employees (collective services relating to defence)
14.01.11.2	Compensation of employees (collective services other than defence)
14.01.12.1	Intermediate consumption (collective services relating to defence)
14.01.12.2	Intermediate consumption (collective services other than defence)
14.01.13.1	Gross operating surplus
14.01.14.1	Net taxes on production
14.01.15.1	*less* Receipts from sales

Box 4.7: Levels of aggregation

10.00.00.0 GROSS DOMESTIC PRODUCT	
11.00.00.0 INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS	= main aggregate
11.01.00.0 FOOD AND NON-ALCOHOLIC BEVERAGES	= expenditure category
11.01.10.0 FOOD	= expenditure group
11.01.11.0 Bread and cereals [COICOP 01.1.1]*	= expenditure class
11.01.11.1 Rice (ND)**	= basic heading
11.01.11.2 Other cereals (ND)**	= basic heading
11.01.11.3 Bread (ND)**	= basic heading
11.01.11.4 Other bakery products (ND)**	= basic heading
11.01.11.5 Pasta products (ND)**	= basic heading
11.01.12.0 Meat [COICOP 01.1.2]*	= expenditure class
11.01.12.1 Beef and veal (ND)**	= basic heading
11.01.12.2 Pork (ND)**	= basic heading

* classification correspondence
** classification by type of product

4.3.5 Presentation of the classification

4.27 The classification is presented in Annex III. GDP, main aggregates, expenditure categories and expenditure groups are identified by capital letters and by one-, two-, four- and five-digit codes respectively. Expenditure classes are underlined and have six-digit codes. Basic headings have seven-digit codes. These distinctions are illustrated in Box 4.7.

4.28 Annex III provides a definition for each basic heading. Examples of these definitions are given in Box 4.4. From these it can be seen that a definition lists either the products or the product groups covered by the basic heading. For example, the definition of services for the maintenance and repair of the dwelling specifies products: *services of plumbers, electricians, carpenters, glaziers, painters, decorators, floor polishers, etc.* The definition for major household appliances identifies six product groups: *refrigerators, freezers and fridge-freezers; washing-machines, dryers, drying cabinets, dishwashers, ironing and pressing machines; cookers, spit roasters, hobs, ranges, ovens and micro-wave ovens; air conditioners, humidifiers, space heaters, water heaters, ventilators and ex-tractor hoods; vacuum cleaners, steam-cleaning machines, carpet shampooing machines and machines for scrubbing, waxing and polishing floors; safes, sewing machines, knitting machines, water softeners, etc.*

4.29 The lists are not comprehensive, but they are complete enough to demarcate the boundaries of the basic headings and to distinguish between them. In addition, there are clarifications, when possible ambiguities may arise, of what is to be specifically included and what is to be specifically excluded. In the case of exclusions, the correct basic heading for the excluded product is identified. From the definition of men's footwear in Box 4.4, it can be seen that the expenditure on the basic heading should include expenditure on *gaiters, leggings and similar articles; shoelaces; parts of footwear, such as heels, soles, etc., purchased by households with the intention of repairing footwear themselves* and should exclude expenditure on *shoe-trees, shoehorns and polishes, creams and other shoe-cleaning articles (11.05.61.1); orthopaedic footwear (11.06.13.1); game-specific footwear (ski boots, football boots, golfing shoes, other such footwear fitted with ice skates, rollers, spikes, studs, etc.) (11.09.32.1); shin-guards, cricket pads and other protective apparel for sport (11.09.32.1)*. Excluded expenditures should be assigned to the basic heading stipulated: 11.05.61.1, 11.06.13.1, 11.09.32.1 or 11.09.32.1.

4.3.6 Correspondence with COICOP, COPNI, COFOG 98 and CPA 96

4.30 The individual consumption expenditures of households, NPISHs and government are classified by purpose using COICOP, COPNI and COFOG 98. Gross fixed capital formation is classified according to CPA 96 which classifies products by activity in line with NACE Rev. 1[23].

4.31 In Annex III, the correspondence with COICOP, COPNI and CPA 96 is specified in square brackets [ ] at the level of the expenditure class. From Box 4.7, it can be seen that expenditure class 11.01.11 Bread and cereals corresponds to COICOP class 01.1.1 and that expenditure class 11.01.12 Meat corresponds to COICOP class 01.1.2. Usually there is a one-to-one correspondence between the expenditure classes of individual consumption expenditure by households and COICOP classes. This is not the case with the expenditure classes of individual consumption by NPISHs and the classes of COPNI. Nor is it so with the expenditure classes of gross fixed capital formation and the classes of CPA 96. In both cases, the correspondence is between an expenditure class and a range of classes of the underlying classification. For example, it can be seen in Annex III that expenditure class 12.02.11 Health corresponds to COPNI classes 02.1.1 to 02.6.0 and that expenditure class 15.01.12 General purpose machinery corresponds to CPA 96 classes 29.11 to 29.24.

4.32 The correspondence with COFOG 98 is defined two aggregation levels higher, at the expenditure category level. The correspondence is broad, generally at the level of COFOG divisions (or two-digit level). For example, in Annex III, the correspondence between expenditure category 13.02.00.0 HEALTH and COFOG 98 is defined as follows:

> "COFOG 07 Health covers government outlays on health services provided to individual persons and health services provided on a collective basis. Only expenditures on individual services - COFOG 07.1.1 to 07.4.0 - are allocated here *(that is, to 13.02.00.0 HEALTH)*. Expenditures on collective services - COFOG 07.5.0 and 07.6.0 - are assigned to 14.01.10.0 *(that is, to COLLECTIVE SERVICES)*."

A clear distinction is made between those expenditures that are individual and those that are collective as required by COFOG 98.

4.3.7 Classification by type of product

4.33 Each basic heading in Annex III is classified by type of product – that is, whether the products it covers are goods or services. For example, in Box 4.7, all the basic headings are designated (ND). This indicates that they contain non-durable consumer goods as explained below.

4.34 Under individual consumption expenditure by households, basic headings containing goods are denoted by either (ND), (SD) or (D) indicating *non-durable*, *semi-durable* or *durable* respectively, while those containing services are denoted by (S). Most of these basic headings comprise either goods or services, but, for practical reasons, some basic headings contain both goods and services. Similarly, there are basic headings which contain either both non-durable and semi-durable goods or both semi-durable and durable goods. Such basic headings are assigned a (ND), (SD), (D) or (S) according to which type of product is considered to be predominant.

4.35 The distinction between non-durable goods and durable goods is based on whether the goods can be used only once or whether they can be used repeatedly or continuously over a period of considerably more than one year.[24] Durables have as well a relatively high purchasers' price. Semi-durable goods differ from durable goods in that their expected lifetime of use, though more than one year, is often significantly shorter and that their purchasers' price is substantially less.[25] These differentiations are the same as those applied to classify COICOP classes by type of product.

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[23] Statistical Classification of Economic Activities in the European Community (NACE Rev.1), Eurostat, Luxembourg, 1996.

[24] Paragraph 9.38, SNA 93.

[25] Paragraph 6.93, SNA 68.

4.36 All basic headings under individual consumption expenditure by NPISHs and individual consumption expenditure by government are classified as individual services (IS). Likewise, all basic headings under collective consumption expenditure by government are classified as collective services (CS) and all basic headings under gross fixed capital formation are classified as investment goods (IG).

4.4 Reporting and validation of expenditure data

4.4.1 Reporting

4.37 Participating countries are required to report details of their final expenditure for a reference year, t, three times: first in the September of year t+1, then in the September of year t+2 and finally in the September of year t+3.

- The detailed expenditures reported in t+1 are used to calculate the preliminary PPPs for t that are released in December of t+1. Countries are expected to report the best estimates for the various levels of aggregation that are available for t at that time. Being provisional, the extent to which the breakdowns, particularly at the lower levels of aggregation, will reflect that of a previous year rather than t will vary from country to country. As a minimum, GDP, the main aggregates and the expenditure categories should be current estimates for t, but the structure of expenditure below these levels may be that of t-1 or even t-2.
- The detailed expenditures reported in t+2 are used to calculate the intermediate PPPs for t that are released in December of t+2. Countries are expected to report breakdowns that refer to t at all levels of aggregation. It is also expected that the breakdowns will be almost final with countries having introduced most of the major revisions to their estimates with only minor revisions outstanding.
- The detailed expenditures reported in t+3 are used to calculate the final PPPs for t that are released in December of t+3. Countries are expected to report breakdowns that refer to t at all levels of aggregation. It is also expected that the breakdowns will be final.

4.38 The PPPs for t will be calculated in December of t+1, t+2 and t+3 just prior to their dissemination. The detailed expenditures that were reported earlier in the corresponding September provide the weights for the calculation. But they do not provide the levels of either GDP or its component expenditures. Levels for GDP and the main aggregates are taken from the national accounts data bases maintained by Eurostat and the OECD just before the calculation is made. The expenditure extracted for each of the main aggregates is then distributed proportionally across the aggregate's basic headings in line with each basic heading's share in the expenditure on the aggregate reported in September.

4.39 Participating countries are required to report their detailed expenditures on the electronic reporting form supplied by Eurostat or by the OECD. An example of the first page of the reporting form is provided in Box 4.8. The various levels of aggregation are listed in descending order - GDP, main aggregates, expenditure categories, expenditure groups, expenditure classes, basic headings – with each aggregation level being nested under the aggregation level immediately above it. The reporting form is programmed to be completed from the bottom up – that is, from the basic heading upwards. For example, once the expenditures on the basic headings *rice*, *other cereals, flour and other cereal products*, *bread*, *other bakery products* and *pasta* have been entered, expenditure on the expenditure class *bread and cereals* will be calculated automatically. This expenditure will be carried through to all the higher levels of aggregation - *food*, *food and non-alcoholic beverages*, *individual consumption expenditure by households* and, finally, *GDP* - as shown in Box 4.8. Of course, as the expenditures for the other basic headings are introduced, the higher levels of aggregation will change. They will keep on accumulating until the expenditures for all their constituent basic headings have been included.

4.40 The cells for basic headings on the reporting form are not programmed – that is, they do not contain an aggregation formula. Only the cells for aggregation levels above the basic heading level are programmed for automatic aggregation. Participating countries should complete the form by entering only the expenditures on the 206 basic headings listed. Automatic aggregation will complete the reporting form and provide a data set that is internally consistent – that is, each aggregate is the sum of its components. In practice, it is unlikely that countries will apply this bottom up approach throughout. For certain expenditure classes, and even, perhaps, for some expenditure groups, countries will follow a top down approach. If a top down approach is adopted, care must be taken not to override the aggregation formula in order to preserve the internal consistency of the data set. This can be done by entering the expenditure for the class in the cell of one of its basic headings. Later the expenditure can be revisited and divided over all the basic headings covered by the expenditure class.[26]

4.41 Neither the reporting form nor the expenditure classification on which it is based makes provision for the statistical discrepancy that may arise when countries use two independent approaches to estimate GDP. For the purposes of Eurostat and OECD comparisons, participating countries that report a statistical discrepancy for their expenditure estimate of GDP should include the discrepancy under the basic heading *change in inventories* on the reporting form.

Box 4.8: Expenditure reporting form

Main aggregates, categories, groups, classes and basic headings	Reference year (t)
10.00.00.0 GROSS DOMESTIC PRODUCT	100
11.00.00.0 INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS	100
11.01.00.0 FOOD AND NON-ALCOHOLIC BEVERAGES	100
11.01.10.0 FOOD	100
11.01.11.0 Bread and cereals	100
11.01.11.1 Rice	15
11.01.11.2 Other cereals, flour and other cereal	5
11.01.11.3 Bread	35
11.01.11.4 Other bakery products	20
11.01.11.5 Pasta products	25
11.01.12.0 Meat	
11.01.12.1 Beef and veal	
11.01.12.2 Pork	
11.01.12.3 Lamb, mutton and goat	
11.01.12.4 Poultry	
11.01.12.5 Other meats and edible offal	
11.01.12.6 Delicatessen and other meat	
11.01.13.0 Fish and seafood	
11.01.13.1 Fresh, chilled or frozen fish and seafood	
11.01.13.2 Preserved and processed fish and	
11.01.14.0 Milk, cheese and eggs	
11.01.14.1 Fresh milk	
11.01.14.2 Preserved milk and other milk products	
11.01.14.3 Cheese	
11.01.14.4 Eggs and egg-based products	
11.01.15.0 Oil and fats	
11.01.15.1 Butter	

[26] For example, a country may have firm information about expenditures on the expenditure class *fruit*, but no direct information on the two basic headings – *fresh or chilled fruit* and *frozen, preserved, processed fruit and fruit products* - that make up the expenditure class. In this case, the country can enter the expenditure on fruit directly into one of the basic heading cells, return later to this expenditure and use its best judgement about the split between the two basic headings.

Main aggregates, categories, groups, classes and basic headings	Reference year (t)
11.01.15.2 Margarine	
11.01.15.3 Other edible oils and fats	
11.01.16.0 Fruit	
11.01.16.1 Fresh or chilled fruit	
11.01.16.2 Frozen/preserved/processed fruit	
11.01.17.0 Vegetables	
11.01.17.1 Fresh or chilled vegetables other than	
11.01.17.2 Fresh or chilled potatoes	
11.01.17.3 Frozen/preserved/processed vegetables	
11.01.18.0 Sugar, jam, honey and confectionery	
11.01.18.1 Sugar	
11.01.18.2 Jams, marmalades and honey	
11.01.18.3 Confectionery, chocolate & other cocoa	
11.01.18.4 Edible ice, ice cream and sorbet	
11.01.19.0 Food products n.e.c.	
11.01.19.1 Food, products n.e.c.	
11.01.20.0 NON-ALCOHOLIC BEVERAGES	
11.01.21.0 Coffee, tea and cocoa	
11.01.21.1 Coffee, tea and cocoa	
11.01.22.0 Mineral waters, soft drinks, fruit and vegetable	
11.01.22.1 Mineral waters	
11.01.22.2 Soft drinks and concentrates	
11.01.22.3 Fruit and vegetable juices	

4.4.2 Validation

4.42 Participating countries should make sure that the reporting form is complete and that there is an entry for each basic heading. If the form is not complete, countries are required to fill the gaps themselves and not leave it to be done for them by Eurostat or the OECD. Countries are generally in a better position to estimate missing expenditures and it is preferable that they, and not Eurostat or the OECD, do the estimations. Possible ways of doing this include referring back to the expenditure data of former reference years, searching for a data source which, while not consulted during regular compilations of the national accounts, could be used for PPP purposes, and soliciting experts for "guesstimates". The allocations of participating countries having "similar" expenditure patterns can also be applied, although this approach works better with the household expenditure than it does with government expenditure or capital formation. If none of these options are effective, then, as a last resort, completeness can be forced by distributing the expenditure on an expenditure class equally over its basic headings. When this occurs it should be brought to the attention of Eurostat or the OECD and indicated on the reporting form. Note, that if there is no expenditure on a basic heading then a zero must be entered into its cell, it should not be left blank. Reporting forms with blank cells will be returned to countries for completion.

4.43 Participating countries should also verify the temporal consistency of the expenditures they report. The shares of the component expenditures of all levels of aggregation should be compared with their respective shares in previous reference years. Conspicuous shifts in shares that cannot be readily explained should be investigated and corrected when necessary. Otherwise they should be flagged and endorsed either on the reporting form or in a covering note. This will avoid needless queries when either Eurostat or the OECD repeats the edit.

4.44 On receipt of the reporting forms, Eurostat and the OECD will repeat the checks for completeness, internal consistency and temporal consistency. They will verify as well the spatial consistency of the reported expenditures by comparing the shares of component expenditures of each level of aggregation across countries. Even though the expenditure patterns of participating

countries can vary considerable, this edit allows inconsistencies arising from differences in interpretation and implementation to be identified. Unless a country has changed its practice between reference years, it is unlikely to find such inconsistencies itself when checking temporal consistency. For example, in the past, some countries included the cost of food purchased in restaurants under food, while others included it under restaurants. This discrepancy was discovered by comparing the expenditure shares of countries. Another example concerns rentals for housing. Rentals, as defined in the SNA 93 and the ESA 95, should not include charges for heating or for miscellaneous services relating to the dwelling such as refuse collection or co-proprietor charges in multi-occupied dwellings. Not all countries observe this definition and countries not doing so can be identified when their expenditure shares are compared with countries that do.

4.45 Once verification is concluded, the expenditure breakdowns that participating countries report for t in September t+3 will be complete and internally consistent. Their temporal and spatial consistency will have been validated. They will also be final – that is, the shares of components for all aggregation levels up to the main aggregate level are fixed. They will not be changed to take account of revisions to GDP estimates that take place below the main aggregate level after September t+3. Revisions to GDP and the main aggregates that are made between September t+3 and December t+3 when the PPPs are calculated will be accommodated however as explained in paragraph 4.38. Changes to the main aggregates will be distributed proportionally over their component expenditures in line with each component's share in the finalised expenditure breakdown.

4.46 Publication policy and the annual publication schedule are explained in Chapter 13. It is sufficient to note here that the PPPs for t calculated and disseminated in December t+3 are final. They will not be recalculated to take account of revisions to the GDP for t that occur after December t+3. Instead the revised estimates of GDP and its component expenditures will be converted to real final expenditures using the PPPs of December t+3. In the long term, the final PPPs for t and for other reference years may be recalculated when the definitions, concepts, classifications and accounting rules of the SNA 93 and the ESA 95 are replaced by those of the SNA 2008 and the ESA 2010.

4.5 Future developments

4.47 The expenditure classification in Annex III is not the same as the classification specified in the PPP Regulation. It has been modified to accommodate the new methodologies for construction and education that have been introduced since December 2007 when the Regulation was adopted by the European Parliament and the Council of the European Union. Further modifications to the classification can be expected when the new methodology for health outlined in Chapter 7, Section 7.6, is introduced in 2013. It is anticipated also that the classification in Annex III will evolve as the result of three other developments that are expected to take place after publication of this manual in 2012. The first is the switch from the SNA 93 and the ESA 95 to the SNA 2008 and the ESA 2010; the second is the harmonisation of COICOP at the five-digit or subclass level; and the third is the redefinition of the correspondence between the classification's capital expenditures and the latest version the CPA – that is, the CPA 2008[27].

[27] *Statistical Classification of Products by Activity in the European Economic Community, 2008 version*, Eurostat, Luxembourg, 2008, http://epp.eurostat.ec.europa.eu/portal/page/portal/cpa_2008/introduction

4.5.1 SNA 2008 and ESA 2010

4.48 The majority of participating countries will have moved to either the SNA 2008 or the ESA 2010 by 2014. Both revised systems have kept the theoretical framework of the system it will replace and remain fully compatible with each other as before. There are no radical departures from their predecessors and the basic structure of the classification will remain as it is. Even so, within the basic structure, changes will occur under gross fixed capital formation as a result of the changes that have been introduced in the classification of fixed assets.

4.49 The first change is the reclassification of expenditures on research and development (R&D) and on military weapons systems as expenditures on fixed assets to be included under capital formation. Previously these expenditures were treated as intermediate consumption. Extending the assets boundary to include expenditure on R&D will raise both the levels of gross fixed capital formation and GDP. The inclusion of expenditure on military weapon systems will increase the level of gross fixed capital formation and, to a lesser extent, the level of GDP, but it will also reduce the level of collective services as these are estimated by summing their costs of production of which intermediate consumption is one. The increase in GDP will be equal to the consumption of fixed capital on weapon systems, while the decrease in collective services will be equal to the intermediate consumption reclassified as capital formation less consumption of fixed capital on weapon systems.

4.50 R&D can be accommodated either by creating a new basic heading or, as it is an intellectual property product, by adding it to the basic heading *other products not elsewhere classified* which includes other intellectual property products. The second option is probably the better given that prices are unlikely to be collected for R&D and real expenditures will be obtained with a reference PPP. Military weapons systems probably require a new basic heading. This is in line with the current practice which distinguishes between *intermediate consumption relating to defence* and *intermediate consumption relating to collective services other than defence*, thereby allowing different reference PPPs to be applied to each. No matter how expenditure on military weapons systems is accommodated, its transfer to gross fixed capital formation removes the reason for having two basic headings for intermediate consumption under collective services.

4.51 The second change in the classification of fixed assets concerns expenditure on land improvements and ownership transfer costs relating to land. Before these expenditures were allocated to the non-produced asset, land. But now they are included under expenditure on non-residential buildings and other structures. Either this will require a new basic heading with possibly the PPP for civil engineering works as the reference PPP or the expenditures can be added directly to the existing basic heading *civil engineering works*.

4.52 The third change concerns the explicit identification of ownership transfer costs on non-produced assets. This is necessary as there is no fixed asset with which they can be identified (the practice is to assign ownership transfer costs to the fixed asset to which they apply). Whether these costs need to be separately identified in the expenditure classification is debatable. They could be included, together with R&D, mineral exploration and evaluation, the acquisition of entertainment, literary or artistic originals and other intellectual property products, under the basic heading *other products not elsewhere classified*.

4.53 The final change concerns computer software and databases. Formerly only computer software was considered to be a fixed asset. Under the revised systems, all databases holding data with a useful life of more than one year are required to be treated as fixed assets. Databases could be included with computer software in a basic heading *computer software and databases*.

4.5.2 Harmonisation of COICOP

4.54 The internationally agreed version of COICOP which covers individual consumption expenditure of households stops at the four-digit or class level. This is not sufficiently detailed for some statistical applications and different versions of COICOP exist at the five-digit or subclass level as a result. Within the European Union three five-digit versions of COICOP were developed: one for Household Budget Surveys (HBS), one for the Harmonised Index of Consumer Prices (HICP) and one for PPPs. The three versions are not the same and this compromises comparability across the three statistical domains. Harmonising COICOP-PPP and COICOP-HICP has particular relevance for the PPP Programme: it will improve the quality of the extrapolations of PPPs from survey years to non-survey years that are required by the rolling survey approach and which are carried out with HICP indices.

4.55 In 2010, Eurostat started the process of developing a 5-digit version of COICOP to be used by all Eurostat statistics. The process was limited to the five-digit level. Changes at the four-digit level would have to be discussed within the context of a broader revision involving the United Nations Statistics Division, the guardian of COICOP. The object at the five-digit level is to draw up a master classification with subclasses defined to meet the needs of the PPP Programme, the HICP Programme and the HBS. The process was concluded in 2012[28]. The classification is to be introduced in HICP and PPP by 2014.

4.56 The detail demanded by the HICP Programme is greater than that required for the PPP Programme so that the master classification to be put forward for consideration by EU Member States consists of more subclasses than there are currently basic headings. For example, it is proposed that the basic heading *services for the maintenance and repair of the dwelling* is broken down into six subclasses covering the services of plumbers, electricians, heating system maintenance engineers, painters, carpenters, and others. Whether internationally comparable prices and expenditures can be collected for each of these sub-classes is questionable and, in practice for PPP purposes, a single basic heading could remain providing it corresponds completely to the six subclasses. This will allow the PPPs for the basic heading to be extrapolated with an index having exactly the same coverage.

4.57 The redefinition of basic headings and HICP subclasses required to harmonise COICOP-PPP and COICOP-HICP should lead to greater alignment between basic heading PPPs and their HICP extrapolators. It should also result in greater coherence in the presentation of PPP and HICP results and, possibly, in the results themselves.

4.5.3 CPA 2008

4.58 CPA 2008 is the latest version of the statistical classification of products by activity of the European Union. It is a revision of CPA 2002 which itself is a revision of CPA 96. CPA 96 is the version that was used in the expenditure classification to define the expenditure classes under gross fixed capital formation. It does not, however, provide structure to gross fixed capital formation in the way that COICOP provides structure to individual consumption expenditure by households and COFOG 98 provides structure to government services. The structure underlying gross fixed capital formation in the expenditure classification is that of the classification of fixed assets in the SNA 93 and the ESA 95. Once the details of the breakdown of gross fixed capital formation were agreed and the expenditure classes defined, a correspondence was established between the products in the expenditure classes and those in the classes of CPA 96. A similar process will be employed with CPA 2008 after the structure of gross fixed capital formation has been brought into line with the classification of fixed assets in the SNA 2008 and the ESA 2010.

[28]The full five-digit classification can be consulted on Eurostat's classification server: http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=COICOP_5&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC

Consumer goods and services

5

5.1 Introduction

5.1 Individual consumption expenditure by households covers the actual and imputed final consumption expenditure incurred by households on the goods and services they require to satisfy their individual needs and wants. It accounts on average for over 60 per cent of GDP and over 85 per cent of actual individual consumption in EU Member States and OECD Member Countries. It is by far the most important of the seven main aggregates that constitute the Eurostat-OECD classification of GDP expenditures and, as such, it is central to the international price and volume comparisons organised by Eurostat and the OECD.

5.2 Households purchase a large and diverse assortment of individual goods and services, but only a subset of these are priced for the purpose of calculating purchasing power parities (PPPs). This chapter explains how the subset of consumer goods and services is selected and how the selected goods and services are specified for Eurostat and OECD comparisons. It also explains how prices for the specified products should be collected, how the prices collected are validated and how the validated prices are converted into national and annual purchasers' prices. The chapter begins with an overview of the survey process and then describes in detail each of its various stages.

5.3 The consumer services covered in this chapter do not include housing, in-patient hospital services and education. These services are covered respectively in Chapters 6, 7 and 8.

5.2 Survey process

5.4 An important feature of Eurostat and OECD comparisons is that prices for consumer goods and services are collected over a period of three years (see Chapter 3, Section 3.3). The basket of products comprising household final consumption expenditure is divided into six parts with prices for two parts being surveyed each year. This requires the organisation of six separate price surveys. The six surveys of the current cycle are listed in Box 5.1 together with a summary of the types of products each survey covers. The advantages of this rolling survey approach is that it lessens the response burden on participating countries and allows national statistical institutes (NSIs) to include the price surveys in their regular programme of data collection.

5.5 A second important feature of Eurostat and OECD comparisons is that there are too many participating countries for the six price surveys to be managed centrally by either Eurostat or the OECD. Organisation is therefore decentralised for operational reasons. Participating countries are divided into groups, each headed by a group leader. Members and leaders of the current country groups are listed in Chapter 3 Box 3.3. The responsibilities of the group leader include coordinating the establishment of a group product list for each survey and overseeing the validation of the prices collected by the group during each survey. Neither task can be accomplished without the active involvement of the group members. Eurostat and OECD oversee the co-ordination between group leaders and ensure a harmonised approach to the surveys between groups.

5.6 A generalised timetable of the survey cycle is outlined in Box 5.2. Two price surveys are conducted each year. For example, in year 2, prices are collected for survey 1 and survey 2, but preparations for the two surveys start in year 1 and the processing of the two surveys ends in year 3. Each survey takes around 24 months to complete and each has five phases: the preview and planning phase, the pre-survey and item list creation phase; the price collection and intra-country validation phase; the validation phase; and the evaluation phase. Within any calendar year, work is underway on all six surveys: the two surveys of the previous year are being finalised; the two surveys of the current year are being carried out; and the two surveys of the following year are being prepared.

Box 5.1: Survey cycle

Sequence	Survey	Coverage
First year of cycle	Survey 1: Food, drinks and tobacco	Food; non-alcoholic beverages; alcoholic beverages; tobacco.
	Survey 2: Personal appearance	Clothing; cleaning, repair and hire of clothing; footwear; goods and services for personal care; personal effects.
Second year of cycle	Survey 3: House and garden	Materials for the maintenance and repair of the dwelling; household appliances; glassware, tableware and household utensils; tools and equipment for house and garden; non-durable household goods such as products for routine cleaning and maintenance; audio-visual, photographic and information-processing equipment; games, toys, hobbies, gardens, plants, flowers and pets; newspapers, books, stationery and drawing materials; electrical appliances for personal care.
	Survey 4: Transport, restaurants and hotels	Personal transport equipment; spare parts and accessories, fuels and lubricants for the operation of personal transport equipment; equipment for sport, camping and open-air recreation; catering services; accommodation services.
Third year of cycle	Survey 5: Services	Maintenance and repair services for the dwelling; water supply; electricity, gas and other fuels; domestic and household services; maintenance and repair services for personal transport equipment; transport services; postal services; telephone and telefax services; maintenance and repair services for major durables; veterinary and other services for pets; recreational and cultural services; other services not specified elsewhere.
	Survey 6: Furniture and health	Furniture, furnishings, carpets and other floor coverings; household textiles; medical products, appliances and equipment; out-patient services.

Housing, hospital services and education are not included in the survey cycle as they are surveyed annually. Other consumer goods and services, such as narcotics, combined passenger transport, telephone and telefax equipment, major durables for outdoor and indoor recreation, games of chance, package holidays, prostitution, social protection, insurance, FISIM and other financial services, are also not included in the survey cycle either. This is because it is difficult to specify and price products for them that are comparable across countries. Reference PPPs are used for the basic headings containing these goods and services (see Chapter 12, Section 12.3.4).

5.7 Each phase consists of a number of steps. These are listed in Box 5.3 together with who carries out the step and the month, specified in relation to the month price collection starts, when the step is implemented. To understand the steps it is necessary to bear in mind that in any given calendar year there are two group leaders' meetings, one in early spring and the other in early autumn, and that these are followed some two to three weeks later by group meetings. Group leaders' meetings and the group meetings have a common standard agenda, namely: preview of the survey that will be carried out in a year's time; planning of the survey that will be carried out in half a year's time; finalising the product list for the next survey; validation of the survey that was carried out half a year ago; evaluation of the survey carried out one year ago.

5.8 The surveys require close collaboration and co-ordination between all parties involved: Eurostat, OECD, the NSIs and the group leaders. Also required is a high level of transparency because each country's PPPs depend on all countries' data. To enable this, the entire survey process is carried out with on-line tools that allow any participant to view other participants' data and to follow the entire process of list creation, price collection, validation and calculation.

5.9 This section describes briefly the various phases of the survey process. Each phase is subsequently described in more detail in the sections that follow.

Box 5.2: Generalised timetable for the survey cycle

Year	Half year	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6
1	1st	Preview		Evaluation	Validation	Creation of item list and price collection	Planning and pre-survey
	2nd	Planning and pre-survey	Preview		Evaluation	Validation	Creation of item list and price collection
2	1st	Creation of item list and price collection	Planning and pre-survey	Preview		Evaluation	Validation
	2nd	Validation	Creation of item list and price collection	Planning and pre-survey	Preview		Evaluation
3	1st	Evaluation	Validation	Creation of item list and price collection	Planning and pre-survey	Preview	
	2nd		Evaluation	Validation	Creation of item list and price collection	Planning and pre-survey	Preview
4	1st	Preview		Evaluation	Validation	Creation of item list and price collection	Planning and pre-survey
	2nd	Planning and pre-survey	Preview		Evaluation	Validation	Creation of item list and price collection
5	1st	Creation of item list and price collection	Planning and pre-survey	Preview		Evaluation	Validation
	2nd	Validation	Creation of item list and price collection	Planning and pre-survey	Preview		Evaluation

5.10 The first phase of the survey process is the preview and planning phase. The aim of the phase is to review the methodology of the survey in question as well as its structure in terms of numbers of products to be priced. The process begins when the survey is first discussed at the group leaders' meeting of t-13. The starting point for the discussion is the evaluation report for the survey from the time it was last conducted. The discussion focuses on the principle features of the survey, its methodology and organisation, the problems specific to the products being surveyed, and the recommendations of the evaluation report. Other changes in methods and practices that may be necessary due to new market conditions or other developments since the previous survey are also considered. The conclusions reached at the group leaders' meeting are presented to the group meetings held later in the month to obtain initial feedback from participating countries.

5.11 Afterwards, in t-11, countries are sent a list of preview questions prepared by the group leaders. These have to be answered by t-8. The questions are designed to obtain information on the prevailing market situation and other associated topics. The responses received from countries will provide input into the planning discussion at the group leaders' meeting of t-7. During this meeting, decisions are taken on methodological issues, the target number of products to be priced for each of the basic headings covered by the survey and the definitions of the *structured product descriptions* (see Section 5.4.4) for the types of products being surveyed. These decisions are presented to the group meetings that follow the group leaders' meeting for approval by participating countries.

5.12 The next step is for group leaders to prepare the pre-survey product lists and make them available to countries through the *Item List Management Tool* (ILMT) by t-5. A pre-survey product list describes the products that are being proposed for pricing. The product descriptions include questions about the products and their markets. The proposals are based on decisions reached during the planning stage, on market research carried out by group leaders and on the product list from the last time the survey was held. The pre-survey list is an amended and updated version of the previous product list. Some products will have been discarded; others will have been redefined; and new products will have been added. It serves as a preliminary draft of the group product list for forthcoming price survey.

5.13 Participating countries carry out the pre-survey over two months in t-4 and t-3. This entails investigating the availability and importance of the products on the list, particularly the new products proposed by the group leader and later by other countries, proposing possible new products and answering the group leader's questions. Each country is expected to ensure that it can price a sufficient number of products for each of the basic headings being surveyed.

5.14 Subsequently, each group leader prepares a draft product list for their group on the basis of the results of the pre-survey. This involves selecting products whose availability and importance are found to be the highest among the countries in the group and adapting product specifications in line with the product parameters reported by countries. It also involves ensuring that the balance between branded and generic product specifications accommodates the different market situations of the countries in the group so that each country is able to price products that are representative of its consumption pattern. The draft lists are to be ready by the first week of t-2.

5.15 The draft group lists are then merged by Eurostat in the ILMT to produce the first draft of the *European product list* (see Section 5.4.3). The list is discussed in detail at the group leaders' meeting held at the beginning of t-1. The aim is to harmonise product definitions, to improve the overlap between group lists by increasing the number of products that appear on more than one group list, and to discuss the draft guidelines for the survey. The European product list is finalised at the group meetings held in the second half of t-1. The draft survey guidelines are also discussed at the group meetings. Immediately after the last group meeting, there is a follow up meeting of group leaders to decide any outstanding issues and to finalise the survey guidelines. The final European product list and the final survey guidelines are prepared by Eurostat and made available to countries at the end of t-1, just before the start of price collection.

5.16 Price collection and intra-country validation takes two and a half months from t to mid t+2. It is the responsibility of participating countries. On receipt of the final product list, countries select the

products for which prices will be collected. They are expected to price as many products on the product list as comparability and availability allow. To increase representativity and overlap, they are also allowed to price products that originally appeared on the lists of other groups.

5.17 Before reporting their prices to Eurostat, countries are expected to validate them. This is called ***intra**-country validation*. It is carried out without reference to the price data collected by other countries. (Prices are compared across countries during the ***inter**-country validation* phase discussed below.) The purpose of intra-country validation is to establish that price collectors within a country have priced comparable products and have reported the prices correctly. It involves editing the price observations for extreme values and checking the average prices for plausibility.

5.18 Countries are required to report their validated price observations and average prices to Eurostat by mid t+2. They are also expected to complete the sections of the *standard survey report* (see Section 5.5.8) that concern the pre-survey, the price collection and the intra-country validation and submit them to Eurostat at the same time.

Box 5.3 Generalised survey timetable

Phase	Step		Who	When		
				Month vis-à -vis month of price collection	Survey 1 of year t	Survey 2 of year t
Preview and planning	01.	First discussion of main issues at group leaders' meeting	Group leaders; Eurostat; OECD	t-13	Mar (t-1)	Sep (t-1)
	02.	Main issues discussed at group meetings	NSIs; group leaders; Eurostat; OECD	t-13	Mar (t-1)	Sep (t-1)
	03.	Preview questions sent to NSIs	Group leaders	t-11	May (t-1)	Nov (t-1)
	04.	Preview answers sent to group leaders	NSIs	t-8	Aug (t-1)	Feb (t)
	05.	Planning decisions prepared by group leaders' meeting	Group leaders; Eurostat; OECD	t-7	Sep (t-1)	Mar (t)
	06.	Planning decisions agreed at group meetings	NSIs; group leaders; Eurostat; OECD	t-7	Sep (t-1)	Mar (t)
Pre-survey and product list creation	07.	Pre-survey product list ready	Group leaders	t-5	Nov (t-1)	May (t)
	08.	Pre-survey	NSIs	t-4 to t-3	Dec (t-1)-Jan (t)	Jun-Jul (t)
	09.	Draft group product lists ready	Group leaders	t-2	Feb (t)	Aug (t)
	10.	First draft of European product list ready	Eurostat	t-2	Feb (t)	Aug (t)
	11.	First draft European product list discussed at group leaders' meeting	Group leaders; Eurostat; OECD	t-1	Mar (t)	Sep (t)
	12.	Second draft European product list ready	Eurostat	t-1	Mar (t)	Sep (t)
	13.	Second draft European Product list discussed at group meetings	NSIs; group leaders; Eurostat; OECD	t-1	Mar (t)	Sep (t)
	14.	Follow up meeting of group leaders	Group leaders; Eurostat; OECD	t-1	Mar (t)	Sep (t)
	15.	Final European product list ready	Group leaders; Eurostat	t-1	Mar (t)	Sep (t)
Price collection	16.	Price collection and intra-country validation	NSIs	t to t+2	Apr-Jun (t)	Oct-Dec (t)

Phase	Step	Who	When		
			Month vis-à -vis month of price collection	Survey 1 of year t	Survey 2 of year t
and intra-country validation	17. Price file and sections 1,2, 3 and 5 of survey report sent to Eurostat	NSIs	t+2	Jun (t)	Dec (t)
Validation	18. Data cleaning and checking	NSIs; group leaders	t+2 to t+3	Jun-Jul (t)	Dec (t)-Jan (t+1)
	19. 1st European Quaranta table calculated	Eurostat	t+3	Jul (t)	Jan (t+1)
	20. Spatial adjustment factors sent to Eurostat	NSIs	t+3	Jul (t)	Jan (t+1)
	21. Analysis of 1st European Quaranta table	NSIs; group leaders	t+3 to t+4	Jul-Aug (t)	Jan-Feb (t+1)
	22. 1st European Quaranta table discussed at group leaders' meeting	Group leaders; Eurostat; OECD	t+5	Sep (t)	Mar (t+1)
	23. 1st European Quaranta table discussed at group meetings	NSIs; group leaders; Eurostat; OECD	t+5	Sep (t)	Mar (t+1)
	24. 2nd European Quaranta table calculated	Eurostat	t+6	Sep (t)	Mar (t+1)
	25. Continuation of validation	NSIs; group leaders; Eurostat	t+6	Oct (t)	Apr (t+1)
	26. Approval of survey results and closure of validation	NSIs; group leaders	t+6	Oct (t)	Apr (t+1)
	27. Section 4 of survey report sent to Eurostat	NSIs	t+7	Nov (t)	May (t+1)
Evaluation	28. Group leader survey reports to Eurostat	Group leaders	t+9	Jan (t+1)	Jul (t+1)
	29. Evaluation at group leaders' meeting	Group leaders; Eurostat; OECD	t+11	Mar (t+1)	Sep (t+1)
	30. Evaluation at group meetings	NSIs; group leaders; Eurostat; OECD	t+11	Mar (t+1)	Sep (t+1)

5.19 Inter-country validation by the group leaders starts immediately after the price data reported by countries have been uploaded to the central PPP database at Eurostat. The first step involves checking whether data have been entered correctly by countries. This takes until the beginning of t+3. By that time, most, if not all, data entry errors will have been identified and corrected and the average prices of the products surveyed should be sufficiently reliable for Eurostat to calculate the first version of the basic heading PPPs. These cover all participating countries and all basic headings surveyed. At the same time the *Quaranta table*, the main instrument for validation of the PPPs, is calculated. It is designed to screen average survey prices for possible errors and to assess the reliability of the PPPs they provide. It does this by comparing the prices for the same product in different countries and by analysing the dispersion of price ratios across countries and across products. A detailed description of the *Quaranta editing procedure* and the Quaranta table is available in Annex IV.

5.20 The group leaders and countries use the Quaranta table to carry out in-depth analysis of countries' data. The analysis focuses on the plausibility of the survey results, judged against previous survey results and overall price levels. It provides the means of verifying that countries have priced products that correspond to the product specifications, have followed the survey guidelines and have allocated the representativity indicators correctly. Countries are required to respond to all questions raised by group leaders during the course of the validation. Even so, while group leaders can

question or point to errors in a country's data, they cannot make any corrections. Only the country can change its data.

5.21 At the group leaders' meeting in the first half of t+5, the survey results are discussed in detail, the approaches to validation are harmonised and agreement is reached on any additional questions that need to be asked about the data of individual countries. The survey data are subsequently discussed with the countries in the group meetings that take place in the second half of t+5. This leads to further correction of data by countries following which a new Quaranta table is calculated by Eurostat. Validation continues on the basis of this table with group leaders and countries working together to resolve outstanding issues and to ensure correct and plausible results. Validation is complete when countries formally approve their data. This should be given during t+6.

5.22 In t+7, countries are expected to complete the section of the standard survey report that concerns inter-country validation and send it to Eurostat and their group leader. Later, in t+9, group leaders submit their own survey reports. These summarise the survey reports of the countries in their group, provide an overview of the advice given to countries during price collection and give a summary of the validation process. The reports should also contain proposals on how the organisation and methodology of the survey can be improved. In particular, they should clearly identify and explain the difficulties encountered during the preparation, execution and validation of the survey and propose solutions on how to overcome them the next time around.

5.23 Eurostat prepares a survey evaluation report based on the survey reports received from the group leaders. The report provides full documentation on the execution of the survey and provides recommendations for the next survey of its kind. It forms the input for the evaluation of the survey at the group leaders' meeting at the beginning of t+11. The conclusions reached by the group leaders are presented for adoption to the group meetings held in the second half of t+11. Twelve months later, in t+23, group leaders, Eurostat and the OECD will again consider the evaluation report when they preview the survey once again.

5.3 Preview and planning

5.24 Each survey starts with a review of the evaluation report on the survey the last time it was held (see Section 5.8). This report contains recommendations that were drafted after the closure of the survey. Each of the recommendations are considered again and taken on board in the preparation of the forthcoming survey. The first step in the preparation process is to draft a short preview questionnaire to collect from NSIs information on changes in the market, the importance of specific parameters in product definitions, the availability of international brands or to exchange views on potential methodological improvements. The aim of the preview questionnaire is to have the best possible basis for drafting the pre-survey lists (see next section).

5.25 Countries are requested to return the preview questionnaire in time for the group leaders to prepare themselves for a group leaders' meeting in which the planning of the survey takes place. Planning involves proposing target numbers of products per basic heading as well as any changes to the SPDs (see Section 5.4.4). Proposals on methodological issues are also made. The conclusions of the group leaders' meeting are presented to participating countries for endorsement at the group meetings that follow the group leaders' meeting.

5.26 The target number of products per basic heading is determined on the basis of the share in actual individual consumption of the basic heading as well as the price variation as measured in the survey previously. Besides these criteria, other considerations play a role as well. For example, services may have high shares in expenditures and high price variation, but it is much more difficult to define services that are comparable across countries than it is to defined goods that are internationally comparable. Hence, for basic headings covering services, the number of products often falls somewhat below the theoretical targets. Also, some basic headings with high expenditure shares may only cover a few products. A case in point is automotive fuels, where the bulk of expenditure is on three or four products. It is obviously not necessary to include more than those products in the product list. There are as well cases where data sources allow the inclusion of more

products than theoretically would be required. Pharmaceutical products for which prices in many countries can be extracted from a central database are such a case.

5.27 Target numbers for basic headings are defined with a view to the resources available in participating countries. The target numbers are used by the group leaders in the development of their product lists (see the following section). Group leaders try to ensure that the final group product lists have a structure that is in line with agreed target numbers.

5.4 Pre-survey and product list creation

5.4.1 Requirements for product lists

5.28 Countries participating in the Eurostat and OECD comparisons collect prices for a sample of representative and comparable products. The prices are collected to calculate PPPs. PPPs are first calculated at the level of the basic heading. Prices, therefore, have to be collected with respect to a basic heading and the selection of products to be priced has also to be done at the level of the basic heading.

5.29 The objective is to select a sample of products that reflects the principal expenditures on the basic heading rather than the full coverage of the basic heading – that is, to select those products included under the basic heading that households are commonly buying.[1] There are two complications to be surmounted. One is the broad, if not heterogeneous, coverage of many basic headings. The other is that what consumers buy in one country is not necessarily the same as what they buy in another country. To some extent, these are compensatory difficulties. In general, the coverage of the basic headings, as defined in the Eurostat-OECD expenditure classification, is wide enough to accommodate the different consumption patterns of all participating countries. In other words, the coverage of most basic headings facilitates the selection of products that are available in more than one country even though the importance of the products with respect to expenditure on the basic heading is not the same for all countries in which they are found. Operationally, this requires participating countries to price not only products that reflect their own expenditure on the basic heading, but also products that reflect the expenditure of other countries on the basic heading.[2]

5.30 Individual consumption expenditure by households is broken down into 143 basic headings in the expenditure classification. Prices are currently collected for 123 of them and reference PPPs[3] are used for the remaining twenty. The majority of basic headings cover a wide range of products. Even when the products covered appear to be relatively homogeneous, the choice of products can still be large. For example, the basic heading *rice* covers “all forms [of rice] except flour”. It includes brown and white rice, long-grain, medium-grain and short-grain rice, aromatic rice such as basmati and jasmine rice, special rice such as arborio for risotto and calasparra for paella, parboiled and glutinous rice. In addition, all of them are sold under various brand names, in a variety of package types and sizes, and with varying percentages of broken rice.

5.31 Faced with such an array, selecting a subset of products for a basic heading that can be priced over a number of countries is clearly going to be difficult, much more difficult than it is to select the products to be priced at the elementary level of a consumer price index (CPI) within a single country. There, within broad guiding parameters, the selection can be left to the price collector whose choice may differ from outlet to outlet providing it does not change over time. This initiative cannot be allowed to price collectors collecting prices for Eurostat and OECD comparisons because they are

1 For example, the basic heading *fresh and chilled fruit* covers all varieties of fruit. But if households mostly buy common varieties, such as apples, pears, oranges, lemons, grapefruit and bananas, and spend little on exotic varieties, like mangoes, guavas, papayas, pineapples and pomegranates, the sample of products selected for the basic heading would consist mainly, if not wholly, of common varieties.

2 To continue with the example of footnote 1. If household expenditure on fruit is mainly on common varieties in some participating countries and mostly on exotic varieties in others, the sample of products chosen for the basic heading *fresh and chilled fruit* would be a balanced selection of common and exotic varieties. And countries, regardless of their preferences, would be expected to price both common and exotic varieties as available.

3 Reference PPPs are PPPs that are used for basic headings for which no prices are collected. They are taken from elsewhere in the comparison to serve as proxies for the missing PPPs. See Chapter 12, Section 12.3.4.

spatial comparisons. The products priced must be comparable across all participating countries pricing them and at all outlets at which the products are priced. If they are not, quality differences will be disguised as price differences leading to biased price relatives. Price levels will be too high for countries pricing superior quality products and too low for countries pricing inferior quality products. To ensure this does not happen, each good and each service selected needs to be defined precisely so that price collectors in participating countries can identify and price a comparable good or service in their domestic markets. If a product cannot be defined precisely, it should not be selected. Product specification is discussed later in the section.

5.32 Not only do the products selected have to be comparable across participating countries, they also have to reflect the expenditures on the basic heading in each country – that is, they have to be representative of the price levels of participating countries for the basic heading. A representative product is generally defined as one that accounts for a significant share of a country's expenditure within a basic heading because this means its price level will be close to the country's average price level for all products in the basic heading. Representativity is specific to an individual country and a particular basic heading.[4] Patterns of consumption vary from country to country as the result of differences in tastes, cultures, climates, income levels, price structures and product availability. Products comparable across countries may be representative for some countries but not for others.

5.33 For a comparison to be based on the prices of products that are both comparable and representative, participating countries have to price both their own representative products and, according to availability, a selection of the representative products of others. Representative products normally have lower price levels than unrepresentative products. If the representativity of the products selected is unevenly distributed among participating countries, biased price relatives will arise. Price levels will be too high for countries pricing a smaller number of representative products and too low for countries pricing a larger number. To avoid this, the selection of comparable and representative products for a basic heading should be balanced or equally representative.

5.34 Equal representativity – or *equi-representativity* - does not require all participating countries to price the same number of representative products for a basic heading. As explained in Chapter 12, the method used by Eurostat and the OECD to calculate the PPPs for a basic heading ensures that any imbalance between countries in the number of representative products priced does not produce biased price relatives. The method requires that each participating country price at least one representative product per basic heading. This is a necessary condition to calculate unbiased PPPs, but it is not a sufficient condition to obtain robust PPPs. For this, each participating country should price that number of representative products which is commensurate with the heterogeneity of the products and price levels within the basic heading and with the importance of its own expenditure on the basic heading. To be able to do this, each participating country should make sure during product selection that it can price the required number of representative products from among those being chosen for the basic heading.

5.35 The issue of heterogeneity raised earlier is partly eased by the way basic headings are defined in the Eurostat-OECD expenditure classification. There, definitions list the products covered by the basic headings. For example, the basic heading *other bakery products* includes "crispbread, rusks, toasted bread, biscuits, gingerbread, wafers, waffles, crumpets, muffins, croissants, cakes, tarts, pies, quiches and pizzas". The lists are not exhaustive, but they are sufficiently extensive to allow the more heterogeneous basic headings to be subdivided into smaller and more homogeneous product groups. Having broken down the basic heading in this way, it becomes easier to identify which subgroups and which products in the subgroups should be selected, providing that information is available on current market conditions.

[4] See Section 5.5.6 on assigning asterisks for a more complete explanation.

5.4.2 Pre-survey

5.36 Product selection starts with the pre-survey. During the pre-survey, information is collected from participating countries on the availability and importance of the set of products proposed for the survey as well as on the descriptions of these products. The aim is to have a solid basis for establishing a well-balanced and equi-representative product list for the survey.

5.37 Responsibility for the selection of products for the pre-survey rests with the group leaders. The selection is made on the basis of the information collected throughout the preview and planning phases. Consultation of participating countries during preview and planning is conducted by email. Thereafter, all exchange of information relating to the pre-survey and the subsequent creation of the final product list is carried out on-line through the ILMT.

5.38 The pre-survey list specifies the products that the group leader proposes the group prices for the price survey. The product specifications are accompanied by questions about the parameters specified and about the availability and importance of the products proposed as shown in Box 5.4. The starting point for the pre-survey list is the group product list used the last time the survey was conducted. The list is amended and updated to take account of the information provided by countries during the preview and planning stages, the decisions reached at group leaders' meeting during the planning stage, and the market research carried out by the group leader or by one of the other group leaders.

5.39 As a result, some products will have been deleted either because they are no longer available on the market or because they proved to be too difficult to specify the last time they were surveyed. Some products will have been proposed for deletion because either their availability or their importance to consumers is questioned. Other products will have had their specifications redefined either because a new model with different technical parameters has appeared on the market or because there is a need to tighten up the existing specification so as to reduce the price variation observed when it was previously priced. And new products that did not exist before or were just beginning to appear on the market at the time of the previous survey will have been added together with their specifications. The pre-survey product list is in effect an annotated preliminary draft of the group product list for forthcoming price survey.

5.40 The pre-survey product list is made available to countries through the ILMT. Participating countries are asked to determine whether the products can be found on their domestic markets, whether they can be found as specified and whether they are important for the country to have on the final product list. Countries collect the information in a variety of ways, including visiting some of the outlets where the actual price collection will be conducted.

5.41 For each product on the pre-survey list, countries are required to:

- Indicate the availability of the product on their market;
- Answer all the questions on basic headings, SPDs or items posed by the group leader in the ILMT.

In addition, they can:

- Indicate whether it is important for them to have the product on the final product list;
- Propose alternative definitions or parameters for products on the pre-survey list;
- Propose entirely new products.

5.42 Participating countries are expected to be proactive in the pre-survey by proposing products for those basic headings for which they cannot price the necessary number of representative products. For a product to be included on the final product list at least one other country, besides the proposing country, has to agree to price it. This is a minimum condition. It is preferable that more than one country agrees to price it. In practice, the products proposed usually have to be available and representative in a majority of countries in the group to be added to the list. Even then, compromises will have to be arbitrated by the group leaders to avoid the product list for the basic heading becoming too long or imbalanced. Not all proposals made by countries will be accepted.

Countries should not be deterred by this. Their product proposals are an important input into the pre-survey process so they should still take the initiative and make them.

5.43 Apart from outlet visits, possible sources of information used in the pre-survey include: the CPI; household budget surveys and retail trade surveys, though they may not be timely or detailed enough; market research companies, whose data can be expensive to acquire; chambers of commerce and consumer organisations; trade fairs and expositions; consumer magazines and trade magazines; marketing documentation such as brochures and catalogues; and the internet. Information can also be obtained by interviewing marketing experts, producers, importers, sales managers and shop buyers. By visiting outlets, looking at what they are selling and talking to owners and sales personnel, a clear picture of what is being sold and how it is being marketed can be established.

5.44 The pre-survey provides participating countries with the means to ensure that the final product list will be equi-representative. By being able to reject, modify and propose product specifications, countries can make sure that, for each basic heading, they are able to price during the price collection that number of representative products which the importance of the basic heading and the degree of price variation within the basic heading warrant. The importance of a basic heading is determined by its share of the total expenditure on the basic headings being surveyed. A measure of price variation within a basic heading can be found in the Quaranta table generated the last time prices were collected for the basic heading.[5] Countries are expected to submit their modifications to existing specifications and their proposals for new specifications within the framework of the structured product descriptions for the products affected.

5.45 A price survey, like any other statistical enquiry, requires thorough preparation if it is to obtain reliable results efficiently and cost effectively. From this perspective, the importance of the pre-survey to a successful price survey cannot be over-emphasised. Besides being the means by which the product list for the forthcoming price survey is shaped and finalised by establishing the availability and representativity of products proposed for the final product list, it also verifies whether they have been specified in a form that ensures that countries pricing them will be pricing comparable products. By doing this the pre-survey impacts on the quality of the results of the survey.

5.4.3 Establishment of the final product list

5.46 On the basis of the replies received from group members, the group leader revises the product list contained in the pre-survey questionnaire to produce the draft group product list.[6] The group leader will include the products with the highest availability, add newly proposed products if they are available in several countries, update the product definitions to the latest market developments and remove products that are no longer available.

5.47 On completion of the group lists, the first draft of the European product list is created by Eurostat merging the four group lists. Products that are included on two or more group lists are called *overlap products* and overlap products covering all four group lists can be seen as the core of the European product list. Overlap products ensure that the country groups can be combined in a single comparison. The share of overlap products varies from survey to survey.

[5] See Annex IV, Section IV.5.

[6] Whether the responses of a group member to the pre-survey questionnaire are partly or wholly reflected in the draft group product list depends on the responses of the other group members and how these are balanced by the group leader.

Box 5.4: Example of pre-survey questionnaire for the basic heading *Rice*

Group Leader question(s):	Do we need all 4 items for Long-grain rice in the list? Which 3 do you prefer? Which one of the 4 other "rice" items are your favourites (round-grain, basmati, Thai rice, rice ready to eat)? Do you think it is important to specify the cooking time? Or just have it as an indication?
Other remarks from the Group Leader:	
Country answer(s):	Representative on our market is the SB item and the BL one (aa, ad). Round grain rice and Basmati are equal but Basmati becomes more popular. To specify cooking time is not important. Just as info in item description. No vacuum sold rice available beside some rice ready to eat.
Other remarks from the country:	

present item proposals		Enter here any suggestions for new values for parameters	Group leader question(s)	Other remarks from the Group Leader	Country answer(s)	Other remarks from the country
11.01.11.1.01.aa Long-grain rice, SB						
Available - (Y)es, (N)o :		**Y**				
Important - (Y)es, (N)o, (U)ndefined :		**Y**				
Picture:	YES		Cooking time: are there still several possibilities for this brand available on your market?		20 min and 10 min. No price influence. Brand Y is absolute number one.	
Brand:	Y					
Brand Type:	Single / multiple brand specified					
Reference Quantity:	1000					
Reference Unit:	g					
Type:	long-grain, white rice					
Parboiled:	yes					
Cooking time:	10 - 15 min					
Quantity:	500 - 1000 g					
Exclude:	if in cooking bags					
Price for:	1 package					
Specify:	Quantity |					
11.01.11.1.01.ab Long-grain rice, WKB						
Available - (Y)es, (N)o :		**Y**				
Important - (Y)es, (N)o, (U)ndefined :		**N**				
Picture:	NO		Cooking time: can we enlarge from 10 to 20 min?		Ok enlarge cooking time.	No need to specify cooking time Most sold quantity is 400 g
Brand:						
Brand Type:	Well Known					
Reference Quantity:	1000					
Reference Unit:	g					
Type:	long-grain, white rice					
Parboiled:	yes					
Cooking time:	15 - 20 min					
Quantity:	500 - 1000 g	400 - 1000 g				
Exclude:	Brand Y; if in cooking bags					
Price for:	1 package					
Specify:	Brand | Cooking time | Quantity |					

5.48 A code in the product description indicates the group lists on which the product is to be found. For example, products on the Northern group list will be coded with either "N", "EN", "NW", "NS", "ENW", "ENS", "NSW" or "ENSW" where "N" stands for the Northern group list, "E" for the Eastern group list, "W" for the Western group list and "S" for the Southern group list.

5.49 The draft European product list is first discussed at a group leaders' meeting in order to harmonise product descriptions and to examine and, if needed, increase the overlap between the group lists. Overlap products can often be created by combining the specifications of products on different group product lists that have similar characteristics: for example, by increasing the range of a parameter such as package size or by identifying clusters of brands that are thought to have equivalent brand values. They can also be obtained by group leaders agreeing to include the products of other groups on their group product list. The process is one of negotiation between group leaders overseen by Eurostat and the OECD.

5.50 After the group leader's meeting, a second draft European list is created which is presented, together with draft survey guidelines, to participating countries at the ensuing group meetings. Here, the countries have a last chance to comment on the list, to push for the inclusion of products that are important to them or to ask for modifications of the product specifications. Immediately after the group meetings, the group leaders meet again to decide the final outstanding issues and to finalise the survey guidelines. The European list, and thereby the four group lists that constitute it, is finalised just before price collection starts.

5.51 Group leaders ensure that their group list is representative for the countries in their group and reflects the availability of comparable products in the domestic markets of the countries in their group. Hence, for any particular group, the final group list embedded in the European list is the starting point for the price collection for the countries in the group. But countries may also choose to price products from the lists of other groups. This possibility may be useful for those countries that have neighbouring countries in other groups[7] or have very specific market structures for certain basic headings.

5.4.4 Structured product descriptions

5.52 Countries participating in Eurostat-OECD comparisons are required to price products that are comparable. This is to ensure that differences in the prices of the products between countries are real prices differences and do not reflect differences in quality. Comparability is obtained by pricing products that have identical or equivalent physical and economic price determining properties. Each product on the European product list has a product specification that fully defines the product in terms of the principal characteristics that influence its market price.

5.53 Underlying these product specifications are structured product descriptions (SPDs). SPDs are designed to standardise the product specifications for different types of product so that all specifications for a particular type of product are all defined in the same way and specifying the same parameters. Standardising product specifications helps to improve their precision making it easier for price collectors to determine whether or not the product in an outlet matches the product specified. Also, by identifying the parameters that need to be specified for different types of products, SPDs provide a framework within which product proposals can be presented uniformly across groups.

5.54 Examples of SPDs are given in Boxes 5.5A and 5.5B. From these it can be seen that SPDs cover a group of products such as pastas or haircuts. SPDs are broader than product specifications. All the parameters listed in a SPD are not necessarily repeated in a product specification because some of them may not be relevant to the product being specified. For example, the parameter filling in the SPD for pasta products is relevant for tortellini but not for spaghetti. SPDs are specific to the basic heading containing the product it delineates. Products such as fresh vegetables and fresh fruits which could share a common SPD do not because they are in different basic headings. The SPDs developed for Eurostat and OECD comparisons are based on the experience gained from specifying

[7] For example, Austria is a member of the Eastern group but its markets may have many similarities with those of Switzerland and Germany that are member of the Western group. By choosing to price some products of the Western group list, Austria would strengthen its comparison with those countries

products for previous surveys. But they are not fixed, they evolve. They are kept up to date through the feedback received from pre-surveys.

Box 5.5A: SPD for pasta products

Code:	**11.01.11.5.01.aa**	**11.01.11.5.01.ac**	**11.01.11.5.01.ca**	**11.01.11.5.01.da**	**11.01.11.5.01.ea**
Name:	**Spaghetti, SB**	**Spaghetti, BL**	**Tortellini or ravioli, fresh, WKB**	**Lasagne Bolognese, frozen, WKB**	**Noodles, instant, portion pack, WKB**
Brand:	BUITONI, BARILLA, DE CECCO, PANZANI (S)		(S)	(S)	(S)
Brand Type:	single / multiple brand specified	brandless	well-known	well-known	well-known
Reference Quantity:	1000	1000	200	500	100
Reference Unit:	g	g	g	g	G
Type:			fresh tortellini or ravioli	frozen lasagne Bolognese	dried instant noodles, with min. 1 spice mixture/oil sachet
Made with:	hard wheat (durum)	hard wheat (durum)			Wheat
Eggs:	no	no			No
Length:	approx. 30 cm	approx. 30 cm			
Filling:			any	tomatoes, minced meat	
Package type:			industrially packed (vacuum or gas preserved)		
Quantity:	400 - 600 g (S)	500 - 1000 g (S)	200 - 350 g (S)	300 - 600 g (S)	55 - 90 g (S)
Exclude:	quick cooking spaghettis	quick cooking spaghettis		low calories products	rice noodles, noodle pots
Price for:	1 package	1 package	1 package	1 package	1 package
Label:		(S)			

(S): parameter to be specified during the price collection

Box 5.5B: SPD for a hairdresser

Code:	11.12.11.1.01.aa	11.12.11.1.01.ac	11.12.11.1.01.ba	11.12.11.1.01.bb	11.12.11.1.01.bd
Name:	**Men's scissors cut, dry, barber's shop**	**Men's scissors cut, wet**	**Ladies' haircut**	**Ladies' haircut and colouring**	**Ladies' hair setting with curlers**
Brand Type:	brand not relevant	brand not relevant	brand not relevant	brand not relevant	brand not relevant
Reference Quantity:	1	1	1	1	1
Reference Unit:	service	service	service	service	service
Type:			cutting long hair to short + creating a new hairstyle	haircut + 1 permanent colour (single process)	
Type of establishment:	barber's shop (no advance booking)	common hairdresser	common hairdresser	common hairdresser	common hairdresser
Length of hair:	short	short	long (cut to short)	medium	Medium
Washing:	no	yes	yes	yes	Yes
Blow drying:		yes	yes	yes	Yes
Products applied:	none	normal shampoo, styling/fixing product	normal shampoo, styling/fixing product, VIP stylists	normal shampoo, colour, styling/fixing product	normal shampoo, setting lotion, styling/fixing product
Exclude:				bleach, foils, highlights, multi-colour, VIP stylists	permanent wave
Price for:	1 service	1 service	1 service	1 service	1 service

5.55 In principle, parameters are only included in a product specification if they have – or are assumed to have – an impact on the price of the product. Parameters that do not influence price do not need to be included because products that only differ in these parameters can be assumed to be comparable. Also, the more parameters included in a product specification, the more difficult it can be for a price collector to identify the product in an outlet and the fewer prices will be collected. In practice, a balance has to be struck between the tightness of a product specification and the need for collecting a sufficient number of prices.

5.4.5 Product specifications

5.56 The product specifications used for Eurostat and OECD comparisons are either *brand and model specific* or *generic*. A brand and model specification designates the specific brand and model to be priced. A generic specification lists only the relevant technical parameters of the product to be priced. It does not identify any brand or model. A brand and model specification has a tight definition. Countries pricing a specification stipulating a particular brand and model are, in principle, pricing identical products. A generic specification has a looser definition. Countries pricing a generic specification are, in principle, pricing comparable products. In practice, models with the same identifiers in different countries are not necessarily identical or even comparable, while generic specifications, especially those that are too loose or too open-ended, are susceptible to variations in quality. As neither Eurostat nor the OECD adjust prices to accommodate quality differences, it is important that the product specifications, particularly the generic specifications, are sufficiently detailed to ensure that participating countries price products of the same or similar quality.

5.57 Box 5.6 lists the characteristics of the various types of product specifications used by Eurostat and the OECD for the price surveys of consumer goods and services. It can be seen that product specifications with brand specific definitions comprise either a single designated multinational brand and model or a cluster of designated multinational brands and, in some cases, models. In addition to specifying the brand and model, or the brands and models, the product specifications also include a comprehensive list of the relevant technical parameters (as defined by the SPD) that have to be matched to obtain comparability. Product specifications with generic definitions distinguish between products of international or national well-known - but unidentified - brands and products without a brand either because they are labelled with a brand name that is meaningless to the purchaser or because to specify a brand is meaningless as it is for most services. Generic definitions provide a detailed list of the technical parameters that have to be matched if the item priced is to be comparable with others priced under the same product specification. Examples of the different types of product specifications are provided in Box 5.7.

5.58 The product specifications give particular importance to brand. There are two reasons for this. The first is that brands provide tight specifications that make possible the identification and pricing of goods that are exactly the same in the countries pricing them. The second is that the brand itself may have a value. Consumers often perceive products with certain brand names as preferable to similar products sold under other brand names. Usually this is because some brands are considered to be of superior quality to others. For example, original or proprietary drugs are frequently regarded as more reliable than generic or non-proprietary drugs that have exactly the same composition and properties. Consumers' perception may have nothing to do with quality but is due to an image of uniqueness or desirability fostered by publicity, fashion or both. Whatever the reason, consumers are prepared to pay more for brand names with a brand value. A brand name with a brand value is a price determining characteristic and as such should be included in the product specification.

5.59 Product specifications that are brand and model specific have two possible disadvantages. The brand and model stipulated may not be available or, if available, the brand and model may not be representative. Specifying clusters of comparable brands and models partly addresses these issues, particularly that of availability. In many participating countries, the representative branded products are to be found among the *well-known brands* stratum under *generic definitions* in Box 5.6. This can be a broad stratum and not all the well-known brands in it can be expected to have a similar brand value. Hence, items with well-known brand names priced in different countries may match the technical parameters exactly but, if their brand names do not have a similar brand value, they are not necessarily comparable. Differences in prices will reflect not only pure price differences but also perceived quality differences.

Box 5.6: Product specifications

Type of specification	Brand specific definitions		Generic definitions		
	Single brand specified	**Multiple brands** specified	Specified as ***well-known brands*** but brands not named	Without a brand	
				Specified as ***brandless***	***Brand* not a relevant** term
Refers to	Specific brand(s) or shop chain(s), usually having a wide spread across countries		International or national brands or shop chains	Goods without a brand label or with a brand label that is meaningless to consumers[(1)]	Services and certain types of goods such as fresh food and furniture
Brand value	Yes		Yes	No	Not applicable
Selling point	Reputation of the producer(s) or shop chain(s) and assumed quality of the product		Reputation of the producers or shop chains and assumed quality of the product	Low price	
Product description comprises	Brand(s), model(s) and other technical parameters		Reference to *well-known brands* and a detailed list of relevant technical parameters	Reference to *brandless* and a detailed list of relevant technical parameters	No reference to brand and a detailed list of relevant technical parameters
To be collected and reported	Only prices of the designated brand(s) and model(s)		Prices for well-known branded goods meeting the technical parameters of the product description	Prices for products meeting the technical parameters of the product description	
		Names of brands priced	Names of brands priced	If labelled, names of "fantasy" brands priced	

(1) Often the brand labels will have fantasy names which sound like the name of an international brand or logos that mimic the logo of an international brand.

5.60 To overcome this, efforts are being made for those kinds of products for which brand value is important[8] to divide well-known international brands into three segments - high, medium and low - that reflect the brand value perceptions in participating countries. Group leaders and participating countries classify brands that are on the market in at least more than one country into these segments, for each group of products. This way, for each survey, lists of brands and their classification are produced that countries should use during the price collection. These lists are also useful as an aid in the classification of national brands, by comparing the quality and brand value of the national brands to the international brands.

5.61 It may be that brands have different brand value in different countries. For this reason, the classification of brands into high, medium and low segments is in principle only indicative and each country should make its own assessment of the value of a particular brand during the price collection. Nevertheless, countries should list and explain those cases in which they deviate from the agreed classification.

8 Examples are clothing, footwear, furniture, household durables and consumer electronics.

Box 5.7: Examples of product specifications

Product		Technical parameters
11.01.11.5.01.aa	Spaghetti, SB	*Brand:* BUITONI, BARILLA, DE CECCO, PANZANI *Reference quantity*: 1000 g *Made with:* hard wheat (durum) *Eggs:* no *Length:* approximately 30 cm *Quantity:* 400 - 600 g *Exclude:* quick cooking spaghetti *Price for:* 1 package *Specify:* brand, quantity
11.04.32.1.01.aa	Plumber, hourly charge	*Reference quantity:* 1 hour *Service:* replacement of 1 old mixer tap by 1 new in a wash basin *Time:* on a regular working day and without urgency (ordered in advance) *Qualified worker*: yes *Any changes to the existing pipes*: no *Price excludes*: price of the tap, travel costs *Price for*: 1 h
11.05.31.1.03.ga	Washing machine, top loader, 5.5 kg, AEG-ELECTROLUX LAVAMAT 46200	*Brand:* AEG-ELECTROLUX *Reference quantity:* 1 piece *Model:* LAVAMAT 46200 (indicative) *Type:* top loader *Wash capacity:* 5.5 kg *Spin speeds (max):* 1200 rpm *Display:* simple, LED (2 - 3 digits) *Energy efficiency class (EEC):* A or A+ *Wash performance class (WPC):* A *Spin drying class (SDC):* B *Time pre-selection:* no *Colour:* white *Dimensions (H x W x D):* approximately 85 x 40 x 60 cm *Price for:* 1 piece *Specify:* model
11.09.14.1.01.cb	Music CD - Pop, Top 5	*Reference quantity:* 1 piece *Type:* in Top 5 of most sold pop music CDs at the time of the survey *Year of publishing:* *Exclude:* CD singles, doubles and boxes *Price for*: 1 CD *Specify*: artist, title of CD
11.12.11.1.01.ba	Ladies' haircut	*Reference quantity*: 1 service *Type:* cutting long hair to short + creating a new hairstyle *Type of establishment*: common hairdresser *Length of hair*: long (cut to short) *Washing*: yes *Blow drying*: yes *Products applied*: normal shampoo, styling/fixing product, VIP stylists *Price for*: 1 service

5.62 Before each price survey, the pricing guidelines are reviewed and adapted to meet the needs of the survey. These and the group product lists are made available to participating countries at the same time. In general, the following practices have to be observed when pricing the different types of product specifications given in Box 5.6:

- When a single brand and model is specified, only the brand and model specified should be priced. No other brand may be priced. If the model specified is no longer available on the market, the replacement model – that is, the model with which the specified model has been replaced by the producer - should be priced instead.
- When multiple brands are specified, only the brands specified should be priced. No other brands may be priced. Prices may be collected for just one of the specified brands – the most representative - or for more than one of the specified brands. All the brands priced should be representative.
- When well-known brands are priced, prices may be collected for just one brand - the most representative - or for more than one brand. All the brands priced should be representative.
- When pricing a segment of well-known brands, only brands that have the required brand value should be priced. The indicative list of brands that is provided with the survey guidelines should be used as reference for deciding on the value of a particular brand. Prices may be collected for just one brand - the most representative - or for more than one brand. All the brands priced should be representative.
- When brandless products are priced, a range of the brandless items in the outlet that match the product specification should be priced.
- Fake brands – that is, brands that forge the products and name of an established brand – are not to be priced either as substitute for the brand they counterfeit or as a brandless product. (Note, brandless products with fantasy names or logos that mimic the name or logo of an established brand are not fake brands.)
- When a range is specified for a package size, such as 500 g to 1000 g or 0.75 l to 1.5 l, the package size within the range that is the most typical for the domestic market should be priced. When the typical size is not known, prices should be collected for all sizes within the range that are available on the domestic market.
- When pricing generic specifications, it is necessary to match the technical parameters of the product observed with those of the product specified to assess whether the two products are comparable. Such an assessment should not be done by just looking at the number of parameters not matching. Account also needs to be taken of the degree to which they do not match. A product observed with “near misses” on most, if not all, characteristics could still be an acceptable substitute for the product specified.
- In cases where different models of a product exist on the market that all match the product specification, the most basic model should be priced.

5.63 The majority of the product specifications on group product lists are supported by pictures of the products they specify. The pictures show price collectors what it is they are searching for, what it is they have to price. Price collectors do not always envisage the same product from a written description, particularly if they are reading it in translation.[9] Care is taken to ensure that pictures accompanying brand and model specifications depict the actual brands and models to be priced. Care is also taken that pictures illustrating generic specifications are also generic – that is, they do not show any brand name or logo which could be misunderstood by price collectors. When a product specification is updated, the picture is also updated.

5.5 Price collection and intra-country validation

[9] Product specifications are first drafted in English. They are subsequently translated, if needed, into the national language for price collectors in the short space of time between receipt of the final group product list and price collection.

5.64 Participating countries are responsible for price collection. They are required to collect prices at a sample of outlets chosen to reflect consumer purchasing patterns for the types of products being surveyed. They are expected to price as many products on the list as comparability and availability allow. After the price survey, countries are required to edit the prices collected for *outliers*[10] using the *Data Entry Tool* (DET) software supplied by Eurostat. After making the necessary corrections, they send the individual price observations and a report on the survey to Eurostat.

5.65 In order for each participating country to price a set of internationally comparable products across a representative sample of outlets, the price surveys need to be carefully planned and prepared by their national organisers. Before starting price collection, participating countries are expected to carry out a number of tasks. These involve:

- selecting the outlets that are to be visited by price collectors and contacting the outlets selected to explain why they are to be visited;
- preparing pricing materials and other documentation for price collectors (product specifications, survey guidelines, price reporting forms (including electronic versions if applicable), outlet codes and co-ordinates, schedule of visits, identification and letters of introduction, etc.), including the translation of product specifications and survey guidelines into the national language if necessary;
- identifying which specifications on the final product list are to be priced and, in the case of generic specifications, which brands are to be priced (if these tasks are not left for the price collectors to do themselves);
- convening a meeting with price collectors to clarify the pricing and supporting materials prepared and issues such as how many items to be priced per basic heading, how many prices to be collected per item, etc.

5.66 The tasks above are important because they prevent non-response and reduce non-sampling error. Participating countries will find that, by providing price collectors with clear and precise written instructions and by ensuring that they are adequately briefed, the subsequent validation of survey prices will be less burdensome. Products are more likely to have been priced to a constant quality across outlets and the number of atypical prices collected is also likely to be small.

[10] Outliers are unusually high or low prices that need to be checked to ensure that price collectors have not made mistakes in collecting or reporting prices. The Eurostat software identifies outliers by reference to the range and variance of the prices collected for each item.

5.5.1 Prices to be collected

5.67 The object of the price surveys is to collect the prices that purchasers actually pay to sellers to acquire the goods and services specified on the final product list at the time of the survey. In other words, the intention is to collect actual transaction prices. Experience shows that it is neither practical nor cost effective to collect such prices from purchasers. The prices are collected from sellers instead. Most sellers display the prices at which they are prepared to sell their products. But the prices at which products are offered for sale are not necessarily the prices at which they are actually sold. NSIs with access to scanner data can collect actual transaction prices. However, the majority of NSIs are without such access. Rather, they have to collect the prices that purchasers would have to pay if they were to actually purchase the goods and services specified at the time of the survey. In other words, price collectors observe *offer prices* but, before recording them as transaction prices, they have to establish whether or not the offer price includes delivery and installation costs, VAT and other indirect tax on products, discounts, surcharges and rebates, invoiced service charges and voluntary gratuities or tips, and adjust it accordingly.

- *Delivery and installation costs* should be included in purchasers' prices by definition. But, for reasons of comparability, they are not to be included in the transaction price reported by participating countries unless it is explicitly stipulated in the product specification that they should be. When goods, such as major household appliances, furniture and floor coverings, have unspecified "free" delivery and installation costs included in their offer price, this should be noted when recording the price observation.

  There is an exception to this rule. Items obtained through mail order or through the internet should always include delivery charges.

- *VAT and other indirect taxes on products* should be included in the transaction price. Sometimes these taxes are included in the offer price, sometimes they are not. It depends on the country and on the product. When they are not included, the offer price should be adjusted by the precise rate(s) of tax(es) applicable and recorded as the price observation. Both the unadjusted offer price and the rate(s) of tax(es) applied should be noted when recording the price observation.

- *Discounts, surcharges and rebates* should be included in the transaction price if they are available to all purchasers throughout most of the year. Temporary price reductions, such as those available during seasonal sales and discount days or as "special offers", should be ignored. Discounts that are offered only to a selected group of purchasers, such as store account holders or holders of certain credit cards, should be ignored too. On the other hand, some kinds of goods, or the goods at some types of outlets, are offered at "permanent discounts". The reductions from the list price are openly stated and, usually, the goods have never been sold at the higher price. In this case, it is the discounted price that should be recorded as the price observation.

  Exceptions to this rule are sales that last for longer than four weeks and products for which a substantial proportion of their sales occur at reduced prices during the sales season.

  For some products, notably motor cars, discounts are generally available but not openly stated. Offer or list prices are available and purchasers attempt to negotiate a price below that level. The situation with motor cars is complicated further because of trade-ins, "free" extras and the inclusion of registration and other administrative costs in the package, but none of these should be included in the transaction price unless expressly stipulated in the product specification. In principle, the transaction price should include the negotiated discount, but participating countries are not expected to report transaction prices. Instead they are required to report list prices. The PPPs that Eurostat calculates for motor cars are based on these list prices.

  Manufacturers sometimes offer rebates in the form of "cash-back" schemes where the purchaser is given a cash sum in exchange for vouchers available with the product. In general these schemes should be ignored because they usually impose some conditions on the purchaser and the proportion taken up is small. But, when the value of the cash returned is large and the scheme is open to all purchasers without conditions for a period longer than

four weeks, the offer price should be reduced accordingly and recorded as the price observation. The unadjusted price, the amount returned and the scheme's conditions and duration should be noted when recording the price observation.

Discounts are sometimes offered in the form of extra goods offered free. For example, "three for the price of two" or "20% free". This is common practice for long-running lines such as cornflakes, biscuits, chocolate, instant coffee, soft drinks, detergents, toothpaste, shampoo, paper handkerchiefs and the like. As these promotional offers are open to everyone usually for a period of over four weeks, they should, in principle, be taken into account. In practice, for reasons of comparability, the price of the standard size should be recorded. Only if the standard size is not available within the survey period, should the price of the special offer be recorded with an explanatory note quantifying what is being offered free.

- *Invoiced service charges and voluntary gratuities* should be included in the transaction price. Depending on the country, invoiced service charges in cafés and restaurants are not always included in the offer price. When they are not included, the offer price should be adjusted by the precise rate of service charge applicable and recorded as the price observation. Both the unadjusted offer price and the rate of service charge applied should be noted when recording the price observation.

  Voluntary gratuities or tips are paid in cafés and restaurants and also in hairdressers and taxis. For these services, participating countries are required to collect and report offer prices. Subsequently, they are required to report the global tipping rates applied in their national accounts for cafés and restaurants and for hairdressers. Eurostat calculates the PPPs using the offer prices and later adjusts the PPPs to transaction price levels with the global tipping rates supplied by the countries. The adjustment is made at the basic heading level and not at the product level. The services provided by cafés, restaurants and hairdressers comprise separate basic headings. The service provided by taxis is just one product among others included in the basic heading covering passenger transport by road which is why global tipping rates are not collected for taxis and no adjustment is made.

5.5.2 Selection of outlets

5.68 Prices are to be collected from a range of outlets that includes markets, department stores, supermarkets, specialised shops, discount stores, corner shops, kiosks, mobile shops, mail order houses and the internet. A list of outlets classified by type is provided in Box 5.8. The classification has been developed by Eurostat in consultation with participating countries. It identifies and defines twelve outlet types. Among other considerations, it takes into account the level of service offered by the outlets.

5.69 The selection of outlets is of particular importance because of the effect it will have on the average prices of the products to be surveyed. Different products have different distribution profiles. Some products are sold mostly in supermarkets; other products are sold mainly in specialised shops. Prices for the same product can vary from outlet type to outlet type because it is being sold under varying conditions or circumstances.[11] For example, a restaurant meal provided with more attentive service in more pleasing surroundings is of a higher quality than exactly the same food and drink provided with less service in a less pleasant environment. And the higher quality will be reflected by a higher price. Conditions or circumstances of sale constitute a service element. If the service element changes from one outlet type to another, the product being purchased is not the same at both outlets even if it is physically identical. This is because what is actually being bought is a composite product – that is, the product itself plus the service element. The difference in the service element is a quality difference and contributes to the price difference. When the conditions or circumstances under which a product is sold are price determining, they should be included in the product specification. Eurostat and OECD product specifications for services provided by garages, restaurants, hotels and hairdressers usually specify the type of outlet and, if relevant, its location.

Box 5.8: Eurostat classification of outlet by type

[11] This and other related points are explained and elaborated in paragraphs 16.105 to 16.109 of the SNA 93.

Code	Outlet Type	Description
01	Department stores	Non-specialised stores with a wide assortment of different types of products such as clothing, footwear, household textiles, consumer electronics, CDs, DVDs, household appliances, glassware and tableware. Every department or floor usually has its own cash desk. Department stores are often located in the city centre or in a shopping mall. In some cases it might be difficult to distinguish between a specialised shop and a department store. If the product types are related to each other, a shop should be seen as specialised. For example, a shop selling furniture, floor coverings, carpets, household textiles, glassware and tableware or clothing, footwear and household textiles or electric household appliances, consumer electronics, computer, software, CDs and DVDs should be classified as a specialised shop. If the shop offers products from different consumption areas, it should be seen as department store even if the number of departments is limited. For example: clothing, footwear, household textiles, cosmetics, glassware and tableware. "Shops-in-shops" can appear in department stores. They have their own area and own cash desk and are clearly identified by their own shop name. They should be treated as an independent shop and not be allocated to department stores.
02	Hypermarkets, super-markets	Self-service stores offering a wide assortment of food and non-food products. Supermarkets offer a much smaller assortment of non-food products than hypermarkets. The cash desks for both hypermarkets and supermarkets are located centrally at the exit. Hypermarkets are often located outside of the city centre.
03	Discount stores	Self-service stores that sell food or non-food products at prices lower than traditional retail outlets, hypermarkets or supermarkets. Discount stores usually offer a minimum level of service. A consultation of shop assistants is not foreseen. Decoration and presentation of products is minimal. Open shipping boxes or pallets in the aisles may be used to display products. These shops usually have a high share of shop-own-brands and brandless products.
04	Convenience stores, mini-markets, service station shops, neighbourhood shops, corner shops and kiosks	Small non-specialised shops that sell mainly food, beverages and non-durable goods for daily needs.
05	Specialised shop chains	Branches of national or international specialised shop chains, mainly selling goods. Self-service is usual, but shop assistants are available for consultation.
06	Specialised shops	Specialised traditional retail outlets mainly selling goods. Usually no self-service. Full sales service available including consultation of shop assistants. Includes bakers, butchers, grocers and the like. Includes shops with a limited number of branches located only in one region, such as the metropolitan area of the capital city, and retailers' cooperatives.
07	Markets	Places where goods are bought and sold. Usually in the open air, but also in covered buildings. Generally with a number of different sellers. Some markets operate daily, others only on specific days.
08	Private service providers	Private companies that offer services.
09	Public and semi public service providers	Public and semi-public companies that offer services. A company is semi-public if at least 50 per cent is owned by the government, a municipality or another corporation under public law.
10	Mail order, internet	"Virtual" stores that sell goods or services only by mail order or via the internet. Websites of companies that also have a physical presence are to be included in their corresponding shop type.
11	Other kinds of outlets	For example: sales at the customer's premises, mobile shops
12	Black market	Transactions on which no (or not all) taxes that apply according to national law are paid regardless of the shop type. For example: smuggled or illegally produced cigarettes and alcohol; non licensed copies of CDs, DVDs and computer software; counterfeit products; unregistered domestic work.
99	CPI data	Average prices taken from the CPI, if no shop type can be identified.

5.70 CPIs measure price changes over time by repeatedly pricing the same product at the same outlet, thereby keeping the service element constant. If this approach would be followed in international price comparisons, it would lead to a multiplication of products to be priced. For this reason, the so called potato is a potato rule is applied instead, which says that each product specified is treated as being homogeneous regardless of where it is priced. If, when averaging the prices collected for the product, no account is taken of the different service elements of the outlets at which they were observed, the average price is likely to be too high or too low. To avoid this, countries participating in Eurostat and OECD comparisons are required to select outlets so that the selection mirrors consumer purchasing patterns at various outlet types for the products being priced. If consumers buy 50 per cent of their clothing from departmental stores, 30 per cent from supermarkets and 20 per cent from specialist shops, then a sample of ten outlets would include five departmental stores, three supermarkets and two specialist shops. As the products being surveyed differ from price survey to price survey, the selection of outlets will also differ between surveys. By selecting outlets in this way, implicit weights are introduced to accommodate the varying service elements of outlets and their impact on price. Unbiased average prices are the result.[12]

5.71 The selection of outlets by type in proportion to the volume of their sales of the products to be surveyed is the first consideration. The second consideration is the variability of prices within outlet type. Such information may be obtained from the CPI. The greater the price variability within a given type of outlet, the larger is the number of outlets of that type that should be included. This may result in a selection of outlets that does not replicate exactly the distribution profiles of the products to be priced. Price variation between outlet types is generally greater than price variation within an outlet type. On balance, it is preferable in most cases to give the first consideration priority over the second and respect the distribution profiles of the products being surveyed. A third consideration is the location of outlets. The number of outlets selected in each location should be proportional to the area distribution of the volume of sales of the products in question. The location of selected outlets can be expected to differ from survey to survey. In the past, for example, suburban outlets for food were likely to have had a larger share of food sales than central outlets, while central outlets probably had a larger share of the sales of clothes than suburban outlets. But such distinctions are gradually being erased by the growth of shopping malls and commercial centres on the outskirts of cities and towns wherein can be found most types of outlets selling almost the entire range of consumer goods: food, beverages, clothing, footwear, household supplies, household appliances, furniture, floor coverings, audio-visual equipment, sports equipment, etc. The increase in the number of households purchasing a whole variety of goods through the internet also blurs the concept of location.

5.72 At basic heading level, household final consumption expenditure is measured according to the domestic concept, that is, it includes the expenditure of residents and non-residents on the domestic territory. For consistency reasons, prices must therefore be collected from domestic outlets only. It may not always be obvious, in particular for internet outlets, to determine whether or not an outlet is domestic.

5.73 It is not always necessary to collect prices from sales outlets or shops. Prices for certain goods and services are uniform throughout the country. This may be because there is only one supplier, typically a public or semi-public enterprise. Examples of such products are electricity, gas, postal services, telephone services and transport services. Prices for these products can be collected centrally, direct from the supplier. The move towards privatisation has increased the number of suppliers of some of these products, even so their prices can still be collected centrally. Prices that are regulated, such as those for pharmaceuticals, newspapers, magazines and books, can be collected centrally as well, but the trend towards deregulation has reduced the number of such products. Some supermarket chains and franchise networks operate, or claim to operate, nationwide uniform pricing policies. Their prices too can be collected centrally, but they should be verified by visits to one or two outlets. There is a tendency among such national retailers to allow price setting to be done locally within centrally established guidelines.

[12] Whether these average prices lead to unbiased price relatives depends on whether the products surveyed have similar distribution profiles in all the countries participating in the comparison and on whether the outlets selected have equivalent service elements in all countries.

5.74 Scanner data is another source for price data. It is mainly used for food products. Scanner data provide an exhaustive set of actual transaction prices for a particular outlet during a certain period. It may also include information on quantities being sold. It is thus a very rich source of data that can provide invaluable information during both the pre-survey and the survey and it would in theory remove the need for actual price collection in shops. However, due to the vastness of the data obtained, there are also many obstacles to overcome before scanner data can be efficiently used, as experience in a number of countries has shown.

5.75 A good starting point for the selection of outlets is the sample of outlets used for the CPI, but it is only a starting point. The final product lists for the price surveys will differ considerably from the product lists for the CPI. There will be products that are common to both lists. These will be mainly food items, such as fresh fruit and vegetables, but other products may be covered as well. Prices for such products will not need to be surveyed because the prices collected for the CPI can be used instead. In general, PPP product lists will be larger than CPI lists, specifying products not included in the CPI. The CPI sample may not be ideal to collect reliable prices for these products because the selection of outlets by type is not in proportion to the volume of their sales of the products. The imbalance of outlet types may be compounded if the CPI sample is designed to measure price change only at the national level and, as is the practice in the majority of participating countries, the price surveys are carried out in the capital city. In these circumstances, it will be necessary to augment the CPI sample with additional outlets. At the same time, because of the limited resources available for the price surveys, the CPI sample may be too large and will have to be reduced. By necessity, both the selection of outlets to augment the CPI sample and the selection of outlets to reduce the CPI sample will be purposive and not random.

5.76 Participating countries are expected to respect the classification in Box 5.8 when reporting the individual price observations collected from them. In addition to the twelve outlet types specified, the classification has a thirteenth category called *CPI data*. It is necessary because countries may extract prices from their CPI database without identifying the outlet type from which they were collected. If, however, the outlet type can be determined, then the prices extracted should be classified accordingly.

5.5.3 Number of products to be priced per basic heading

5.77 The number of products to be priced per basic heading will vary from basic heading to basic heading. It will depend on the heterogeneity of products covered by the basic heading and on the importance of the basic heading. These are the same considerations that participating countries had to take into account when proposing products for the final product list. Then, each country was required to ensure that for each basic heading it could price that number of representative products that were commensurate with the price variation within the basic heading and its expenditure on the basic heading. The final product list is of course a compromise that attempts to balance the conflicting needs of the different countries without the list becoming too long and unmanageable. Even so, as long as a country has participated actively in all stages of product selection, it should find that the final product list includes a number, if not all, of its representative products for each basic heading. And these it should price. Participating countries are required to price at least one representative product per basic heading as this provides for the calculation of unbiased PPPs. But they should actually price more than one representative product per basic heading as this facilitates the calculation of PPPs that are both unbiased and robust.

5.78 Besides pricing their own representative products, participating countries are also required to price the representative products of other participants, otherwise a comparison cannot be made. Which unrepresentative products a country should price depends on availability. A country cannot price what is not sold in its domestic market. There are degrees of availability. Price collectors should not be asked to waste resources tracking down products that are not easily found. Also, it is desirable that the prices collected for unrepresentative products provide relatively reliable average prices. In this context, availability should be defined in terms of the number of outlets at which the product can be observed. Defining availability in this way without specifying a number is not particularly helpful. This raises the question of whether a rigorous selection of unrepresentative products should be

made prior to price collection.[13] As every effort is made by group leaders to keep product lists manageable, a better approach would be for each country to prune the list of products it cannot price or cannot price without difficulty. Much of this information should be on hand from the pre-survey. It may also be known to the experienced price collectors. Price collectors would then attempt to price all products remaining on the list. The selection of unrepresentative products for which prices would be reported could then be made ex post based on the number of prices observed and their variation.

5.5.4 Number of price observations per product

5.79 The number of prices to be collected for a product will differ from one basic heading to another. It will also differ from product to product within a basic heading. Normally, the number of prices collected for a product determines the reliability of its average price. The larger the number of price observations, the more accurate the average price. The actual number depends on the degree to which the prices of the product vary. The number of prices to be collected for each product could be decided using random sampling techniques. Providing the price variation (CV) of the product is known and the desired degree of accuracy (SE) is specified, sample size (N) is determined by $[t^2CV^2/SE^2]$ where t is Student's t and which is here assumed to equal 2 at 0.95 probability. For example, if it is known from the last time the price survey was conducted that the coefficient of variation for the average price of a product is 20 per cent and the level of precision sought in the forthcoming survey is 10 per cent, the sample size should be 16. With the same price variation and a precision level of 5 per cent, the sample size should be 64. In other words, a twofold increase in accuracy requires a fourfold increase in sample size.

5.80 A coefficient of variation of 20 per cent is high. A coefficient of variation higher than 20 per cent may indicate that either the product description was too broad or that the price collection was faulty. In most cases, price differences for a product within a country are not more than 10 to 50 per cent, a coefficient of variation of approximately 5 to 15 per cent. Tight specifications usually have a lower coefficient of variation than loose specifications. On this basis, rough upper limits can be assigned to the coefficients of variation for specifications that are brand specific (10 per cent), specifications that cover well-known brands (15 per cent) and specifications that are brandless (20 per cent). Assuming a level of precision of 10 per cent, which is both reasonable and acceptable, application of $[t^2CV^2/SE^2]$ gives sample sizes of around 5 for brand specific specifications, of around 10 for well-known brand specifications and between 15 to 20 for brandless specifications.

5.81 Participating countries are not expected to apply random sampling techniques when deciding on the number of prices to be collected for a product. Instead, each participating country should decide on the number of price observations to be collected per product by taking into account the type of specification being priced, the conditions prevailing in its market and experience gained from previous survey rounds. For example, experience shows that brand specific specifications usually require a smaller number of observations than well-known brand specifications and that well-known brand specifications generally require a smaller number of observations than brandless specifications. This suggests that the numbers of the previous paragraph provide a rough general rule of thumb, namely: 5 observations for brand specific specifications, 5 to 10 observations for well-known brand specifications, and 10 to 15 observations for brandless specifications. When deciding on the number of observations for a product, participating countries should bear in mind the following:

- More prices should be collected for products in basic headings with large expenditure weights because of the impact they will have on the PPPs for aggregation levels above them.
- More prices should be collected for products in basic headings with price variations larger than the average price variation for basic headings.
- More prices should be collected for representative products.

[13] If this approach is followed, priority should be given to retaining overlap products on the list.

- More prices should be collected for products in basic headings with a small number of product specifications.

- More prices should be collected for products with price dispersions greater than the average price dispersion for their basic heading, particularly if the product is representative. Products with generic specifications that cover a wide range of varieties or package sizes and products that are available in a broad range of outlet types usually fall into this category. More generally, products with generic definitions have larger price variations than products defined by brand and model and will require more price observations.

5.5.5 Assigning representativity indicators

5.82 For each basic heading, participating countries are required to price both representative products and unrepresentative products. Representative products normally have lower price levels than unrepresentative products. If this is not taken into account when calculating the PPPs for a basic heading, the PPPs will be biased. Either they will be too high and give volume indices that are too low. Or they will be too low and give volume indices that are too high. By definition, there are no expenditure weights below the basic heading level and other means are necessary to distinguish representative products from unrepresentative products when calculating PPPs at the basic heading level. As explained in Chapter 12, and demonstrated in Annex V, the method of calculation used by Eurostat and the OECD assigns quasi expenditure weights to representative and unrepresentative products. This requires participating countries to indicate which of the products they have priced are representative when reporting their prices. Representative products are designated by a representativity indicator. The indicator currently employed by Eurostat and the OECD is an asterisk (*). So participating countries have to *assign asterisks* to representative products and representative products are called *asterisk products*.

5.83 Representativity is discussed in Chapter 2, Section 2.3.2, where the following points are made:

- Representativity is defined in terms of an individual country within a basic heading. A product is either representative or unrepresentative of the price level in country A for a given basic heading. It is representative, if in country A, it is among the most important items purchased, in terms of relative total expenditure within the basic heading.[15] Usually, this implies that its price level is close to the average for all products within the basic heading.

- Basic headings can cover a heterogeneous mixture of goods or services, but this only becomes a consideration if there are significant disparities in their price levels. In these circumstances, representativity is considered in two stages. First in terms of the product types comprising the basic heading – representative product types are those that account for the bulk of the expenditure on the basic heading. And then in terms of products within the representative product types – representative products are those whose price level is close to the average for all products of its type.

- The decision as to whether or not a product is representative of the price level of a basic heading is made independently of the relative importance of the basic heading with respect to other basic headings.[16]

- A distinction has to be made between the products in the universe covered by the basic heading and the products in the sample selected for its product list. The products in the sample represent a wider group of products in the universe. They have been chosen to represent the price level of the wider group. It is the wider group of products that need to have an important share of expenditures within the basic heading. It is not required that the individual products of the sample are among the volume sellers for the group, even

[15] See PPP Regulation, article 3(k), in Annex II.

[16] See the example in Chapter 2, paragraph 2.18.

though they often are. It is just necessary that they are sold in sufficient quantities for their price levels to be typical for the product group they represent. For this reason it is possible that they can appear to be unrepresentative when their volume of sales is compared to the volume of sales of other products in the sample.[17]

- Neither of the two criteria on which representativity is based, and which should be considered in parallel, is easy to apply in practice. The criterion - that the products price level is close to the average for all products within the basic heading - is difficult to apply unless the average price level for the basic heading is known. Usually it is not known until the PPPs for the basic heading are calculated. Yet representative products have to be identified before the PPPs are available. While the other criterion - that representative products are typically volume sellers and, depending on the product, generally available – requires information on market shares which is often not readily accessible.

5.84 Participating countries have problems identifying representative products and assigning asterisks to them. This is understandable because the reason why representative products have to be identified – namely, the lack of expenditure weights below the basic heading level – is also the reason why it is difficult to identify them. The problem is not with products that countries themselves have proposed for the final product list because these products are supposed to be representative. The problem lies with products that other countries have proposed. The openness of domestic markets, particularly in the European Union, has progressively increased the availability of many of these products. The question is: To what extent are they being purchased? Are they being sold in large enough numbers to be representative? The absence of reliable expenditure or sales data by product within basic headings makes it a difficult question to answer objectively. Other sources of data have to be investigated. If scanner data are available, these can provide high quality information on sales volumes. For motor cars, registration statistics detailing the brands and models registered can be consulted. There are as well a growing number of internet sites providing country-specific information on "best sellers" for a whole range of products and product types. Paragraph 5.43 lists other possible sources.

5.85 Two key sources are the pre-survey and the price survey itself. By interviewing experienced sales personnel at the outlets visited during the pre-survey, it should be possible to determine the representativity of the products specified on the pre-survey list. But not all these products will remain on the final product list. Some will have been discarded. Others will have been retained, but with their definitions altered. And new products, not on the pre-survey product list, will have been added. It will still be necessary to establish the representativity of many of the products on the final product list. This should be done, as it was done for products on the pre-survey list, by asking sales persons at the outlets visited during the price survey.

5.86 The price survey can also be used in other ways. Both the number of outlets at which a product is priced and the number of prices collected for the product are indicators of availability and possible representativity. Asterisks can be provisionally assigned using such criteria. Later, the allocation can be verified during validation by comparing the *price level indices* (PLIs) of the different products priced within a basic heading.[18] Products with PLIs that are significantly higher or lower than the PLIs of other products priced for the basic heading are probably not representative and should have their asterisk removed if one has been assigned. Conversely, products designated unrepresentative can be re-designated representative and assigned an asterisk if their PLIs are close to those of other products - specifically the representative products - priced for the basic heading. In this way, validation provides a general fallback position, making it possible to rectify any misallocation of asterisks, even those based on objective information. This is a particularly important consideration given that the decision on whether or not a product is representative has, in the absence of any relevant data or informed opinion, to be subjective. Opinions should be solicited from a number of different persons when the decision is subjective.

[17] See the example in Chapter 2, paragraph 2.20.

[18] That is, by comparing the PPP-Indices of the products priced in the Quaranta table for the basic heading. See Annex IV.

5.87 Countries have to ensure a proper balance between the numbers of representative and unrepresentative products priced. It is not possible to give a rule a-priori for the share of unrepresentative products, as the impact of the unrepresentative prices cannot be predicted in advance. As will be explain in Chapter 12, Section 12.2.3, the actual weight each price receives in the calculation of the PPPs between two countries depends on the number of representative products priced by each country and the size of the overlap between them. In basic headings with a large number of products, the impact of individual asterisks on the PPPs will usually be limited. In basic headings that contain only a few number of products, the precise allocation of asterisks can become decisive. The allocation of asterisks therefore needs to be carefully verified during validation in the way indicated above.

5.88 The asterisks introduce implicit weights into the calculation of PPPs. Representative products receive higher weights and their relative prices have thus a higher influence on the PPPs than unrepresentative products. Countries can also use this fact and reduce the impact of less reliable average prices - for example, those with few observations or high variation coefficients - by not allocating asterisks to them.

5.5.6 Intra-country validation

5.89 Once price collection is finished, participating countries are required to record and validate their price observations before they are dispatched to Eurostat. The Data Entry Tool (DET) is used for this. The DET is the software developed by Eurostat for the recording of price observations, the calculation of average survey prices, the validation of price observations and average survey prices, and the preparation of the data file that is to be transmitted to Eurostat via eDAMIS. The validation carried out by countries at this stage is referred to as intra-country validation as it involves countries checking their own price data separately without reference to the price data of other participating countries. Inter-country validation, when average survey prices are compared across countries, takes place during the second phase of validation and will be considered in Section 5.6.

5.90 Both intra-country validation and inter-country validation have the same aim and that is to identify and eliminate non-sampling errors from the survey price data. Both focus on two types of non-sampling error: product error and price error.

- *Product error* occurs when price collectors price products that do not match the product specification and neglect to report having done so. This can be because they are not aware of the mismatch, such as when the product specification is too loose[19], or because they price a substitute product as required by the pricing guidelines but do not mention this on the price reporting form. Price collectors are instructed to collect the price of a substitute product if they are unable to find the product specified. They are further instructed to flag the substitution and to note the differences between the substitute product and the specified product. Flagging brings the substitution to the attention of the person in the country's NSI responsible for the survey who, together with the group leader, can then decide what to do with the price collected. If other countries report prices for the same substitute product[20], price comparisons can be made for the substitute product as well as for the product originally specified. If this is not an option, the price will have to be discarded. Substitution does not in itself introduce error. It is the failure of price collectors to flag and document the substitution that gives rise to product error.

[19] With a product specification that is too loose the problem is not so much that the product priced does not match the product specified because it probably does, but that it is not comparable with the products that other price collectors, both within the country and in other countries, have matched and priced for the same specification. Within a country the problem can be ameliorated by the price collectors agreeing on how generic specifications are to be interpreted and what products are to be priced before starting price collection. This will not avoid differences in interpretation between countries which will only become apparent during inter-country validation.

[20] This can happen when the product specification refers to a specific model that is in the process of being replaced by a later model in a number of countries: not an infrequent occurrence in the case of household durables.

- *Price error* occurs when price collectors price products that do match the product specification but record the price incorrectly or they record the price correctly and error is introduced afterwards in the process of reporting and transmitting the price. Associated with each price is a quantity. There is the *specified quantity* - the quantity to be priced - and there is the *reference quantity* - the quantity to which the price collected is to be adjusted. Price error can also arise because, even though the price is correctly recorded, the quantity priced is recorded wrongly (or it is recorded correctly and error is introduced later during processing) so that the adjusted price for the reference quantity, which is the price that is validated, will be wrong as well.

5.91 Editing for product errors and price errors involves identifying prices that are outliers – that is, prices whose value is determined to be either too high or too low vis-à-vis the average according to given criteria. The price may score a value for a given test that exceeds a pre-determined critical value or its value may fall outside some pre-specified range of acceptable values. Both are standard ways of detecting errors in survey data and both are employed by Eurostat and the OECD. Prices that are outliers are not necessarily wrong. But the fact that they are outliers suggests that they could be wrong, that they are possible errors and need to be investigated. It is not Eurostat or OECD practice to reject outliers outright but to establish first whether or not they are genuine observations. Once this is known, it can be decided how to deal with them. Outliers that are found to be wrong are errors and should be corrected or dropped, while outliers that are shown to be accurate observations should be retained, at least in principle.

5.92 Intra-country validation is designed to establish that price collectors within the same country have priced products that match the product specifications and that the prices they have reported are correct. It does this by searching for outliers first among the individual prices that a country has collected for each product it has chosen to survey and then among the average survey prices for these products.

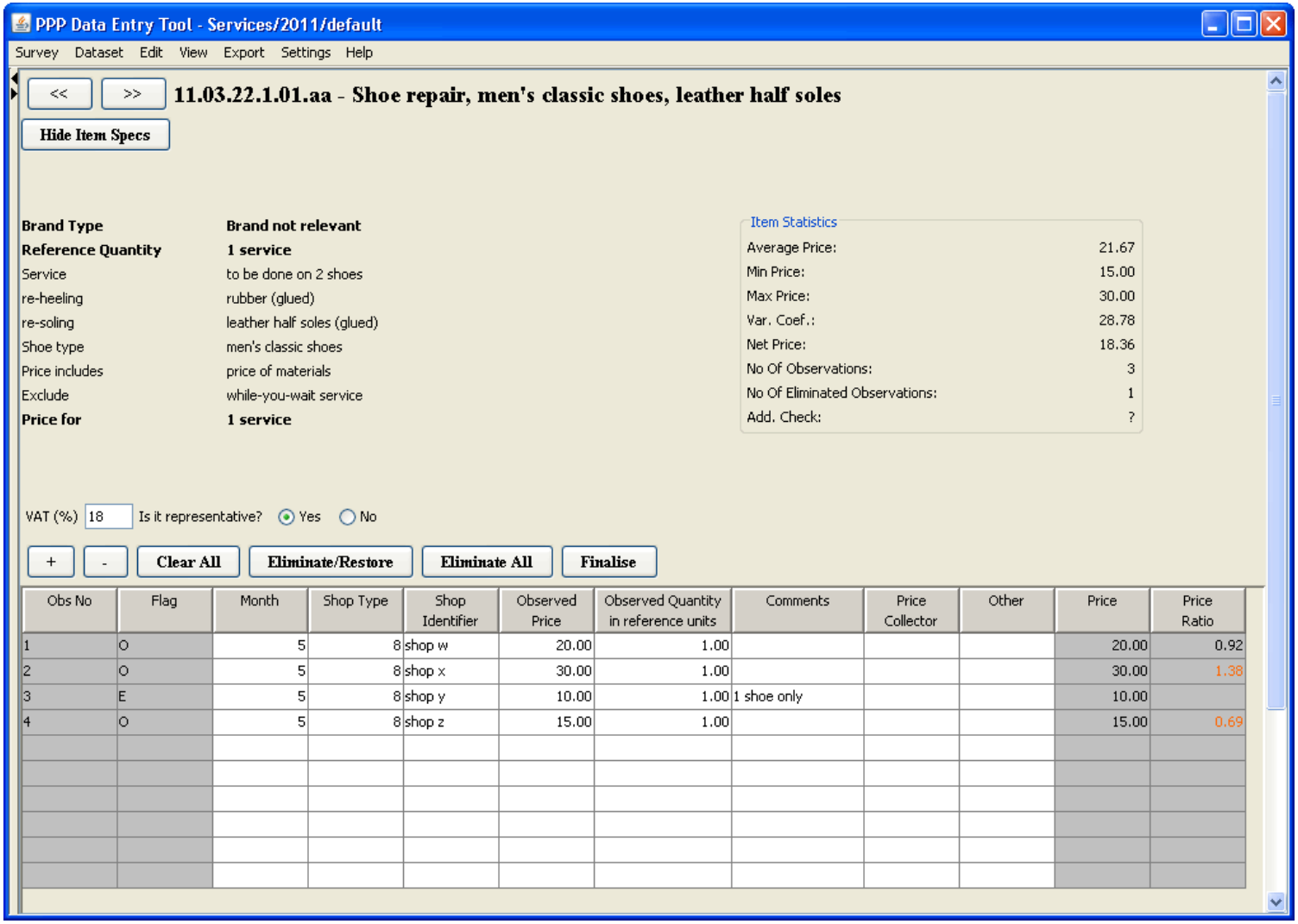
5.93 Before editing can commence, the price observations have to be recorded on the *price input screens* of the DET. An example of a price input screen is shown in Box 5.9. Each product has its own input screen which can be called up from a list detailing product codes and names. The price input screen for a product gives the product's specification (brand type, reference quantity, and the technical and economic parameters) in the top left-hand corner. The details of the price observations for the product are entered in the columns at the bottom of the screen. In addition, the rate of VAT on the product has to be provided, as this is used to calculate the net average price, and the question on representativity has to be answered, as this is taken into account when calculating basic heading PPPs. For each price observation, the price for the reference quantity and the *price ratio* - price of the observation divided by the current average price - are calculated in the last two columns to the right. *Item statistics* appear in the top right-hand corner of the screen.

5.94 The price input screen in Box 5.9 is self-explanatory, but two columns need some elaboration. The first is the second column from the left. In this column, the status of the price observation is flagged. Price observations with "O" are original price observations and those with "E" are observations that have been eliminated during validation. (Eliminated observations are not included in the calculation of average price or other item statistics, but remain on the price input sheet for the record.) When the price observations are first recorded, they are flagged with "O". In the example in Box 5.9, observation number 3 was eliminated because it did not comply with the item definition.

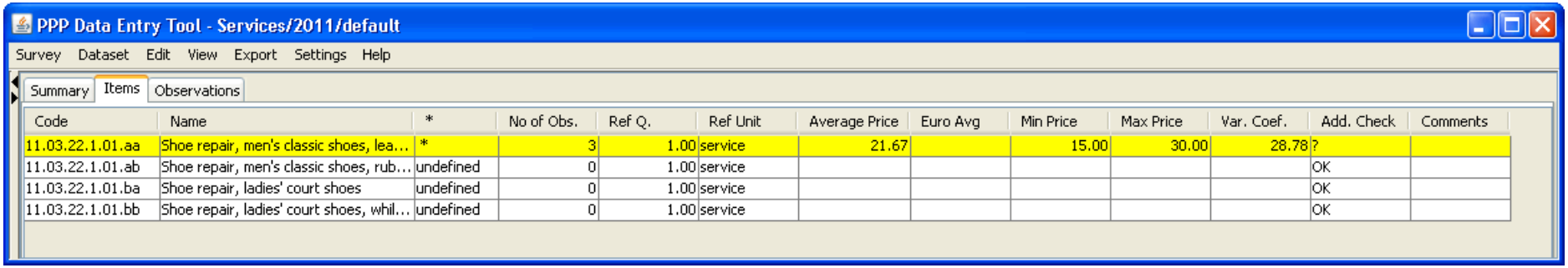
5.95 The second column requiring further explanation is the last column to the right. In this column, the prices for the reference quantity generated for the price observations are expressed as ratios of their average – that is, the average of the prices for the reference quantity in the second last column. The price ratio is the measure that determines whether or not a price observation is an outlier. There are two ranges of critical values. Price observations with price ratios that fall outside the range 0.75 to 1.25 are marked in orange and require verification. Price observations with price ratios that fall outside the range 0.5 to 1.5 are marked in red and need to be thoroughly scrutinized. In the example in Box 5.9, observations numbers 2 and 4 are marked in orange.

5.96 The average survey prices can be validated on the *Items screen tabs* in the DET. An example of this screen tab is shown in Box 5.10. All the columns are calculated by the DET. The example is self-explanatory. The measures used to identify outliers among the average survey prices are their variation coefficient and the ratio between their maximum and minimum price observations - called the *max-min price ratio*. There are two critical values for each measure. Average survey prices with variation coefficients of over 20 per cent or with a max-min price ratio larger than 2.0 are flagged with one question mark (?) as *questionable* and need to be checked – this is the case in the example in Box 5.10. Average prices with variation coefficients of over 40 per cent or with a max-min price ratio larger than 4.0 are flagged with three question marks (???) as *extremely questionable* and require to be investigated rigorously.

Box 5.9: Price input form in the PPP Data Entry Tool (DET)



Box 5.10: Items summary information in the DET



Code	Name	*	No of Obs.	Ref Q.	Ref Unit	Average Price	Euro Avg	Min Price	Max Price	Var. Coef.	Add. Check	Comments
11.03.22.1.01.aa	Shoe repair, men's classic shoes, lea...	*	3	1.00	service	21.67		15.00	30.00	28.78	?	
11.03.22.1.01.ab	Shoe repair, men's classic shoes, rub...	undefined	0	1.00	service						OK	
11.03.22.1.01.ba	Shoe repair, ladies' court shoes	undefined	0	1.00	service						OK	
11.03.22.1.01.bb	Shoe repair, ladies' court shoes, whil...	undefined	0	1.00	service						OK	

5.97 Participating countries are expected to: one, search the price data for price observations that have been flagged as outliers in the last column of the price input screen; two, search the Items screen tabs for products having average survey prices flagged as outliers in the column *Add. Check*; and three, to establish the reliability of the outliers identified. In the first instance, the prices will need to be checked against the prices as recorded by price collectors to establish that the prices and quantities observed have been entered correctly. If entries are wrong, they should be corrected. In many cases, verification will require revisiting the outlets where the prices were collected to see whether what was priced matches the product description and whether the correct price and quantity were recorded. Price observations that are found to be incorrect should be either eliminated or replaced by the correct observation. Price observations that are flagged as questionable and found to be correct should be retained. But price observations that are flagged as extremely questionable and found to be correct should probably be removed from the price input sheet.[21] It is to be expected that verification of outliers among price observations will introduce changes that will impact on the outlier status of average survey prices.

5.98 A high coefficient of variation can be due to a number of reasons. The price of the product may vary greatly between different types of outlet or the product may not have been priced consistently across outlets because either the product specification is too broad or it has been interpreted differently by different price collectors. Countries should establish which reason applies before deciding on a course of action. Providing the price observations are correct and a comparable product has been priced across outlets, price variation arising from different outlet types is an economic fact of life. The product should be retained and the reason for the variation explained to the group leader. It is possible that the outlet mix selected for the survey does not reflect the distribution profile of the product in question. This should be investigated and the mix adjusted as appropriate by suppressing prices of shop types that are over-represented or by duplicating the prices of shop types that are under-represented.

5.99 Products with price variation caused by too broad a specification or inconsistent pricing across outlets should be deleted if they are unrepresentative or if they are representative and the country already has enough representative items for the basic heading. But if the products are representative and the country does not have enough representative products for the basic heading, they should be retained. The circumstances should be carefully explained to the group leader. This will enable the group leader to advise whether the products should be dropped, retained or split on the basis of what other countries have reported, during inter-country validation.

5.100 Once all the outliers have been investigated, participating countries should transmit the validated price observations and average survey prices to Eurostat through eDAMIS. There will still be outliers among the prices reported. Participating countries are required to document the reliability of these outliers when submitting their prices to Eurostat.

5.5.7 Survey report

5.101 At the same time as they send their price observations and average prices for a survey to Eurostat, participating countries are required to complete the survey report and send it to Eurostat. Like the prices, the report is transmitted via eDAMIS. The survey report template is available in Box 5.11 from which can be seen that the report has five sections. The first four sections cover survey phases: pre-survey, price collection, intra-country validation and inter-country validation. The fifth section contains questions relevant to the survey being reviewed. All sections, except section 5, have two questions in common: one on timing, organisation and resources used; the other on problems encountered. Otherwise the questions are specific to survey phase under consideration.

[21] The product average prices are calculated as unweighted arithmetic means of the observed prices. This way of calculation is justifiable only if the price variation is moderate. If this is not the case, weights for price observations should be used. In principle, it is preferable to remove outliers that have been verified as correct because of the noise they introduce into the data set, but, in practice, there may be reasons for not doing so. Countries retaining extremely questionable observations should explain why they are keeping them to the group leader.

Box 5.11: Standard report form consumer goods price surveys

Country:

Survey:

Survey year:

Note: Please enter information in this survey report that is <u>complementary</u> to your PPP Inventory and describes specific aspects related to this survey, especially if they are different from what is in the Inventory. If the PPP Inventory describes accurately the procedures for a certain section, it suffices to make a reference.

1. PRE-SURVEY

1.1 Timing, organisation and resources used (Describe when and how the pre-survey (including the pre-view before the pre-survey) was carried out and how much (human or other) resources were spent.)

1.2 Sources of information (Describe the sources used to determine availability and importance of the products and to determine new products. How have you tried to ensure that the list will become sufficiently representative for your country?)

1.3 Problems encountered and lessons learned (Describe any problems encountered during the pre-survey, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

2. PRICE COLLECTION

2.1 Timing, organisation and resources used (Describe when and how the price collection was carried out and how much (human or other) resources were spent. Describe also the preparations for the price collection (translation, training of price collectors, etc.).)

2.2 Sampling of outlets, locations, products and brands (Describe how the outlets and locations to be visited were selected and how the selection of products and brands to be priced was made. Describe also how many price observations were collected on average per product and how this was determined (in relation to the recommended minimum number specified in the PPP Manual). Also comment on the variation of the prices observed per product.)

2.3 Use of other sources than outlet visits (Describe if any others sources of information than outlet visits were used (for example, CPI, scanner data, Internet, etc.).)

2.4 Allocation of representativity indicators ("asterisks") (Describe the sources and methods that were used to determine which products received an asterisk.)

2.5 Problems encountered and lessons learned (Describe any problems encountered during the price collection, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

3. INTRA-COUNTRY VALIDATION

3.1 Timing, organisation and resources used (Describe when and how the intra-country validation was carried out (before the submission of data to Eurostat) and how much (human or other) resources were spent. Provide the date of the first delivery of the data file (.xml file) through eDAMIS and any potential problems related to the transmission. Include the "Summary" table from the DET for the entire survey as it stands when the data are transmitted.)

3.2 Checks performed (Describe the validation checks performed before submitting the data file to Eurostat via eDAMIS. For example, how is it decided which prices to keep and which to delete? How is it checked that all input data (e.g. observed quantities) are correct? Are changes made to the asterisk allocation during this stage? How is it ensured that a representative average price results for each product? Also comment on the share of questionable ("?") and very questionable ("???") items.)

3.3 Problems encountered and lessons learned (Describe any problems encountered during the intra-country validation, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

4. INTER-COUNTRY VALIDATION

To be filled after the validation process as an update of the earlier version of the survey report.

4.1 Timing, organisation and resources used (Describe when and how the inter-country validation was carried out (after the submission of data to Eurostat) and how much (human or other) resources were spent.)

4.2 Checks performed and changes made ([1] Describe the validation checks performed in the Validation Tool in analysing your country's data against those of other countries. List the countries you compare your prices against. [2] Describe the procedures followed in responding to your Group Leader's queries. [3] Describe the main changes (deletions, modifications or additions) made to your data and the reasons for these changes. [4] Include the "Summary" table from the VT for the entire survey as it stands when the data are fully validated and approved.)

*4.3 Problems encountered and lessons learned (*Describe any problems encountered during the inter-country validation, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

5. SPECIFIC QUESTIONS RELATED TO THE SURVEY

[1] Please explain general deviations (if any) from the indicative shop type classification given in the survey guidelines. (Individual cases can be explained in the comment fields of the DET.) [2] etc. [3] etc.

5.102 Only sections 1, 2, 3 and 5 – pre-survey, price collection, intra-country validation and questions specific to the survey – are to be completed and sent with the price data. These sections help Eurostat and the group leaders to assess the quality of the price data received. They will also assist group leaders with their review of the intra-country validations of their group members. Section 4 – inter-country validation – is to be completed and submitted to Eurostat through eDAMIS after the inter-country validation is finished and countries have approved the survey results. These sections will help Eurostat and the group leaders to assess the efficacy of the inter-country validation phase and to see how participating countries have handled problem areas particular to the survey.

5.6 Inter-country validation

5.6.1 Validation of prices

5.103 Inter-country validation involves editing and verifying the average survey prices reported by participating countries and assessing the reliability of the PPPs they produce. The object is to establish that the average survey prices are for comparable products, that the products have been correctly priced and the allocation of asterisks is correct. In other words, to ascertain whether countries have interpreted the product specifications the same way and whether their price collectors have priced them accurately. The Quaranta editing procedure is employed for this purpose. The procedure involves first converting the average survey prices - which are in national currencies - to a common currency using exchange rates and basic heading PPPs and then comparing the average survey prices for the same product across countries and analysing the dispersion across products and across countries of the price ratios that the average survey prices generate between countries. Outliers among the average survey prices are detected by identifying outliers among the corresponding price ratios.

5.104 Inter-country validation is carried out at the level of the basic heading. The Quaranta editing procedure entails compiling a Quaranta table for each of the basic headings surveyed. A Quaranta table has two parts: one providing measures with which to assess the quality of the PPPs for the

participating countries included in the table and for the basic heading overall; the other providing measures with which to assess the quality of the average survey prices of the products that the countries covered by the table have priced for the basic heading. An example of a Quaranta table can be found in Annex IV which explains the Quaranta editing procedure in detail.

5.105 Quaranta tables are computed by the on-line *Validation Tool* (VT) developed by Eurostat. The VT software enables Eurostat, group leaders and participating countries to calculate Quaranta tables for all participating countries together, for the four country groups separately, and for subsets of countries that are either within a country group[22] or cross over country groups[23]. In other words, the average survey prices can be validated within the context of all participating countries, within the context of the country group or within the context of a subgroup of countries chosen, for example, because their price levels are expected to be similar or because they are neighbours.

5.106 Inter-country validation starts when Eurostat makes the first European Quaranta table available to group leaders and participating countries through the VT. This happens after the group leaders and the countries themselves have checked the price data supplied by group members through the VT for entry errors and reviewed the thoroughness of intra-country validation carried out by group members. Once the price data for the country groups are clean, the first European Quaranta table is computed. Thereafter inter-country validation is an iterative process that can involve several iterations or rounds before being completed. After each round, a new Quaranta table is produced and, as incorrect average survey prices are removed or corrected, the PPPs for the basic heading become more stable. Eventually, after a number of rounds, there is a rough convergence. At this point, group leaders and their group members will agree that the returns from further rounds would be marginal and not worth pursuing and sign off on the validation. In the timeline for the survey process in Box 5.3, it is indicated that the official European Quaranta table is calculated twice by Eurostat but, between and after these two official computations, a number of interim Quaranta tables are produced in keeping with the number of validation rounds carried out.

5.107 As explained in Annex IV, the measures used to identify outliers among the average survey prices for products are the *XR-Indices* and the *PPP-Indices*. These are *standardised price ratios*: the former based on the average survey prices for the product converted to a common currency with exchange rates; the latter based on average survey prices for the product converted to a common currency with the PPPs for the product's basic heading.[24] When validation begins, it is the outliers among XR-Indices that are verified initially. The PPP-Indices are preliminary as they are based on PPPs calculated with the average survey prices that are being edited and verified. As validation progresses, the PPPs and the PPP-Indices become more reliable and the search for outliers shifts from those among the XR-Indices to those among the PPP-Indices. The object is to remove, or at least reduce, the outliers among the PPP-Indices. If this is achieved, the outliers remaining among the XR-Indices can be ignored. XR-Indices and PPP-Indices that fall outside the range 80 to 125 are flagged as outliers and require verification.

5.108 The average survey prices flagged as outliers in the Quaranta table are only possible errors. They are not errors by definition, no matter how well established are the criteria used to identify them. They cannot be removed automatically, they have to be referred back to the countries reporting them for verification. Participating countries are required to investigate the average survey prices flagged as outliers and to confirm whether they are correct or incorrect. When prices are found to be incorrect, participating countries are expected to correct them or to suppress them.

5.109 In principle, an outlier that is correct should be retained, but the lack of weights within a basic heading at the product level can make this impractical, particularly as the unweighted procedures applied at the basic heading level assume price variation within a basic heading to be moderate. The retention of an outlier that is correct can therefore create noise which impacts not only

[22] For example, the Nordic countries or the Scandinavian countries in the Northern group.

[23] For example, the Balkan countries or the Western Balkan countries in the Eastern group and the Southern group.

[24] A standardised price ratio equals $(CC\text{-}Price_{1A} / [CC\text{-}Price_{1A} * CC\text{-}Price_{1B} * \ldots\ldots CC\text{-}Price_{1N}]^{1/N}) 100$ where $CC\text{-}Price_{1A}$ is the average price for product 1 in country A in the common currency. $CC\text{-}Price_{1A}$ is itself equal to $NC\text{-}Price_{1A} / CC_A$ where $NC\text{-}Price_{1A}$ is the average price for product 1 in country A in national currency and CC_A is the currency conversion rate between the national currency of A and the common currency. The currency conversion rate is either the exchange rate or the PPP: $CC_A = XR_A$ or PPP_A.

on the basic heading PPP for the participating country reporting the outlier but also on the basic heading PPPs for the other participating countries. If the outlier refers to a representative product, the effect of the noise can be reduced, at least for the reporting country, by suppressing the representativity indicator. The other option is to suppress the outlier. Neither of these actions would be justified if, within the context of the basic heading, the product is representative of the reporting country or if most of the other countries pricing the product have reported it as unrepresentative (which may explain why it is an outlier in the first place). But, if the outlier is unrepresentative, removing it is probably warranted. Whatever action is taken, it has to be decided jointly by the participating country and the group leader on a case-by-case basis.

5.110 The Quaranta editing procedure also involves analysing the dispersion among the PPP-Indices. For this purpose, three variation coefficients are calculated: the *product variation coefficient* that measures dispersion among the PPP-Indices for a product; the *country variation coefficient* that measures the dispersion among PPP-Indices for a country; and the *overall variation coefficient* that measures average dispersion of product dispersions. The higher a coefficient's value the less reliable are the PPP-Indices to which it refers. The critical value for all three variation coefficients is 33 per cent. Coefficients with values above 33 per cent are outliers requiring countries to investigate the PPP-Indices that are flagged among the PPP-Indices covered by the coefficient.

5.111 Besides being editing tools, the coefficients provide the means to monitor progress during validation and, at its conclusion, to assess how effective the whole process of editing and verification has been in reducing the incidence of non-sampling error among the price data. In a usual situation, coefficients should be smaller at the end of validation than they were at the beginning.

5.6.2 Validation of representativity indicators

5.112 In the analysis of the Quaranta tables, specific attention is paid to the allocation of the representativity indicators or asterisks. As explained in Section 5.4.1, the concept of representativity is used because it is expected that representative products have lower price levels than unrepresentative products. The use of asterisks avoids a potential bias due to countries pricing different numbers of representative and unrepresentative products as well as giving representative products a higher weight in the calculation of the basic heading PPPs than the unrepresentative products.

5.113 The PPP-Indices calculated in the Quaranta table help in identifying products that have price levels that are higher or lower than average for that basic heading. Those cases where either

- a product with a high PPP-index receives an asterisk, or
- a product with a low PPP-index receives no asterisk,

deserve to be investigated in detail.

5.114 The allocation of asterisks can have an important impact on the PPPs, in particular for those basic headings in which only a few products are priced. In such a basic heading, adding or removing one asterisk can change the PPPs significantly, not only for the country concerned but for all countries. It is therefore particularly important to carefully check the allocation of asterisk in such basic headings.

5.115 Another way of analysing the correctness of the allocation of asterisks is to calculate PPPs according to the *Country-Product-Representativity-Dummy* (CPRD) method. The CPRD method calculates an explicit coefficient that reflects the average ratio between the price levels of representative and unrepresentative products which is expected to be higher than 1. Comparing the

results of the CPRD method with that of the EKS method gives insight into the robustness of the PPPs calculated, in particular as regards the allocation of asterisks.[25]

5.6.3 Comparison of results across surveys

5.116 Quaranta tables are the tool for inter-country validation, as explained in Section 5.6.1. However, there is one important drawback to using Quaranta tables: if errors exist that have the same systematic impact on all items within a basic heading for one country, the PPP-indices may show no outliers although the PPPs for the basic heading will be biased. In general, Quaranta tables help in identifying outliers and improving the robustness of the results but they do not provide an assessment of the plausibility of the resulting PPPs and PLIs. For that purpose, the results need to be compared with other indicators.

5.117 First of all, the PLIs can be generally assessed for their plausibility. For example, large price differences between neighbouring countries, or countries at the same level of economic development, should be checked. In addition, the PLIs can be checked against the results of the same survey of three years earlier and corresponding CPI information. For this purpose, two sets of comparison tables are produced during the validation:

- Tables that compare the PLIs of two different surveys at constant exchange rates.
- Tables that compare PLIs of the current survey with PLIs that are extrapolated from the previous survey using CPI indices at basic heading level.

5.118 As explained in Chapter 1, Section 1.3.3, PLIs are calculated as PPPs divided by the exchange rates. Hence, changes in PLIs can be due to either changes in the PPPs or changes in the exchange rates. Calculating PLIs at fixed exchange rate - for example, those of the latest survey year - enables an analyst to visualise the relative changes in PPPs. An increase in the PLI calculated this way for a country indicates that prices have increased faster than the average of all countries and, vice versa, a decrease of the PLI suggest that inflation was less than the average. Those results can then be checked against CPI data in the second type of tables.

5.119 Differences found between the current survey PLIs and the extrapolated PLIs from the previous survey point at instances where the PPP surveys show different price developments than the CPI. There can be many reasons for this:

- Changes in PLIs over time are affected by changes in the underlying structures of volumes.
- The two PPP surveys being compared may have had different product samples or otherwise different methods, these being designed to measure spatial rather than temporal price differences. For example, PPP surveys include unrepresentative products whereas CPIs do not.
- The product sample of the PPP surveys may be different from those employed in the CPI, or more generally, there may be different concepts and methods. For example, CPI surveys apply quality adjustments whereas PPP surveys do not.
- There may be errors in either the previous PPP survey or the current PPP survey, or in the CPI indices that were used as extrapolators.

5.120 It is important to analyse each instance of incoherence between CPI and PPP and to determine the nature of its cause, in particular to see if any is due to identifiable error. It cannot be expected that PPPs and the CPI will be fully coherent, due to the first three sets of reasons listed above. But major discrepancies should be understood, to be able to explain them to users.

[25] More generally, comparing EKS results with the results of other versions of the EKS, such as the classic EKS which does not take representativity into account or the EKS-S which does (see Chapter 12, Section 12.2.7), also provides useful information about the allocation of asterisks and the PPPs that the allocation gives rise to.

5.121 In order to reduce the magnitude of discrepancies between temporal and spatial price measures, it is attempted to keep methodologies and sampling constant between surveys to the extent possible. This should of course not be at the expense of updating product lists, since these need to remain representative for the time period surveyed, or of improvements in methodology. Another approach to improve coherence is to further strengthen the links between CPI and PPP data collections. This is discussed further in Section 5.10.

5.7 Evaluation

5.122 After the closure of each of the consumer price surveys - that is, after all countries have approved the final results - countries send the final version of the survey report to their group leaders and Eurostat. This final version includes section 4 on inter-country validation, describing the work done during this stage of this survey. The survey report thereby forms a complete description of the execution of the survey by the country. Countries are also invited to report the problems they encountered during the survey and to bring forward their suggestions for improvements.

5.123 The group leaders take the country survey reports as input to their own survey reports. They summarise the countries' experiences and add their own views and suggestions from the group leader perspective. Finally, Eurostat takes the group leader reports and develops them into a unified evaluation report. This report serves as documentation on the execution of the survey, describing stage by stage the steps taken, problems encountered and lessons learned. It also gives a general assessment of the quality of the results of the survey. It concludes with a set of suggestions and recommendations for the next similar survey.

5.124 When the survey is next being prepared, the evaluation report is an important input to decisions on survey methodology and product lists during the preview and planning stages.

5.8 Derivation of national annual prices

5.8.1 Survey prices to national prices

5.125 After each survey all countries are required to provide Eurostat with spatial adjustment factors in order to adjust average prices obtained from one or more locations within the economic territory of a participating country to national average prices.[26] Countries report spatial adjustment factors for each basic heading included in the respective survey. According to the PPP Regulation they are required to measure regional differences in price levels once every six years – that is, the spatial adjustment factors can be retained for two survey cycles after which they have to be re-surveyed.

5.126 Spatial adjustment factors are to be transmitted to Eurostat two months after data collection is completed – that is, in July for the survey held in the first half of the year and in January of the following year for the survey held in the second half of the year. Once the average prices for a survey have been approved by both Eurostat and the participating countries, Eurostat adjusts the average survey prices of those countries reporting capital city prices to national prices, basic heading by basic heading, using the spatial coefficients provided by countries.

5.127 There are at least two main approaches that can be followed by the countries in the establishment of the spatial adjustment factors: they can be calculated on the basis of available CPI data or they can be derived from specific surveys aiming at measuring regional differences in consumer price levels.

5.128 The first approach is generally less resource demanding and it is therefore recommended to investigate its feasibility before undertaking specific surveys. If CPI data are used, the exercise

[26] Countries that collect prices in a representative selection of locations across the countries do not need to provide spatial adjustment factors.

should cover observations for one complete year in order to guarantee a consistent annual average. Furthermore, CPIs are also used in the PPP exercise as temporal adjustment factors (see next section). Within the CPI approach, there are again broadly two ways of proceeding:

- One can take the PPP product list and try to match it against CPI products. This method has the advantage that the prices are comparable to those collected for PPP purposes.
- Alternatively, one can search the CPI data for products that are comparable across regions and base the spatial adjustment factors on the prices for these products. This method is independent of the PPP product list but may yield more representative prices for the regions.

5.129 Should CPI sources prove to be insufficient, further specific price collections for this purpose can be taken into consideration. Such a price collection should aim to measure relative differences in regional consumer price levels and can provide a good basis for the calculation of the spatial adjustment factors. However, it is resource-intensive. In practice, a combination of using available CPI data with additional price collection for areas where comparable CPI data are lacking may be optimal. Basic headings with national pricing like tobacco, motor cars, fuels, etc. do not need to be considered in the research.

5.130 If regional average prices have been computed, the calculation of the spatial adjustment factors can proceed in the same way as PPPs are calculated at European level - that is, using the EKS method, including the assignment of representativity indicators at regional level. This would yield regional PPPs. If the regional PPPs are expressed with country = 1, the spatial adjustment factor would be the inverse of the PPP for the capital region. It is not necessary to calculate regional PPPs though. It is also possible to calculate national average prices and capital city average prices and take the unweighted geometric mean of the ratios between the two. This gives the spatial adjustment factor for the basic heading directly.

5.131 Account should be taken of the weights of each region within the country. Normally the capital city region will have the largest share of national expenditures among the regions. If regional PPPs are calculated, it should be ensured that the spatial adjustment factor is calculated as the difference between the weighted national average price and the capital city price. If national average prices are directly calculated, it should be ensured that the number of prices collected in each region reflect the importance of each region in the national expenditure. Regional consumption weights at basic heading level may be available from the household budget survey.

5.132 A number of countries participating in the PPP Programme assume a spatial adjustment factor of 1. These countries have markets with insignificant regional price differences for most of the products and consequently it is assumed that capital city price levels are close to the national average level. In some cases this is confirmed by data collected for the purposes of CPI. This is the case especially when national markets are dominated by chains following a national price policy and consequently it is reasonable to assume that capital prices represent national averages to a fair degree.

5.8.2 National prices to annual national prices

5.133 The national survey prices, irrespective of whether they are adjusted capital city prices or national prices supplied directly by countries, refer to the point in time when the survey was conducted. They are not annual prices and need to be adjusted accordingly. To this end, participating countries are required to provide Eurostat or the OECD with monthly temporal adjustment factors with which the national survey prices can be converted to national annual prices. The adjustment factors are to be monthly and to be transmitted once a year – or, more precisely, the adjustment factors for the twelve months of the year t are to be reported by the end of March of the year t+1. An adjustment factor is to be supplied for each basic heading comprising individual consumption expenditure by households. This is because temporal adjustment factors are not just used to convert national survey prices to national annual prices for the basic headings surveyed

during the year, they are also used to extrapolate the PPPs of those basic headings that were not surveyed during the year – a requisite of the rolling survey approach.

5.134 At the beginning of each year, Eurostat sends participating countries an electronic reporting form which is partially completed with temporal adjustment factors that it has extracted from its CPI data base. There is a good correspondence between CPI sub-indices and the basic headings constituting household expenditure. This is because COICOP[28] is the classification underlying the CPI and, as explained in Chapter 4, Section 4.3.3, it is the classification underlying the breakdown of household individual consumption expenditure in the Eurostat-OECD classification of GDP expenditures. Even so, not all basic headings are covered or CPI data are not applicable for the PPP purposes due to different price concepts - for example, the full market price concept for medical goods and services[29] - and countries are required to provide temporal adjustment factors for these basic heading. They are expected to extract the temporal adjustment factors from their CPI database or another source. COICOP is also the classification underlying the CPIs of most participating countries and so the correspondence between CPI sub-indices and basic headings is generally high. But when there is no exact match, participating countries are expected to select a sub-index, or an aggregation of sub-indices, that closely approximates the basic heading in question. CPI sub-indices are usually more detailed than basic headings and often they can be aggregated specifically for a basic heading. Countries are required to return the completed reporting form to Eurostat via eDAMIS.

5.8.3 Seasonal products

5.135 Seasonal products are defined as those products for which both prices and the quantities sold vary considerably throughout the year. Typically, the patterns of variation are repeated from one year to the next. By this definition, certain fruits, vegetables, fish and flowers are obviously seasonal products. Various types of clothing are also seasonal products. So too are those goods that are sold in substantial amounts at prices well below normal prices during seasonal sales. For the purposes of Eurostat and OECD comparisons, only seasonal food products warrant special treatment.

5.136 The approach adopted by Eurostat for seasonal food products is to obtain annual prices by adjusting survey prices with weighted temporal adjustment factors.[30] This requires participating countries to provide weights in addition to an appropriate CPI sub-index for each seasonal food product they priced. The weights should be quantity weights reflecting the quantities of the item purchased throughout the survey year. If quantity weights are not available, expenditure weights based on the amounts spent on the item during the survey year should be provided instead. The weights should be monthly weights. If monthly weights do not exist, quarterly weights should be estimated by allocating a share of 100 per cent to each of the four quarters of the survey year. This assumes that, for most seasonal food products, participating countries are able to identify approximately the consumption pattern over a year and to attribute the major part of consumption to one or two quarters of the year accordingly. If a country is unable to supply weights, the annual average price will be calculated as an unweighted harmonic mean and not as an unweighted arithmetic mean.

5.137 Neither seasonal food products nor their seasonality are necessarily the same for all participating countries. It is left to the participating countries to decide which of the food items specified on the final product list for the food survey they regard as seasonal. Each country is required to mark those priced products deemed affected by seasonality. Eurostat then prepares an electronic reporting form including all the products that were marked by countries. The layout of the reporting form is set out in Box 5.12. The Box gives two examples. The first shows what the completed form looks like when actual monthly weights are provided. The second shows how the completed form appears when estimated quarterly weights are supplied.

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28 "Classification of Individual Consumption According to Purpose (COICOP)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

29 See Chapter 7, Section 7.3.1.

30 Countries participating in OECD comparisons are required to provide annual prices for seasonal food products. It is left to the countries to decide how the annual prices are obtained.

5.138 Only seasonal products are listed on the reporting form. Their codes and descriptions are copied from the final product list for the food survey by Eurostat. For each seasonal product specified, the country is required to complete the shaded cells – that is, the cells covering:

- type of weights being provided: quantity weights or expenditure weights;
- coverage of the CPI sub-index chosen as temporal adjustment factor. The sub-index will refer either to the product itself or to the product group or basic heading to which it belongs;
- monthly values of the sub-index for the survey year t based on t-1, the year prior to the survey year;
- actual monthly weights or estimated quarterly weights;

The reporting form is programmed to complete the cells outlined in red - namely, the weighted annual average and the correction coefficients.

5.139 Participating countries are expected to return the completed reporting form to Eurostat via eDAMIS after the close of the survey year – that is, by end-January of t+1. Eurostat uses the correction coefficients for the survey month (or months) to adjust the average survey prices for the seasonal products to annual prices. In cases where the prices were surveyed over two months, the arithmetic average of the correction coefficients of the months in question will be used.

Box 5.12: Reporting form for data required for seasonal food products

Country		Quantity weights		Expenditure weights	

Item	Code	Description	Closest CPI for t			Weights for t			Temporal adjustment factor (TAF)
			Survey month	CPI code and title	Monthly index (average of t-1 = 100)	Actual monthly CPI weight (%)	Quarter	Estimated quarterly weight (%)	Survey month price * TAF = annual price
(a) Example with actual monthly weights									
36	11.01.16.1.01.la	Fresh kiwis	Jan	123 Fresh fruit	59.10	14	I		1.335[(c)]
			Feb		69.69	14			1.132
			Mar		76.14	12			1.036
			Apr		94.70	9	II		0.833
			May		95.65	7			**0.825**
			Jun		96.19	4			0.820
			Jul		128.25	3	III		0.615
			Aug		116.57	2			0.677
			Sep		121.32	4			0.650
			Oct		98.99	5	IV		0.797
			Nov		70.42	13			1.120
			Dec		57.80	13			1.365
			Year		78.88[(a)]	100.0	**Year**		
(b) Example with estimated quarterly weights									
38	11.01.16.1.01.na	Fresh straw-berries	Jan	150 Straw-berries	118.89		I	10	0.697
			Feb		95.08				0.871
			Mar		73.69				1.124
			Apr		60.94		II	45	1.359
			May		60.37				**1.372**
			Jun		60.37				1.372
			Jul		70.78		III	30	1.170
			Aug		82.89				0.999
			Sep		112.43				0.737
			Oct		128.65		IV	15	0.644
			Nov		140.11				0.591
			Dec		119.05				0.696
			Year		82.84[(b)]		**Year**	100	

[(a)] Weighted annual average: [(59.10 x 14) + (69.69 x 14) + …… + (57.80 x 13)] / 100
[(b)] Weighted annual average: [{(118.89 + 95.08 + 73.69) / 3} 10 + …… + {(128.65 + 140.11 + 119.05) / 3} 15] / 100
[(c)] Weighted annual average / monthly index: 78.88 / 59.10; 78.88 / 69.69; etc.
(For comparison: Kiwis: unweighted arithmetic mean = 90.40; unweighted harmonic mean = 84.49.
Strawberries: unweighted arithmetic mean = 93.60; unweighted harmonic mean = 85.45)

5.9 Estimation of PPPs for non-survey years

5.140 Following the rolling survey approach, each basic heading for consumer goods and services is priced only once every three years. PPPs for non-survey years are calculated by applying annual extrapolation factors to the PPPs of the survey years at basic heading level. The annual extrapolation factors are derived from the same set of data as provided for the temporal adjustment factors described in the previous section. They are calculated as the annual arithmetic average of the monthly temporal adjustment factors and would in most cases correspond to the annual CPI index.

5.141 If a basic heading is priced in year t, the PPP for that basic heading in year t+1 is derived as:

$$PPP_{t+1} = EXT_{t+1} * PPP_t$$

with EXT_{t+1} being the extrapolation factor for year t+1 - that is, a price index giving the change in prices between year t and t+1 relative to the average change in prices for the European Union. For year t+2, the PPP will be retropolated from the PPPs derived in the survey of year t+3:

$$PPP_{t+2} = PPP_{t+3} / EXT_{t+3}$$

This can only be done after PPPs for year t+3 have become available. Until then, the PPPs for year t+2 are derived as:

$$PPP_{t+2} = EXT_{t+2} * PPP_{t+1} = EXT_{t+2} * EXT_{t+1} * PPP_t$$

5.142 The general use of CPI indices as extrapolation factors for the PPPs underlines the importance of checking the coherence of the PPP survey results with corresponding CPI data as described in Section 5.6.3. Suppose, for example, that the PPP surveys of years t and t+3 show that, for a certain country, price levels have increased compared to the average of all countries, whereas the CPI shows the opposite. The above extrapolation scheme would then result in a large – and difficult to explain – jump in the PPPs between years t+1 and t+2.

5.10 Synergies between PPP and CPI price collection

5.143 Because of the extensive use of CPI data to extrapolate PPPs, both from monthly survey prices to annual average prices as well as from survey years to non-survey years, it is desirable to achieve a high level of coherence at national level between the prices used for the calculation of CPIs and those used for the calculation of PPPs. However, CPIs and PPPs have different aims which require different approaches that are not always compatible.

5.144 CPIs aim at measuring the month-to-month price changes at national level. Each country has its own basket of goods and services that is to be as representative for that country as possible. Generally, product descriptions are wide because the main aim for price collectors is to find the same product in an outlet that was priced in the previous month. In some cases several hundreds of prices are collected nationwide per product each month.

5.145 PPPs aim at measuring price differences across countries at a given point in time. For this purpose, a product list is devised that aims to combine comparability across countries with representativity for each country (see Section 5.4.1). Product descriptions are detailed in order to obtain prices for comparable products across countries. The number of prices collected per product within a country can vary between 1 and a few dozen. Prices are often collected only in capital cities.

5.146 There is a potential gain in quality to be made if CPI price observations could be used for PPP purposes without compromising comparability across countries. It would give a much broader base of data - monthly prices, national coverage, a large number of observations - from which to calculate PPPs. In addition, it would lead to savings in costs since the separate price collection for PPPs could be reduced. Many countries already examine their CPI data to see if any of the products on the PPP product list also appear in the CPI sample so that no additional price collection for PPPs

is necessary. This is already possible for some food categories like fresh fruit and vegetables. Due also to shrinking financial and human resources in NSIs, there is an increased interest in searching for further synergies in the price collection for CPI and PPP purposes. There are broadly two ways this can be explored:

- *Ex-post approach*: CPI price observations can be mined for products that match the PPP product descriptions. This requires that information is available on the characteristics of the products that were priced for the CPI. Increasing the collection of such metadata on CPI products would enable more of such matching. If characteristics of CPI products were collected in all countries in a standardised way - for example, by using SPDs - matching across countries would also be possible. Collecting such information is costly and there is a risk that it may be to the detriment of the number of prices being collected for the CPI. If this approach is followed it must be done with great care not the affect the quality of the CPI. On the other hand, there may be a benefit to the CPI process in having detailed information on the products being priced: it may be used to control for quality changes for example.

- *Ex-ante approach*: adapting CPI baskets to contain precisely-defined product specifications that can be used for purposes of PPP calculations. It would enable a monthly collection of the PPP prices so that a more reliable annual average price can be obtained. CPI price collectors will have to be trained to search for products according to a precise definition. Not all such precisely-defined products however will be representative for each country; normally such products should not enter the national CPI calculations. Again, any changes should be implemented carefully.

5.147 Another development that could benefit the quality of both CPI and PPP results and stimulate their integration is the increased use of scanner data. Some countries are already using scanner data as the main source for prices data for products that are typically purchased in supermarket, hypermarkets, and the like. Scanner data provide exhaustive information on transaction prices. They also provide information on sales volumes per bar code. Whereas scanner data have great potential as a data source there are also challenges, specifically in the processing of huge volumes of data on a monthly basis for the CPI, or for PPPs, and in identifying those bar codes that correspond to a particular product definition. Many countries are now researching the possibilities for obtaining scanner data from outlets and the most efficient ways of using them.

Housing

6

6.1 Introduction

6.1 Final expenditure on housing is an important component of GDP. Its share of GDP for countries participating in Eurostat and OECD comparisons is usually between 8 and 12 per cent and tends to increase as GDP per capita rises. Although housing is a part of household consumption expenditure, it is not included in the cycle of price surveys for consumer goods and services described in Chapter 5. Instead it is covered by a special rent survey[1] for which participating countries are not expected to collect data specifically but to extract them from existent statistical sources. The survey is organised by Eurostat and is held every year.[2] Data are collected on the rents paid by tenants and on the rents imputed to owner-occupiers for a set of broadly-defined dwellings. Quantity and quality data on the housing stock are also collected.

6.2 The data collected on rents are used to calculate purchasing power parities (PPPs) with which the final expenditures on actual and imputed rents are deflated to derive volume measures for housing indirectly. This is the *price approach*. It is the approach generally applied in Eurostat and OECD comparisons. There is, however, a refinement in the case of rents. Basic heading PPPs are calculated with actual expenditure weights for products and not with the usual quasi-expenditure weights to indicate whether or not a product is representative.

6.3 The data collected on the housing stock are used to compute volume measures for housing directly. This is the *quantity approach*. It is not widely applied in Eurostat and OECD comparisons being employed only for housing and education. The direct volume measures for housing from the quantity approach are used in place of the indirect volume measures for those participating countries that do not have a large and representative rent market and so are unable to supply the data required on actual and imputed rents.

6.4 This chapter describes the rent survey and the derivation of expenditure weights. It explains how PPPs for housing are calculated directly by the price approach with the data collected on rents and indirectly by the quantity approach with the data collected on the housing stock. It also explains how these two sets of PPPs, neither of which has complete country coverage, are combined to obtain a single series of PPPs covering all participating countries.

6.2 Actual and imputed rents

6.5 Most participating countries estimate final expenditure on housing in line with the SNA 93[3] or the ESA 95[4], namely:

- *Household expenditure on actual rents* is obtained by summing the rents paid by households that rent their accommodation. The calculation includes dwellings that are rented but not occupied. It also includes rented secondary residences.

  Rents are defined as payments for the use of the land on which the property stands, the dwelling occupied, the fixtures and fittings for heating, plumbing, lighting, etc., the furniture in the case of a dwelling let furnished, and the garage or parking space providing parking for the dwelling[5].

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1 The term *rent* is used throughout this chapter. From a national accounts perspective, this is incorrect. The term *rental* should be used instead. The SNA 93 and the ESA 95 broadly define rent as property income received by owners of non-produced assets such as land or subsoil assets and rentals as payment for a service made to owners of produced assets such as buildings or machinery.

2 For OECD comparisons, the survey is organised once every three years by the OECD.

3 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

4 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

5 The garage or parking space does not have to be physically contiguous to the dwelling nor does it have to be rented from the same landlord.

Rents do not cover payments for maintenance and repair of the dwelling, water supply, refuse and sewage collection, electricity and gas, and heating and hot water supplied by district heating plants. Nor do rents cover co-proprietor charges for caretaking, gardening, stairwell cleaning, maintenance of lifts and refuse disposal chutes, heating and lighting, etc., in multi-occupied buildings.

- *Household expenditure on imputed rents* is obtained by summing the rents imputed to households that own and occupy their accommodation. Owner-occupied secondary residences are included in the calculation. Dwellings owned by households that are not occupied (nor rented out) are excluded.[6]

  Imputed rents are defined as rental equivalents – that is, the estimated rent that a tenant would pay for identical accommodation let unfurnished, taking into consideration factors such as the type of dwelling (single-family or multi-family), its size (useable surface, number of rooms), its facilities (running water, indoor toilet and bathroom, electricity, central heating, etc.), its location (city centre, suburban or rural) and neighbourhood amenities.

  The preferred method of determining rental equivalents is the stratification method whereby the housing stock is broken down by type, size, quality and location into strata and combined with information on actual rents paid in each stratum. More precisely, the number of owner-occupied dwellings in the stratum is multiplied by the average rent paid for rented accommodation in the stratum to arrive at the total imputed rent for the stratum. Summing the imputed rents across strata gives the total imputed rent for the country.

  Implementation of the stratification method requires the existence of a well-organised market for rented housing. In the absence of such a market, the second best method, the user cost method, has to be employed. This entails estimating imputed rents by summing all the costs that owner-occupiers incur in owning their dwellings: intermediate consumption, compensation of employees, consumption of fixed capital, net operating surplus and other taxes (less subsidies) on production.[7]

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6 Not occupied means empty, that is, unfurnished. Principle 12 of Commission Regulation (EC) No 1722/2005 of 20 October 2005 on the principles for estimating dwelling services for the purpose of Council Regulation (EC, Euratom) No 1287/2003 on the harmonisation of gross national income at market prices states that "a furnished owner-occupied dwelling in general shall be treated as an occupied dwelling".

7 The SNA 93 recommends that the output of owner-occupied dwellings should be estimated by the rental equivalence method and assumes that well-organised markets for rented housing exist in most countries. It makes no recommendation if such a market does not exist in a country. But, when considering the valuation of goods and services produced on own account in general, the SNA 93 recommends that output produced for own final use should be valued by the total production costs incurred if it cannot be valued at average basic prices of the same goods and services sold on the market. In other words, in countries were a well-organised rent market does not exist, housing output produced by owner-occupiers should be valued by the total cost to the producer or user. The European Union is more explicit. It requires EU Member States and EU Candidate Countries to apply the stratification method. If the method cannot be applied, because the rent market is small and unrepresentative, it requires Member States and Candidate Countries to apply the user cost method instead. See Principle 1 of Commission Regulation (EC) No 1722/2005.

6.6 Household expenditure on actual rents and household expenditure on imputed rents constitute two of the four basic headings covering housing in the Eurostat-OECD classification of GDP expenditures. The other two basic headings are the expenditure on housing by non-profit making institutions serving households (NPISHs) and the expenditure on housing by general government. Neither price nor quantity data are collected specifically for either of these two basic headings. Their volume indices are derived with the PPPs calculated for household expenditure on actual rents.

Box 6.1: Price approach reporting form

Country	
Year	

N°	Item definition				Data collection						Average size m^2
	Rental	Flat/House	Rooms	Central heating	Monthly rent per m^2	Total surface m^2	Annual expenditure	Monthly rent per dwelling	Number of dwellings	Annual expenditure	
1	2	3	4	5	6	7	8=(6*7)*12	9	10	11=(9*10)*12	12=(7/10)
1	Actual	Flat	1-2	No							
2	Actual	Flat	1-2	Yes							
3	Actual	Flat	3	No							
4	Actual	Flat	3	Yes							
5	Actual	Flat	4+	No							
6	Actual	Flat	4+	Yes							
7	Actual	House	All	No							
8	Actual	House	All	Yes							
9	Actual rents for dwellings without facilities										
A	Actual rents: average or total				(∑8/∑7)/12	∑7	∑8	(∑11/∑10)/12	∑10	∑11	∑7/∑10
10	Imputed	Flat	1-2	No							
11	Imputed	Flat	1-2	Yes							
12	Imputed	Flat	3	No							
13	Imputed	Flat	3	Yes							
14	Imputed	Flat	4+	No							
15	Imputed	Flat	4+	Yes							
16	Imputed	House	All	No							
17	Imputed	House	All	Yes							
18	Imputed rents for dwellings without facilities										
B	Imputed rents: average or total				(∑8/∑7)/12	∑7	∑8	(∑11/∑10)/12	∑10	∑11	∑7/∑10

GDP (from the expenditure questionnaire)		Difference
Actual rents	AR	∑8A - AR
Imputed rents	IR	∑8B - IR

Difference
∑11A - AR
∑11A - IR

Box 6.2: Quantity approach reporting form

Country	
Year	

Quantity indicators

Dwellings with	Flats				Houses				Total				Average size of dwelling m^2		
	Number of dwellings	%	Total surface m^2	%	Number of dwellings	%	Total surface m^2	%	Number of dwellings	%	Total surface m^2	%	Flats	Houses	Total
1 room															
2 rooms															
3 rooms															
4 rooms															
5 rooms															
6+ rooms															
Total															

Quality indicators

Dwellings with	Flats		Houses		Total	
	Number of dwellings	%	Number of dwellings	%	Number of dwellings	%
Electricity						
Running						
Inside toilet						
Central						
Total						

6.3 Rent survey

6.7 The rent survey collects data for both the price approach and the quantity approach. The survey questionnaire which is in Excel has two reporting forms: one for the price and other data on actual and imputed rents needed for the price approach; the other for the quantity and quality data on the housing stock needed for the quantity approach. Examples of the reporting forms are given in Box 6.1 and Box 6.2. Participating countries estimating final expenditure on imputed rents by the stratification method are required to complete the reporting form for the price approach in Box 6.1. Participating countries applying the user cost method to estimate final expenditure on imputed rents are required to complete the reporting form for the quantity approach in Box 6.2. A small subset of countries completes both reporting forms. By supplying data for both approaches, these countries provide the means of linking the direct PPPs derived by the price approach with the indirect PPPs obtained by the quantity approach.

6.8 The rent survey covers three years: t-2, t-1 and t. The questionnaire has a reporting form for each approach for each year. Participating countries are only expected to fill in the cells that have been highlighted on the reporting forms in Box 6.1 and Box 6.2. The reporting forms are programmed to complete the cells that are not highlighted. In addition to the reporting forms, the questionnaire has three summary sheets – two for the price approach, one for the quantity approach – whereby countries can check the inter-temporal consistency of the data they have reported for each year over the three years covered. Respondents do not have to fill in the summary sheets as the questionnaire is programmed to complete them automatically as data are entered on the reporting forms. Examples of the summary sheets are available in Boxes 6.3, 6.4 and 6.5. The questionnaire also has a comments page where apparent inconsistencies and anomalies in the data can be explained.

6.9 Both reporting forms refer to rooms, useable surface and central heating. These are defined as:

- *Rooms:* Bedrooms, dining rooms, living rooms, habitable cellars and attics, servants' rooms and other separate spaces used or intended for habitation all count as rooms. Kitchens, corridors, verandas, halls, utility rooms (such as boiler rooms and laundry rooms), lobbies, bathrooms and toilets do not count as rooms.
- *Useable surface:* The floor space measured inside the outer walls minus the thickness of internal walls and door and window recesses. Excluded are stairs, balconies and terraces, non-habitable cellars and attics and, in multi-dwelling houses, all common spaces.
- *Central heating:* A dwelling is considered as centrally heated if heating is provided either from a community heating centre or from an installation built in the building or in the housing unit that is established for heating purposes without regard to the source of energy.

6.10 Both reporting forms also refer to *facilities* but the definitions differ. For the price approach, facilities are specified as a bundle of amenities comprising hot and cold running water, electricity, inside flush toilet and bathroom and kitchen. The bundle may or may not include central heating. For the quantity approach, facilities are specified individually. The amenities identified are electricity, running water, inside toilet and central heating. In other words, with the price approach, a dwelling must have all the facilities listed in the bundle, with the exception of central heating, to be counted as *with facilities*. This is not the case with the quantity approach. For example, a dwelling may have running water but not an inside flush toilet to be counted as *with running water*.

6.11 Eurostat distributes the rent questionnaire in February of t+1. Participating countries are expected to return the questionnaire to Eurostat via eDAMIS by the end of August of t+1 after having completed and validated the reporting forms. Validation in the context of the rent survey requires countries to check the summary sheets for any inter-temporal inconsistencies in the data they have supplied. It also requires countries to ensure that the data reported are consistent with the data on which the expenditure estimates on rents in the national accounts are based. Consistency with the national accounts is particularly important in the case of the price approach for which respondents are required to make an explicit check as explained below.

6.3.1 Price approach reporting form

6.12 Participating counties that use the stratification method to estimate imputed rents are required to fill in a price approach reporting form (Box 6.1) for each of the three years covered by the rent survey. The reporting form in Box 6.1 lists 18 dwellings of which nine are rented and nine are owner-occupied. The definitions for the rented dwellings are the same as the definitions for the owner-occupied dwellings with two exceptions. First, the rented dwellings specified refer to all rented dwellings irrespective of whether they are rented furnished or unfurnished, whereas the owner-occupied dwellings specified refer to dwellings without their furnishings (that is to say, the furnishings of the dwelling are not taken into account when imputing the rent). Second, rented dwellings can be vacant, they do not have to be occupied to be counted. Owner-occupied dwellings, on the other hand, cannot be empty, they have to be occupied - indicated by being furnished - to be included.[8]

6.13 The definitions first distinguish between dwellings with facilities and dwellings without facilities. Facilities are defined as hot and cold running water, electricity, inside flush toilet and bathroom and kitchen. If one of these amenities is missing, the dwelling is classified as without facilities. The data on dwellings without facilities have to be reported for completeness to assist validation, but they are not broken down further nor are they used to calculate PPPs for rents. The second distinction, which applies only to dwellings with facilities, is between dwellings that are flats and dwellings that are houses. Flats are broken down by size, where size is defined by number of rooms. Houses are not broken down by size. A further and final distinction is between whether or not the flat or house is centrally heated.[9]

6.14 The reporting form in Box 6.1 has two parts. In the first part, participating countries are to report for each dwelling specified the average monthly rent paid (or imputed) per square metre of useable surface in column 6 and the total number of square metres of useable surface in column 7. In the second part, countries are to report for each dwelling specified the average monthly rent paid (or imputed) per dwelling in column 9 and the total number of dwellings in column 10. Participating countries are required to fill in both parts of the reporting form, although it is recognised that some countries are unable to supply data by square metre. It is important that countries which can complete both parts do so, as this provides the means whereby countries that have no data by square metres can be linked with those countries that do. Countries that only have rent per dwelling typically impute an average size of dwelling (and then total surface in square metres and rent per square metre) by taking the arithmetic mean of the average size of dwellings in countries that are able to provide both sets of data. The questionnaire is programmed to complete the summary table in Box 6.3 so that countries can check the consistency of both sets of monthly rent data and average dwelling sizes over the three years surveyed.

6.15 The annual expenditure on actual and imputed rents for each of the dwellings specified is obtained either by multiplying the monthly actual/imputed rent per square metre in column 6 by the total surface in column 7 (and by 12 to make the monthly expenditure annual) or by multiplying the monthly actual/imputed rent per dwelling in column 9 by the number of dwellings in column 10 (and by 12). These annual expenditures are calculated and entered automatically into column 8 and column 11 respectively. They provide the weights to calculate the PPPs for the basic heading covering household expenditure on actual rents and for the basic heading covering household expenditure on imputed rents. The questionnaire is programmed to compute the weights and enter them into a summary table (Box 6.4) so that they can be checked by countries for consistency over the three-year period covered. Inconsistencies that reflect actual circumstances should be retained with an explanation on the comments page, otherwise they should be corrected.

6.16 Not only is it important that the annual expenditures and the data from which they are derived are consistent over time, it is also important that they are consistent with the data underlying the expenditure estimates for actual and imputed rents in the national accounts. In other words, whenever possible, the same data sources should be used to complete the price approach reporting

[8] See footnote 6.

[9] The reporting form for the OECD rent survey covers a longer list of dwellings to accommodate the circumstances of non-European participating countries. The definitions of these additional dwellings specify either number of rooms or number of bedrooms.

form as those used by the national accountants in their rent estimation model. Sources other than these should only be used, if the questionnaire cannot be filled in directly from the national accounts sources. At the bottom of the price approach reporting form, under columns 5 to 8, there are boxes in which the estimates of expenditure on actual rents and expenditure on imputed rents that the national accountants report for the computation of PPPs and real expenditures should be recorded. The reporting form is programmed to show the differences between the national accountants' estimates and those in columns 8 and 11 on the reporting form. Differences should be explained on the comments page.

6.17 When reporting expenditure on actual and imputed rents to Eurostat and the OECD, national accountants report household expenditure on actual rents, household expenditure on imputed rents, expenditure on housing by NPISHs and expenditure on housing by general government separately. But the actual rents recorded on the reporting form are, as explained below, total rents that included the amounts paid by households plus any social transfers in kind for housing that households receive from NPISHs and general government. Hence, for consistency, when completing the box labelled *actual rents* under columns 5 to 8 on the reporting form, the expenditure to be recorded is the sum of household expenditure on actual rents, expenditure on housing by NPISHs and expenditure on housing by general government. These expenditures, plus household expenditure in the box labelled *imputed rents*, constitute actual individual consumption of housing.

6.18 The rents that countries report should be national averages and not capital city prices. They should also be monthly averages for the reference year and not month-of-survey prices. And, further, they should be consistent with the internationally agreed definitions of actual and imputed rents given earlier.

6.19 Not all countries have national definitions that comply with those of the SNA 93 and the ESA 95. For example, some national definitions include heating and hot water. Participating countries with such national definitions are still required to report rents that conform to the international definitions – that is, they are expected to adjust their national rent data accordingly. To preserve consistency between prices and final expenditures, they are also required to adjust their expenditures on the basic headings covering actual and imputed rents in their detailed estimates of GDP expenditures that they report for the calculation of PPPs. This calls for close collaboration between price statisticians and national accountants.

6.20 Consistency also requires participating countries to supply prices for imputed rents that correspond to the prices underlying the estimated expenditure on imputed rents. According to the SNA 93 and the ESA 95, expenditure on imputed rents for owner-occupied dwellings should be estimated using actual rents paid for comparable unfurnished dwellings. But, if the renting of furnished dwellings is widespread, actual rents paid for comparable furnished dwellings may also be used providing a deduction is made first for the rent differential between furnished and unfurnished dwellings. When this is the case, consistency requires that price statisticians and national accountants adjust actual rents for furnished dwellings by the same furnished-unfurnished rent differential. Similarly any other adjustments that national accountants may make to the actual rents used to estimate expenditure on imputed rents should be applied by the price statisticians. This too calls for close collaborate between price statisticians and national accountants.

Box 6.3: Price approach summary sheet I

N°	Rental	Flat/ House	Rooms	Central heating	Monthly rent per m^2			Monthly rent per dwelling			Average size m^2		
					t-2	t-1	t	t-2	t-1	t	t-2	t-1	t
1	Actual	Flat	1-2	No									
2	Actual	Flat	1-2	Yes									
3	Actual	Flat	3	No									
4	Actual	Flat	3	Yes									
5	Actual	Flat	4+	No									
6	Actual	Flat	4+	Yes									
7	Actual	House	All	No									
8	Actual	House	All	Yes									
9	Actual rents - dwellings without facilities												
A	Actual rents: average or total												
10	Imputed	Flat	1-2	No									
11	Imputed	Flat	1-2	Yes									
12	Imputed	Flat	3	No									
13	Imputed	Flat	3	Yes									
14	Imputed	Flat	4+	No									
15	Imputed	Flat	4+	Yes									
16	Imputed	House	All	No									
17	Imputed	House	All	Yes									
18	Imputed rents - dwellings without facilities												
B	Imputed rents: average or total												

Box 6.4: Price approach summary sheet II (weights)

N°	Rental	Flat/ House	Rooms	Central heating	Weights based on rent per m^2			Weights based on rent per dwelling		
					t-2	t-1	t	t-2	t-1	t
1	Actual	Flat	1-2	No						
2	Actual	Flat	1-2	Yes						
3	Actual	Flat	3	No						
4	Actual	Flat	3	Yes						
5	Actual	Flat	4+	No						
6	Actual	Flat	4+	Yes						
7	Actual	House	All	No						
8	Actual	House	All	Yes						
9	Actual rents - dwellings without facilities									
A	Actual rents: average or total									
10	Imputed	Flat	1-2	No						
11	Imputed	Flat	1-2	Yes						
12	Imputed	Flat	3	No						
13	Imputed	Flat	3	Yes						
14	Imputed	Flat	4+	No						
15	Imputed	Flat	4+	Yes						
16	Imputed	House	All	No						
17	Imputed	House	All	Yes						
18	Imputed rents - dwellings without facilities									
B	Imputed rents: average or total									

Box 6.5: Quantity approach summary sheet

Dwellings with	Number of dwellings			Average size of dwelling		
	t-2	t-1	t	t-2	t-1	t
1 room						
2 rooms						
3 rooms						
4 rooms						
5 rooms						
6+ rooms						
Total						

Dwellings with	t-2 %	t-1 %	t %
Electricity			
Running water			
Inside toilet			
Central heating			
Total			

6.21 The actual rents reported by participating countries should be a weighted average of the rents paid by households for dwellings rented from the private sector and dwellings rented from government. Generally, when a dwelling is rented from the private sector, the full market rent is paid by the household. But if a household pays a reduced rent because of the social benefits it receives from government, the full market rent - that is, the part paid by the household plus the part paid by government - should still be used when calculating the average.10 A household renting a dwelling from government may pay a rent that does not cover total costs – where total costs are defined as including compensation of employees, intermediate consumption, consumption of fixed capital and other taxes (less subsidies) on production. When this is the case, the rent of a dwelling rented from government should be valued at total cost when calculating the average.

6.3.2 Quantity approach reporting form

6.22 Participating countries that have small unrepresentative rent markets[11] and are unable to estimate expenditure on imputed rents by the stratification method are required to estimate the expenditure by the user cost method if they are EU Member States or EU Candidate Countries[12].

6.23 The user cost method consists of estimating each of the costs that the owners of dwellings would need to take into account in fixing the market rent if they decided to rent their dwellings. These costs are intermediate consumption (comprising routine maintenance and repair that does not extend the lifetime of the dwelling and insurance services), consumption of fixed capital, other taxes (less subsidies) on production and net operating surplus (defined as the nominal rate of return on capital invested in the dwellings and the land). The method provides realistic estimates of final expenditure on housing. This is an important consideration because with the quantity approach it is the PPPs that are derived indirectly. Realistic final expenditures give meaningful PPPs. Similarly, realistic final expenditures provide realistic weights when the PPPs for housing are aggregated to obtain PPPs for individual consumption expenditure by households and GDP.

6.24 Participating countries responding to the rent questionnaire that estimate imputed rents by the user cost method are required to fill in a quantity approach reporting form (Box 6.2) for each year covered by the rent survey. The reporting form in Box 6.2 refers to the total housing stock. There are two tables to be completed: one for quantity data, the other for quality data. In both tables data are required for flats and houses separately. In the table for quantity data, flats and houses are ordered by size, where size is defined by number of rooms. For each size category specified, respondents are to report the number of dwellings in the category and the total number of square metres of useable surface for all dwellings in the category. In the table for quality data, respondents are to report the number of flats and the number of houses having electricity, running water, inside toilet and central heating. Respondents are only expected to fill in the cells that are highlighted as the reporting form is programmed to complete the cells that are not highlighted. The questionnaire is

[11] Commission Regulation (EC) No 1722/2005 defines a rent market as small when less than 10 per cent of the dwelling stock are privately rented and unrepresentative when the disparity between private rentals and other paid rentals exceeds a factor of three.

[12] If they are not EU Member States or EU Candidate Countries, they are encouraged to apply it.

programmed to complete the summary table in Box 6.5 which allows respondents to check the consistency of the data supplied for the three years the questionnaire covers. Inconsistencies that mirror actual changes should be kept and explained on the comments page; those that do not should be corrected.

6.4 Calculating PPPs for housing

6.25 PPPs for housing are obtained either directly with the price approach or indirectly with the quantity approach. With the price approach, PPPs are calculated with the price and expenditure data collected on actual and imputed rents. The PPPs are subsequently used to convert the national expenditures[13] of participating countries on housing to real expenditures from which the volume indices for housing are derived. Conversely, with the quantity approach, first the volume measures are computed using the quantity and quality data collected on the housing stock. The volume measures are then divided into the national expenditures of participating countries on housing to get the PPPs for housing.

6.4.1 Directly by the price approach

6.26 As described in Chapter 12 and illustrated in Annex V, the standard way of calculating bilateral PPPs for a basic heading is first to calculate a Laspeyres type PPP between each pair of participating countries, then to calculate a Paasche type PPP between each pair and finally to calculate a Fisher type PPP between each pair. The Fisher type PPP between two countries is the geometric mean of their Laspeyres type PPP and their Paasche type PPP. The Fisher type PPPs are not transitive. They are made transitive by the Èltetö-Köves-Szulc (EKS) procedure.

6.27 Expenditure weights are not usually employed to calculate the bilateral PPPs for a basic heading. But, when they are, the Laspeyres type PPP between two countries is defined as the arithmetic mean of the price ratios weighted with the weights of the base country.

$$L(j/h) = \sum_{i=1}^{k} \left(\frac{P_{ij}}{P_{ih}}\right) * w_{ih} \Big/ \sum_{i=1}^{k} w_{ih} \qquad (1)$$

And the Paasche type PPP is defined as the harmonic mean of the price ratios weighted with the weights of partner country.

$$P(j/h) = \sum_{i=1}^{k} w_{ij} \Big/ \sum_{l=1}^{m} w_{ij} \Big/ \left(\frac{P_{ij}}{P_{ih}}\right) \qquad (2)$$

In both equations, *h* is the base country and *j* the partner country, P_{ij} and P_{ih} are the prices of product *i* in countries *j* and *h* (in this case, the average rent per square meter for each dwelling type), w_{ih} is the weight as a percentage for product *i* in the base country *h* (that is, the share in total expenditure on the basic heading), w_{ij} is the weight as a percentage for product *i* in partner country *j*, and *k* is the number of products for which price ratios exist between *j* and *h*.

6.28 In practice, Paasche type PPPs are not calculated directly. Instead they are derived as the reciprocal of the transpose of the Laspeyres type PPPs when *j* is the base country and *h* is the partner country. In other words,

$$P(j/h) = 1/L(h/j) \qquad (3)$$

[13] Final expenditures valued at national price levels and expressed in national currencies.

where *P* is the Paasche type PPP between *j* and *h* when *h* is the base country and *L* is the Laspeyres type PPP between *j* and *h* when *j* is the base country.

6.29 Direct PPPs are calculated separately for the basic heading household expenditure on actual rents and for the basic heading household expenditure on imputed rents. First, equation 1 is employed to obtain a matrix of Laspeyres type PPPs. These Laspeyres type PPPs are then transposed and their reciprocals taken to derive a matrix of Paasche type PPPs. The geometric means of the two sets of PPPs provide a matrix of Fisher type PPPs which, as explained in Chapter 12 and Annex V, are made transitive by the EKS process.[14] The EKS PPPs are used to convert the national expenditures that participating countries report for actual rents and for imputed rents to real expenditures. The real expenditures are subsequently expressed as volume indices and per capita volume indices. EKS PPPs for rents - that is, actual and imputed rents combined – are obtained by aggregating the EKS PPPs for the two basic headings following the EKS aggregation method described in Chapter 12 and Annex V.

6.4.2 Indirectly by the quantity approach

6.30 The quantity approach as applied to housing involves combining the quantity data collected on the housing stock in a single measure of quantity and combining the quality data collected on the housing stock in a single measure of quality. The quantity and quality measures are used to compute a volume measure. The mechanics of the quantity approach are illustrated by the worked example in Box 6.6. The example shows how the volume measure between two countries, A and B, is calculated. Although there are only two countries in the example, volume measures derived in this way would be transitive in a multilateral comparison. The calculations in the example are based on all dwellings in the housing stock. No distinction is made between flats and houses as this how the volume measures are calculated in practice.

6.31 From the worked example, it can be seen that:

- the quantity measure is the ratio between the usable surface per capita in country B and the usable surface per capita in country A;
- the quality measure is the ratio between the average percentage share of dwellings having the specified facilities in country B and the average percentage share of dwellings having the specified facilities in country A;[15]
- the volume measure is the product of the quantity measure and the quality measure so that the per capita volume index for B is 33 when the per capita volume index for A is 100.

In other words, the quantity measure between the two countries is adjusted, downwards in the worked example, for the differences in quality between their housing stocks.

6.32 The indirect PPPs for housing are obtained by dividing the per capita indices of national expenditure on housing by the corresponding per capita volume measures for housing. In other words:

[14] The matrix of Fisher type PPPs may not be complete. This could be because there is no overlap between a pair of countries. For example, one country only prices dwellings with central heating, while the other only prices dwellings without central heating. An incomplete matrix could also be because of the requirement that the overlap's share of total expenditure on actual rents (or on imputed rents) should be at least 25 per cent in both countries. So, if there is an overlap between two countries but the overlap's expenditure share is less than 25 per cent of total expenditure in one or both countries, either the Laspeyres type PPP or the Paasche type PPP or both will be discarded and no Fisher type PPP will be calculated. Gaps in the matrix of Fisher type PPPs are filled by PPPs obtained indirectly through third countries as described in Annex V.

[15] In principle, the quality measure should be the weighted average of the percentages of the dwelling stock having each of the facilities that contribute to the total value of rent, with the weights being each facility's share in the total value of rent. In practice, it is calculated as the sum of the percentages of the dwelling stock with electricity, with running water, with an inside toilet and with central heating. The measure is rough because the four facilities represent only a part of the total value of rent and because each facility is given the same weight. Even so, although the four facilities give an incomplete picture of the quality of the dwelling stock, they are important basic facilities for which data are generally available across countries.

$$indirect\ PPP_{B/A} = [PCFEHnc_B / PCFEHnc_A] / PCVIH_{B/A} \quad (4)$$

where $PCFEHnc_A$ and $PCFEHnc_B$ are the per capita final expenditure on housing in the national currency of country A and country B respectively, and $PCVIH_{B/A}$ is the per capita volume index for housing between country A and country B.

6.33 The per capita national expenditures on housing used in the derivation of the PPPs include all final expenditure on housing. They are the sum of the four basic headings for housing in the Eurostat-OECD expenditure classification: household expenditure on actual rents, household expenditure on imputed rents, expenditure on housing by NPISHs and expenditure on housing by general government on housing. This is because the volume measures refer to the housing stock in total with no distinction being made between dwellings that are rented and dwellings that are owner occupied. The indirect PPPs for housing therefore refer to all housing.

6.4.3 Linking the direct and indirect PPPs

6.34 In order to make price and volume comparisons of housing across all participating countries, the PPPs of countries that follow the price approach have to be linked with the PPPs of countries that follow the quantity approach. Overlaps between the two groups of countries are established through bridge countries - that is, countries that supply data for both the price approach and the quantity approach. The three participating countries that report data for both approaches and serve as bridge countries are currently France, Austria and Finland. By combining the data of the three countries a link is established between the direct PPPs for actual rents of the price approach and the indirect PPPs for total rents of the quantity approach and between the direct PPPs for imputed rents of the price approach and the indirect PPPs for total rents of the quantity approach.

Box 6.6: A worked example of the quantity approach

1. Estimation of the quantity measure (Qt)

Population (in thousands): country A = 7 718; country B = 23 207

Number of rooms per dwelling	Number of dwellings (thousands) n	Total surface (million m²) m	Number of rooms per dwelling	Number of dwellings (thousands) n	Total surface (million m²) m
Country A			**Country B**		
1 room	308	10.7	1 room	1008	20.4
2 rooms	698	39.8	2 rooms	3243	120.0
3 rooms	834	66.8	3 rooms	2353	122.3
4 rooms	551	57.2	4 rooms	789	53.7
5 and more	509	68.8	5 and more	240	21.7
Total	2900	243.3	Total	7632	338.1
per capita		**31.5**	**per capita**		**14.6**

Quantity measure country B relative to country A = $Qt_{b/a}$ = $[\Sigma m_b / pop_b]/[\Sigma m_a / pop_a]$ = 14.6 / 31.5 = 0.462

2. Estimation of the quality measure (Ql)

Facility	Number of dwellings with the specified facility (thousands)		Weight of facility	Share of dwellings with the specified facility (%)	
	Country A	Country B	w	Country A f_a	Country B f_b
Electricity	2900	7556	0.25	100	99
Running water	2863	4503	0.25	99	59
Toilet inside	2729	3739	0.25	94	49
Central	1775	3205	0.25	61	42
Total	2900	7632	1.00	88.5	62.2

Quality measure country B relative to country A = $Ql_{b/a}$ = $(\Sigma f_b * w) / (\Sigma f_a * w)$ = 62.2/88.5 = 0.703

3. Estimation of the volume measure

Volume measure country B relative to country A = $Qt_{b/a} * Ql_{b/a}$ = 0.462 * 0.703 = 0.325

6.35 The mechanics of the process is as follows. A linking factor is calculated as the ratio of the geometric mean of the direct PPPs of the three bridge countries from the price approach to the geometric mean of the indirect PPPs of the three bridge countries from the quantity approach. The indirect PPPs of countries following the quantity approach are subsequently multiplied by the ratio to obtain a set of PPPs that can be combined with the direct PPPs of those countries following the price approach. In other words, the indirect PPPs are scaled to the level of the direct PPPs. For the three bridge countries, the final PPPs are those of the price approach.

6.36 The PPPs linked in this way are used to provide volume measure across all participating countries for household expenditure on actual rents and for household expenditure on imputed rents. The PPPs for actual rents are also used to derive volume measures for all countries for expenditure on housing by NPISHs and for expenditure on housing by general government.

6.5 Validation of housing data

6.37 Before submission of the housing data to Eurostat, participating countries are required to perform an initial validation. Countries import the Excel questionnaire into the Data Entry Tool (DET) which performs a number of basic checks, such as the completeness of the information.[16] In addition, countries should check the data for consistency over time and for revisions compared to previous submissions of the same data. The price data should also be checked for their internal plausibility, for example, that a two room apartment has a lower monthly rent than a three room apartment. The quantity data should be checked for consistency between changes in total surface data and changes in total numbers of dwellings. These plausibility checks are also carried out by Eurostat during the validation process.

6.38 For the inter-country validation of the actual and imputed rents collected by the price approach, the Quaranta editing procedure is used. The procedure as applied to the prices of consumer goods and services is explained in Chapter 5, Section 5.6, and in Annex IV. The structure of the Quaranta tables produced for rents is exactly the same as that described for consumer goods and services in the Annex, but – due to the nature of the survey – some columns are not used or are used differently. For example, because there is only one price observation per product (an average rent per specified dwelling), there is no price observation variation coefficient in column 22 of Box IV.2A. In addition, instead of using asterisks as representativity indicators, weights are used at the product level. The weights are shown in column 20 of Box IV.2A. Otherwise the process of applying the Quaranta tables to the inter-country validation of rents is similar to that for consumer goods and services. Validation takes place between the submission of the data at the end of August and the inclusion of the data in the annual calculations made in the following December.

6.39 The Quaranta editing procedure cannot be used for quantity approach data. Instead the data are validated by direct comparison of the quantity and quality indicators across countries and by evaluating the plausibility of the resulting per capita volume indices.

[16] The DET also converts the file with the questionnaire into the standard xml format for transmission to Eurostat via eDAMIS.

7

Health

7.1 Introduction

7.1 Health expenditure accounts for a large share of GDP in EU Member States and OECD Member Countries. Both governments, as providers of health services, and households, as recipients of the services, are interested in knowing whether the differences in expenditure across countries reflects different amounts of health services being consumed or health services having different price levels. International price and volume comparisons of health expenditures provide countries with a means to assess their national health systems – at least in principle. In practice, inter-country comparisons of health expenditures are difficult to carry out because health services are comparison resistant with the institutional arrangements for their provision and payment varying from country to country.

7.2 Medical goods and services can be provided by market producers at economically-significant prices; they can also be provided by non-market producers at prices that are not economically significant. Patients can be private patients or public patients with each facing a different tariff of prices for the same services from the same providers. Pharmaceutical products can be proprietary brands or generic whose medical equivalence is not reflected in their respective prices. Furthermore, while the sale of a good or a service usually involves a transaction between a seller and a buyer, sales of medical goods and services can involve a transaction between a seller and two buyers with each paying a share of the total price independently. There is also the question of whether producers of health services in different countries provide services of comparable quality. An additional complication is that each treatment given for a specific illness is to some extent unique as no two patients are alike.

7.3 This chapter describes how Eurostat and OECD comparisons of health expenditures are organised and how the difficulties mentioned in the previous paragraph are addressed. It concludes with an outline of the new methodology that is to be introduced for hospital services.

7.2 Classification of health expenditures

7.4 In the Eurostat-OECD expenditure classification, individual consumption expenditure on health is spread over three institutional sectors - households, non-profit institutions serving households (NPISHs) and government – and 25 basic headings as shown in Box 7.1. Expenditure by households is broken down by the type of good or service purchased. Expenditure by NPISHs is not disaggregated as most participating countries are unable to provide the breakdown that would be required if it were. Also the share of health services provided by NPISHs is relatively low for most countries. Expenditure by government is divided between medical goods and services that government buys in whole or in part from market producers - labelled *health benefits and reimbursements* - and health services that government produces itself. Purchases from market producers are broken down by the type of good or service bought. Expenditure on government-produced health services is broken down by cost components.

7.5 The breakdown of government purchases from market producers is the same as that for household purchases. This allows a common approach to be adopted for the two sets of expenditures when calculating PPPs. The approach followed is the standard approach used for consumer goods and services whereby PPPs are computed with economically-significant purchasers' prices collected from a sample of outlets. The approach is sometimes referred to as the *output-price approach* because, being economically significant, the prices can be used to value the outputs of market producers by multiplying the quantities produced by the prices at which they are sold.

7.6 The health services produced by government are non-market services because they are generally supplied free or at prices that are not economically significant. Government as a non-market producer of health services has to be treated as any other non-market producer. No economically-significant prices with which to value the quantities produced means that the expenditure on the goods and services provided by a non-market producer cannot be obtained by summing its sales. Instead, in line with national accounting practice, the expenditure is estimated by

summing the costs of producing the goods and services. To preserve consistency with the prices underlying the expenditure estimate, Eurostat and the OECD calculated PPPs for the goods and services provided by a non-market producer with the prices of its inputs (hence the breakdown of expenditure by cost components). The approach is called the *input-price approach*.

Box 7.1: Health expenditure by basic heading

BH Code	Basic heading	PPPs used
INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS		
11.06.11.1	Pharmaceutical products	PPPs calculated with prices from the sixth survey of the three-year cycle of price surveys for consumer goods and services: Furniture and health
11.06.12.1	Other medical products	
11.06.13.1	Therapeutic appliances and equipment	
11.06.21.1	Out-patient medical services	
11.06.22.1	Out-patient dental services	
11.06.23.1	Out-patient paramedical services	
11.06.31.1	Hospital services	PPPs for production of health services by government (without receipts from sales)
INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS		
12.02.11.1	Health services	PPPs for production of health services by government (without receipts from sales)
INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT		
Health benefits and reimbursements		
13.02.11.1	Pharmaceutical products	PPPs calculated with prices from the sixth survey of the three-year cycle of price surveys for consumer goods and services: Furniture and health
13.02.11.2	Other medical products	
13.02.11.3	Therapeutic appliances and equipment	
13.02.12.1	Out-patient medical services	
13.02.12.2	Out-patient dental services	
13.02.12.3	Out-patient paramedical services	
13.02.12.4	Hospital services	PPPs for production of health services by government (without receipts from sales)
Production of health services		
13.02.21.1	Compensation of employees: Physicians	PPPs calculated with prices from the annual survey of compensation of government employees
13.02.21.2	Compensation of employees Nurses and other medical staff	
13.02.21.3	Compensation of employees: Non-medical staff	
13.02.22.1	Intermediate consumption: Pharmaceutical products	PPPs for pharmaceutical products
13.02.22.2	Intermediate consumption: Other medical products	PPPs for other medical products
13.02.22.3	Intermediate consumption: Therapeutic appliances and equipment	PPPs for therapeutic appliances and equipment
13.02.22.4	Intermediate consumption n.e.c.	PPPs for individual market consumption (see Box 12.3B for coverage)
13.02.23.1	Gross operating surplus	PPPs for gross fixed capital formation
13.02.24.1	Net taxes on production	PPPs for production of health services by government (without net taxes on production and receipts from sales)
13.02.25.1	Receipts from sales	PPPs for production of health services by government (without receipts from sales)

7.3 Price collection: purchases from market producers

7.7 PPPs for household purchases of medical goods and services from market and non-market producers and for government purchases of medical goods and services from market producers are calculated with prices collected during the *furniture and health survey*, the sixth and last survey in the three-year cycle of price surveys for consumer goods and services. The health part of the survey covers pharmaceuticals and other medical goods (including therapeutic appliances and equipment) and medical, dental and paramedical services delivered to out-patients. It does not cover hospital services. When surveying prices for medical goods and out-patient services, participating countries are required to collect prices paid to market producers only. Medical goods and out-patient services provided by non-market producers are covered under government-produced health services for which input prices are required.

7.3.1 Full market price

7.8 An essential consideration when surveying the prices for medical goods and out-patient services is to ensure that the full market price is collected. The full market price is the total amount paid to the provider of the good or service. Most consumer products when they are sold involve a transaction between a seller and a single buyer. The seller's offer price – adjusted, if necessary, to include discounts, taxes, etc. – is the purchasers' price that the buyer will have to pay. It is a price that price collectors can readily observe. This is not always the case with medical products which can entail a transaction involving a seller and two independent buyers when they are sold. There are three possible ways that medical products can be purchased from market producers, none of which are mutually exclusive. They can be purchased and paid for in full by a household (either with or without subsequent reimbursement by the government); they can be purchased and paid for in full by the government; or they can be purchased and paid for in part by a household and in part by the government. Participating countries are required to report purchasers' prices for medical products whichever way or ways they are sold in their domestic market.

7.9 The first possibility is straightforward. As with most consumer products, there is one buyer involved – the household – and purchasers' prices can be collected by visiting a sample of outlets. That the purchaser may be partially or fully reimbursed by the government is immaterial since the price required to calculate PPPs is the price before reimbursement. The second possibility is also straightforward. It too involves one buyer – the government. Normally, the purchasers' prices paid by the government for medical goods and services are regulated and can be obtained from the appropriate government authority. The third and last possibility is more complicated since it involves two purchasers and two payments. For PPP purposes, the purchasers' price needed is the total or composite price – that is, the sum of the price paid by the household and the price paid by government. If composite prices are not used to calculate PPPs, the volume of medical products purchased will be twice what it should be as demonstrated in Box 7.2. Usually there are regulations that determine what the household should pay and what the government will pay. And, as with the second possibility, information on composite prices can be obtained from the government office responsible.

Box 7.2: Full market price avoids double counting

Suppose that the quantity of a pharmaceutical product purchased is 1000 units and that the price per unit is 10 euros of which households pay 2 euros and government 8 euros. In the national accounts, 2000 euros will be recorded as household expenditure and 8000 euros will be recorded as government expenditure under health benefits and reimbursements. If the amounts actually paid – that is, 2 euros by households and 8 euros by government – are used to deflate these expenditures, it will seem that both households and government have each purchased 1000 units or 2000 units in total. But if the total amount paid – that is, 10 euros – is used, households will appear to have purchased 200 units and government 800 units - a total of 1000 units.

7.10 PPPs for medical goods and out-patient services purchased by households and for medical goods and out-patient services purchased from market producers by government are calculated with the full market prices collected during the health survey. The same PPPs are used for household expenditure and for government expenditure on health benefits and reimbursements. By using the same PPPs for both sets of expenditures, double counting is avoided and the correct volumes are arrived at as explained in Box 7.2. The PPPs are also employed as reference PPPs for intermediate consumption relating to government-produced health services as indicated in Box 7.1.

7.3.2 Pharmaceuticals and other medical products

7.11 The specifications for pharmaceutical products distinguish between propriety branded products[1] and generic products. The distinction is necessary because, while from a medical point of view propriety products and generic products with the same active substance and the same strength may be equivalent, from an economic perspective they are not as propriety brands generally have a brand value and a higher price. Comparing the prices of like with like – that is the propriety product prices with propriety product prices and generic product prices with generic product prices - ensures that the price differences observed between countries are pure price differences that translate into pure volume differences when expenditures are deflated by the PPPs to which the prices give rise.

7.12 Participating countries are required to select and price a minimum of 50 pharmaceutical products from a product list with some 150 to 200 products specified. When choosing pharmaceuticals products to be priced, countries are expected to ensure that the selection is a representative cross-section of the various types of pharmaceutical products listed and that it reflects the respective shares of propriety products and generic products in the value of pharmaceutical sales. For example, if 60 per cent of sales are purchases of propriety products and 40 per cent purchases of generic products, the selection should comprise 60 per cent propriety products and 40 per cent generic products or, in terms of the minimum 50 products to be priced, 30 propriety products and 20 generic products. Maintaining a balance between packet sizes, dosages and presentation (pills, tablets, syrup, injection, powder, cream. etc.) is also important.

7.13 Prices of pharmaceutical products can be obtained in most countries from centrally maintained databases which are frequently publically available. In some cases prices are collected direct from pharmacies. Not all the medical products specified are pharmaceuticals. Also included on the product list are *other medical products* and these can be sold not only in pharmacies but also in supermarkets, petrol stations, drug stores, as well as through the internet. Therapeutic appliances and equipment, for example, are sold by suppliers of medical equipment. Participating countries are expected to include such outlets in their sample of outlets when pricing other medical products. Full market prices should be collected for both pharmaceutical products and other medical products.

7.3.3 Out-patient health services

7.14 The specifications for out-patient health services make a distinction between the services market producers provide private patients and the services they provide public patients. Private patients purchase health services without any reimbursement from government. Public patients either receive health services free of charge or, if they pay for the health services, are partially or fully reimbursed by government. Both private patients and public patients may have complementary private health insurance. Prices for private patients are usually determined by the market producer and so are generally higher than prices for public patients which are normally fixed or regulated by government. The distinction between private and public patients is made because the quality of services provided by the market producer may also differ between the two types of patients. Participating countries are required to report the full market price for each health service priced irrespective of whether the patient is private or public.

[1] Also referred to as *original brands* because they are produced and sold, usually under a patent, by the pharmaceutical companies that invested in the research and development.

7.4 Price collection: government-produced health services

7.15 PPPs for expenditure on government-produced health services are obtained by the input-price approach. For this the expenditure is broken down by the cost components shown in Box 7.1: compensation of employees, intermediate consumption, gross operating surplus[2], net taxes on production and receipts from sales[3]. Of these cost components, compensation of employees is by far the most important and so in practice prices are only collected for compensation of employees. As prices are not collected for the other cost components, no PPPs are calculated for them and the reference PPPs listed in Box 7.1 are used instead. Reference PPPs are discussed in Chapter 12, Section 12.3.4.

Box 7.3: References to ISCO-08

Code	Occupation	Skill level	ISCO-08	
13.02.21.1.01.aa	Hospital doctor	4	2211	Generalist medical practitioners
13.02.21.1.01.ab	Specialist doctor	4	2212	Specialist medical practitioners
13.02.21.2.01.aa	Hospital nurse (skill level 4)	4	2221	Nursing professionals
13.02.21.2.01.ab	Hospital nurse (skill level 3)	3	3221	Nursing associate professionals
13.02.21.2.01.ac	Laboratory assistant	3	3212	Medical and pathology laboratory technicians
13.02.21.2.01.ad	Nursing aide (clinic or hospital)	2	5321	Health care assistants
13.02.21.3.01.aa	Executive official	3	3343	Administrative and executive secretaries
13.02.21.3.01.ab	Secretary	2	4120	Secretaries (general)
13.02.21.3.01.ac	Cleaner	1	9112	Helpers and cleaners in offices, hotels and other establishments

7.16 The prices that are collected for compensation of employees are the compensation that general government pays to employees in a selection of medical and non-medical occupations in hospitals. Collection takes place annually as part of the *survey of compensation of government employees* which also covers a selection of occupations engaged in the production of collective services. The occupations are defined using job descriptions taken from the ISCO-08[4]. A table cross-referencing the medical and non-medical occupations and their ISCO job descriptions is given in Box 7.3. The reporting form to be completed for these occupations is reproduced in Box 7.4. Details of the survey are available in Chapter 9, Section 9.4, and will not be repeated here. How to complete the reporting form is explained in Box 9.3B and the full definition of compensation of employees is given in Box 9.7.

[2] Gross operating surplus will be equal to consumption of fixed capital as net operating surplus is expected to be negligible.

[3] Receipts from sales are negative. It is netted off from gross output to obtain government final consumption expenditure on the production of health services. In this way double counting is avoided since household purchases of government-produced health services are included under household expenditure.

[4] International Standard Classification of Occupations 2008, International Labour Office, Geneva.

7.5 Hospital services

7.17 The breakdown of health expenditure by basic headings in Box 7.1 identifies household expenditure on hospital services as well as government expenditure on hospital services purchased from market producers. Expenditures on hospital services by NPISHs and hospital services produced by government are not identified separately. The expenditure on government-produced health services is not broken down by outputs but by inputs as required by the input-price approach described in the previous section.

7.18 Early attempts by Eurostat and the OECD to collect prices for hospital services were unsuccessful. The services were specified in terms of the type of hospital room occupied, type being defined primarily by the number of beds in the room. Not all countries could supply the prices requested and the prices that were provided were neither comparable nor representative. As a result, it was decided not to collect prices for hospital services and to use reference PPPs. This remains the current practice. The reference PPPs that are applied are the PPPs obtained for government-produced health services by the input-price approach. It is assumed that government-produced health services consist primarily of services provided to in-patients by government hospitals and that the input prices paid by market producers are the same as those paid by government. (The same PPPs are also used as reference PPPs for individual consumption expenditure by NPISHs on health services.)

Box 7.4: Reporting form for the survey of compensation of government employees (hospital services)

SURVEY OF COMPENSATION OF GOVERNMENT EMPLOYEES

Country: **Year:** **2012**

only the shaded fields are to be filled in by the countries

Basic heading code Basic heading	Weight group	Percentage weight within the basic heading	Occupation code	Occupation (see Box 9.4 for references to ISCO-08)	Requested skill level	Observed skill level	Average annual gross salary	Employers' actual social contributions		Employers' imputed social contributions		Annual average compensation	Contractual working week	Holiday entitlement	Public holidays	Annual contractual hours worked	Adjusted annual average compensation
								national accounts ratio	value	national accounts ratio	value		(number of hours)	(number of days)	(number of days)		
(1)(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
				EXAMPLE	4	4	10000	10%	1000	5%	500	11500	37,5	30	10	1650	11918
13.02.21.1 Physicians	Physicians	100	13.02.21.1.01.aa	Hospital doctor	4				0		0	0				0	0
			13.02.21.1.01.ab	Specialist doctor	4				0		0	0				0	0
13.02.21.2 Nurses and other medical staff	Nurses and other medical staff	100	13.02.21.2.01.aa	Hospital nurse (skill level 4)	4				0		0	0				0	0
			13.02.21.2.01.ab	Hospital nurse (skill level 3)	3				0		0	0				0	0
			13.02.21.2.01.ac	Laboratory assistant	3				0		0	0				0	0
			13.02.21.2.01.ad	Nursing aide (clinic or hospital)	2				0		0	0				0	0
13.02.21.3 Non-medical staff	Non-medical staff	100	13.02.21.3.01.aa	Executive official	3				0		0	0				0	0
			13.02.21.3.01.ab	Secretary	2				0		0	0				0	0
			13.02.21.3.01.ac	Cleaner	1				0		0	0				0	0

7.19 The current practice is considered to be unsatisfactory because the reference PPPs are based on input prices (compensation of employees) and proxies for input prices (reference PPPs) of a non-market producer. More generally, a major limitation of the input-price approach is that it does not take account of productivity differences between the countries being compared. As it is unrealistic to assume that the productivity is uniform across countries, the volume measures generated by PPPs based on the input-price approach represent the volume of inputs consumed in the production of the output and not the volume of output produced. In other words, the reference PPPs used for hospital services do not provide volumes measures that relate to the output of hospital services.

7.6 Towards an output based approach

7.20 One alternative to the assumption of equal productivity would be to make productivity adjustments but, as explained in Chapter 9, Section 9.5, Eurostat and the OECD do not make productivity adjustments when applying the input-price approach. The method preferred by Eurostat and the OECD is to adopt an output based approach. The approach envisaged is an output-price approach and will entail replacing the survey of compensation of government employees with a price survey covering hospital services. Establishing such a survey involves first identifying and defining those units of hospital output that can be measured and priced across countries and then identifying and defining the output prices with which to price them. In the health domain, output prices which are the result of market transactions are not readily observable, but alternative sources of information through reimbursement schemes managed by health care providers and health administrations could provide *quasi prices*. These quasi prices would be economically significant in that they cover the average cost of producing the output and affect decisions relating to reimbursements of costs borne by patients, health financing and the allocation of hospital resources.

7.21 These preparatory steps have already been taken. Measurable outputs have been specified and the feasibility of collecting economically-significant quasi prices for them has been tested in several rounds of pilot data collection[5]. From 2013 onwards, the survey will be part of the regular work programme for countries and the data collected will be included in official PPP results. It will run in tandem with the survey of compensation of government employees for a number of years until it is sufficiently well established for the input-price approach for hospital services to be discontinued. The methodology of the survey is outlined in the paragraphs below.

7.6.1 Defining output

7.22 The Eurostat national accounts handbook on price and volume measures[6] defines health output as "the quantity of health care received by patients, adjusted to allow for the qualities of service provided, for each type of health care. ..... The quantity of health care received by patients should be measured in terms of complete treatments."[7] In other words, for national accounting purposes, health output is defined as complete treatments provided irrespective of outcome[8].

7.23 Typically a complete treatment comprises a basket of discrete services obtained from a varying number of independent health care providers. For example, treatment may start with a series of consultations – the first with a general practitioner, the others with a specialist - which may need to be complemented by visits to an X-ray centre and a medical analysis laboratory. It may continue with admission first to a hospital for surgery and post-surgical care and then to a nursing home for

5 Results and full description of the methodology used in the second pilot study can be found in *Comparing Price Levels of Hospital Services Across Countries: Results of a Pilot Study*, Statistics Directorate Working Paper No.32, OECD, Paris, July 2010: http://www.oecd-ilibrary.org/social-issues-migration-health/comparing-price-levels-of-hospital-services-across-countries_5km91p4f3rzw-en

6 *Handbook on price and volume measures in national accounts*, Eurostat, Luxembourg, 2001: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-41-01-543. See as well Chapters 4 and 5, *Towards measuring the volume output of education and health services: a handbook*, Paul Schreyer, Statistics Directorate Working Paper No 31, OECD, Paris, April 2010.

7 Section 4.13.

8 Outcome cannot be ignored completely, especially when considering the quality of a treatment. Differences in outcomes between countries (or over time) are indicative of differences in the quality of the treatments being compared.

convalescence. The ease with which a complete treatment can be measured depends on the extent to which the various services constituting the treatment are supplied by different providers. The more providers involved the more difficult it becomes to measure a complete treatment. Data to map a treatment fully from one provider to another are usually not readily available.

7.24 For practical reasons, a narrower definition of a treatment has to be applied when measuring health output. The one adopted by national accountants, and for the survey, defines a treatment as that part of a complete treatment delivered by a single provider. In other words, the original basket of services constituting a complete treatment is broken up into its component services according to the provider of the service. Hence, in the example above, the providers - the general practitioner, the specialist, the X-ray centre, the medical analysis laboratory, the hospital and the nursing home – are supplying a set of separate treatments rather than a single complete treatment. Each treatment is a unit of output, each is a product.

7.6.2 Case types

7.25 With the output-price approach PPPs are calculated with the market prices that participating countries collect for a sample of comparable and representative products. Before prices can be collected, the products to be priced have to be selected and defined. Therefore, prior to collecting prices for hospital services, it is first necessary to select and define the products – that is, the treatments – that participating countries have to price. When doing this for the survey, a distinction is made between general and specialist hospitals and mental health and rehabilitation facilities.[9] Products are only defined for general and specialist hospitals.

7.26 The products defined for the survey are called *case types*. A case type refers to categories of hospital services that are similar from a clinical perspective and in terms of their consumption of resources. Two categories of case types are specified: medical and surgical. The medical case types specified refer only to in-patients. The surgical case types specified are divided between those that require hospitalisation and apply only to in-patients and those that can be performed either with hospitalisation on in-patients or without hospitalisation on out-patients (day care patients). The specifications provide a description of the case type followed by the relevant ICD codes. Medical case types are defined with ICD-10 codes[10] while surgical case type specifications are defined with ICD-9-CM codes[11]. The codes promote comparability among countries by enabling them to locate the case types specified within national classification and coding systems.[12] Finally, the specifications give rules – for example, all the medical case type specifications rule out operating room procedures - and criteria for inclusion and exclusion. Examples of case type specifications are presented in Box 7.5.

[9] A general hospital is a licensed establishment engaged primarily in providing general diagnostic and medical treatment to in-patients with a wide variety of medical conditions. A specialist hospital is a licensed establishment engaged primarily in providing diagnostic and medical treatment as well as monitoring services to in-patients with a specific type of disease or medical condition. A mental hospital is a licensed establishment engaged primarily in providing diagnostic and medical treatment and monitoring services to in-patients who suffer from mental illness or substance abuse disorders.

[10] ICD-10 is the tenth revision of the *International Classification of Diseases* that was first disseminated by the World Health Organisation (WHO) in 1992. It provides codes to classify diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances and external causes of injury or disease. It is standard diagnostic tool for epidemiology, health management and clinical purposes and is used worldwide for morbidity and mortality statistics and reimbursement systems.

[11] ICD-9-CM is an adaption of ninth edition of the *International Classification of Diseases* by the United States National Center for Health Statistics. Besides including additional detail on morbidity, it provides a classification system for surgical, diagnostic and therapeutic procedures. CM stands for *clinical modification*.

[12] If a country uses a different coding system to the ICD, the ICD-9-CM or ICD-10 codes in the specification for the case type are taken as reference and the national classification is mapped to the international classification accordingly.

Box 7.5: Examples of case type specifications

In-patient medical case type: M04 Heart failure	
Case type description	*Heart failure occurs when the heart cannot pump enough blood to meet the body's needs, and it typically develops after other conditions have weakened or damaged the heart. The chronic variant tends to develop slowly over time. However, patients may also experience a sudden onset of symptoms, which is known as acute heart failure. Congestive heart failure is defined as blood backing up into the liver, abdomen, lower extremities, and lungs.*
ICD-10 codes	I50.0, Congestive heart failure I50.1, Left ventricular failure I50.9, Heart failure, unspecified
Rules	No operating room procedure is performed.
Inclusion	
Exclusion	Hypertensive heart failure (I11.0) Rheumatic heart failure (I09.9)
In-patient surgical case type: S01 Appendectomy	
Case type description	Procedure to surgically remove appendix through laparoscopic intervention or traditional (open) appendectomy.
ICD-9-CM codes	47.01, Laparoscopic appendectomy 47.09, Other appendectomy 47.11, Laparoscopic incidental appendectomy 47.19, Other incidental appendectomy
Rules	Principal diagnosis of diseases of appendix (K35-K38)
Inclusion	Incidental appendectomy
Exclusion	
In-patient and out-patient surgical case S18 Arthroscopic excision of meniscus of knee	
Case type description	Knee arthroscopic surgery is a procedure performed through small incisions in the skin to repair injuries to tissues such as ligaments, cartilage, or bone within the knee joint area. The surgery is conducted with the aid of an arthroscope, a very small instrument guided by a lighted scope attached to a television monitor. Arthroscopic surgeries range from minor procedures such as flushing or smoothing out bone surfaces or tissue fragments (lavage and debridement) associated with osteoarthritis, to the realignment of a dislocated knee and ligament grafting surgeries
ICD-9-CM codes	80.26, Arthroscopy, knee and 80.6, Excision of semi-lunar cartilage of knee
Rules	Any principal diagnosis code. The two codes should be reported at the same time for the same case
Inclusion	
Exclusion	

7.27 To be selected for the survey, case types had to be common procedures or diagnoses and account for a significant percentage of hospital expenditure. In addition, surgical case types had to be procedures that would be the principal procedure within one hospitalisation and medical case types had to be for conditions that were clearly identifiable. The case types meeting these criteria that have been selected for the survey are listed in Box 7.6.

Box 7.6: Selected medical and surgical case types

In-patient medical case types	
M01	Acute myocardial infarction
M02	Angina pectoris
M03	Cholelitiasis
M04	Heart failure
M05	Malignant neoplasm of bronchus and lung
M06	Normal delivery
M07	Pneumonia
In-patient surgical case types	
S01	Appendectomy
S02	Caesarean section
S03	Cholecystectomy
S04	Colorectal resection
S05	Coronary artery bypass graft
S06	Discectomy
S07	Endarterectomy: vessels of head and neck
S08	Hip replacement: total and partial
S09	Hysterectomy: abdominal and vaginal
S10	Knee replacement
S11	Mastectomy
S12	Open prostatectomy
S13	Percutaneous transluminal coronary angioplasty (PTCA)
S14	Peripheral vascular bypass
S15	Repair of inguinal hernia
S16	Thyroidectomy
S17	Transurethral resection of prostate (TURP)
S18	Arthroscopic excision of meniscus of knee
S19	Lens and cataract procedures
S20	Ligation and stripping of varicose veins - lower limb
S21	Tonsillectomy and/or adenoidectomy
Out-patient surgical case types	
S18	Arthroscopic excision of meniscus of knee
S19	Lens and cataract procedures
S20	Ligation and stripping of varicose veins - lower limb
S21	Tonsillectomy and/or adenoidectomy

7.6.3 Quasi prices

7.28 The objective of the survey is to collect average quasi prices for the selected case types. The quasi prices are to be extracted from the databases that health administrations and national insurance funds in participating countries maintain for the purposes of reimbursement and health financing. The quasi prices in these databases can be negotiated prices or administered prices. Negotiated prices are prices that have been established through negotiations between purchasers (third party payers) and providers of hospital services. Administered prices are regulated prices that typically reflect the average costs of the service provided. Whether the quasi prices are negotiated prices or administrative prices, it is important that the costs they cover are the same for all participating countries. They should reflect direct costs as well as the capital costs and overhead

costs relating to the production of the health service. The cost items to be included are listed in Box 7.7.[13]

7.29 Average quasi prices have to be determined for each of the case types specified. Quasi prices can be available at the level of individual patients as, for example, when price (cost) information is provided for each discharge from hospital. When they are, the average quasi price for a case type is the mean of the prices of those discharges whose characteristics match the codes and rules specified for the case type. The quasi prices should be for typical cases only. Quasi prices for atypical cases and for long-stay cases should be excluded as explained below.

7.30 If quasi prices are not available at the individual patient level, they are generally available at the category level of *Diagnosis Related Groups* (DRGs). DRGs are a clinically coherent set of patient classes defined on the basis of diagnoses, surgical procedures and the age, sex and discharge status of the patients treated. Each DRG is associated with a quasi price. The correspondence between case types and DRG categories is not necessarily one to one as a DRG category may encompass more than one case type. Moreover, a case type may correspond to more than one DRG category. When a case type is linked to a single DRG category, the quasi price attached to the DRG category becomes the average quasi price for the case type. When the case type is linked to more than one DRG category, the average quasi price for the case type is the weighted average of the quasi prices of the DRG categories with which it is linked where the weights are case numbers for typical cases.

7.6.4 Weights

7.31 In addition to collecting an average quasi price for each case type, the survey will also collect the number of cases recorded for each case type. The average quasi prices and the case numbers should refer to typical cases only. Atypical cases and long-stay cases should be excluded. Typical cases are cases where the patient has undergone a normal and expected course of treatment. Atypical cases are cases for which the standard profile of care is not followed because the patient dies, signs out or transfers to other facilities. Long-stay cases are those with a number of days of stay higher than 1.5 standard deviations from the mean stay for the case type in question.

7.32 Multiplying the average quasi prices by the corresponding case numbers provides each case type with a value. These case type values can be summed across case types to give a total value for all case types with which the individual case type values can be converted into percentage shares. The percentage shares are used as weights when calculating PPPs for hospital services. Hospital services comprise a basic heading and generally quasi-expenditure weights rather than actual weights are employed to calculate PPPs for a basic heading. A description of how basic heading PPPs are calculated with percentage shares as weights can be found in Chapter 6, Section 6.4.1.

7.6.5 PPPs for actual individual consumption of health[14]

7.33 When the new method is in place, the scheme of PPP calculations indicated in Box 7.1 will change. There will no longer be a distinction between services produced by market producers and services produced by non-market producers, thereby producing PPPs for actual individual consumption of health directly. The expenditures on health will be classified by goods and services - pharmaceutical products, out-patient services, hospital services, etc. - and by the three institutional sectors - households, NPISHs and general government. The PPPs derived for each of the products will be used for all three sectors to ensure broad consistency with the national accounts at the level of total health expenditures per sector.

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13 In some reimbursement schemes, a point system is used in the place of quasi prices. A benchmark treatment is assigned a score of 100 for example with more points being assigned to treatments that are more costly and less points for treatments that are less costly. How much to pay per point – the base rate - is determined by negotiation or regulation. The base rate is adjusted periodically as costs increase. Participating countries with such schemes will have to convert reimbursement points into monetary values to obtain the quasi prices required.

14 The approach to calculating PPPs for actual individual consumption of health is similar to that used to calculate PPPs for actual individual consumption for education and described in Chapter 8, Paragraph 8.30.

7.34 The relative weight of each of the products included in the new classification will be calculated using the data from the system of health accounts[15], in particular data on health providers and from the functional classifications, and will represent the share of health expenditure on each product in the total expenditure on health care, whereas the total health expenditure of each sector will be drawn from the national accounts.

Box 7.7: Costs to be covered by quasi prices

Overhead costs	Medical infrastructure	Laundry
		Sterilization
		Patient transport within the hospital
		Food service to patients
		Other (includes patient transport outside the hospital, staff transport, transportation of samples/blood)
	Non-medical infrastructure	Administrative staff
		Cleaning
		Security
		Gardening
		Desk officers
		Telephone
		Printing and stationery
		Rent
		Taxes
		Energy
		Water
		Waste disposal
		IT/IS services
		Building maintenance
		Equipment maintenance
Capital costs[1]		Consumption of fixed capital
Direct costs	Compensation of employees	Medical staff
		Nursing staff
		Technical staff
		Administrative staff
	Goods and services	Medical and surgical equipment[2]
		Laboratory equipment[2]
		Disposables (including medical and surgical supplies)
		Drugs
		Medical gases
		Dressings
		Prosthesis

[15] A detail description of the system of health accounts can be found in OECD et al (2011) *System of Health Accounts 2011*, OECD Publishing, Paris.

[1] Capital costs should also cover research and development (R&D) but as countries have difficulty determining the cost of this item, R&D is not included in the quasi prices reported.

[2] Includes small tools - that is goods that may be used repeatedly or continuously in production over many years but may nevertheless be small, inexpensive and used to perform relatively simple operations

Education

8

8.1 Introduction

8.1 Education is primarily a non-market service with the majority of pupils and students in participating countries receiving their education free or at prices that are not economically significant from non-market producers. Without economically-significant prices to value output, the expenditure on education provided by non-market producers cannot be derived as it is for market producers by summing their sales. To get round the problem, national accountants have adopted the convention of estimating expenditures on non-market services by summing their costs of production. Previously, to preserve consistency with the prices underlying the expenditure estimates, Eurostat and the OECD calculated PPPs for education and other non-market services with input prices: the *input-price approach*.

8.2 In practice, with this approach, only prices for the principal cost component – compensation of employees – are collected.[1] PPPs are calculated with the prices (wages, salaries and allowances) that general government pays employees in selected occupations, such as teaching professionals, school administrators and support staff in the case of education. The volume measures generated by these PPPs are volume measures for inputs and do not reflect productivity differences between the non-market producers of participating countries. In the absence of any adjustment for productivity, this is widely perceived as a serious weakness of the approach. It is, in effect, assuming that productivity is uniform across the producers of non-market services in different countries which is unrealistic. Even so, it is only recently, that alternative approaches for non-market services have emerged and been adopted by the Programme. The new approaches concern individual services such as health and education. The input-price approach is still used for collective services as described in Chapter 9.[2]

8.3 Eurostat and the OECD stopped using the input-price approach for education in 2008. It has been replaced by an output method or, more precisely, a quantity method with quality adjustments. The method provides direct measures of the volume of education output where the definition of education output is the same as that of the Eurostat national accounts handbook on price and volume measures[3]. It has the additional advantage that it draws on data from in-house databases which eases the Programme's response burden for most participating countries. This chapter describes the approach, the data used, the derivation of the quantity measures, the quality adjustments made, and the calculation of the PPPs and volume measures.

8.2 The output method

8.4 Education like other non-market services is considered to be comparison resistant. While this is principally because there are no economically-significant prices with which to value output, it is also because the units of output are difficult to define and measure and because the differences in the quality of output between countries cannot be easily identified and quantified. Education provided by market producers faces similar difficulties when it comes to defining and measuring output and to identifying and quantifying quality differences among countries. This suggests that any method developed for non-market producers of education that defines and measures output would be applicable to market producers as well. Employing a common method avoids any bias that differences in the relative shares of market and non-market producers between countries may introduce to the comparison if their education outputs are treated differently.

8.5 The output method that Eurostat and the OECD employ for education makes no distinction between market and non-market producers. The individual consumption expenditures on education

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1 Reference PPPs are used for the other cost components as explained in Chapter 9, Section 9.3.

2 And, until the output approach being developed for health is introduced in 2013, for hospital services. See Chapter 7, Sections 7.5 and 7.6.

3 *Handbook on price and volume measures in national accounts*, Eurostat, Luxembourg, 2001: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-41-01-543. See as well Chapters 2 and 3, *Towards measuring the volume output of education and health services: a handbook*, Paul Schreyer, Statistics Directorate Working Paper No 31, OECD, Paris, April 2010.

by households, by non-profit making institutions serving households (NPISHs) and by general government – each of which is a separate basic heading in the Eurostat-OECD classification of GDP expenditures - are added together to obtain *actual individual consumption of education* (AICE). PPPs and volume measures are calculated for AICE as a whole. Volume measures for the component individual consumption expenditures are subsequently derived with the overall PPPs for AICE. The approach reflects that education is an individual service that is consumed by individual and identifiable households. It is fully consistent with the Programme's objective to provide a measure of material well-being that compares what households in participating countries actually consume rather than what they purchase.[4]

8.6 For the national accountant, education consists "principally of teaching provided by the producers of education services – schools, colleges, universities - to the pupils and students who consume such services"[5]. The Eurostat handbook defines education output as "the quantity of teaching received by the students, adjusted to allow for the qualities of the services provided for each type of education"[6]. A measure of output has therefore to take into account the quantity of teaching provided by the producers of education, the quality of the education provided by their producers and the level and field of education for which education is provided.

8.7 The quantity of teaching can be expressed as the number of hours that teachers spend teaching or as the number of hours that students spend being taught. Teaching is usually undertaken in groups and the groups can vary in size. This is not reflected in the number of hours spent teaching because it does not take into account the number of students being taught. The number of hours that students spend being taught, on the other hand, does and so it is considered to be the appropriate measure of education output. Data on student-hours are not available for all levels of education among participating countries. So for the Eurostat-OECD output method, the number of students is measured in full-time equivalents (FTEs). Although close to the concept of student hours, FTEs are not necessarily fully comparable across countries because the number of hours within a FTE can differ from one country to another, particularly at the tertiary level. Even so, they are regarded as an acceptable approximation of student hours in general and compatible with the use of outcome based quality indicators.

8.8 Measuring the quality of education is not so straightforward. The issue itself is highly sensitive and its measurement is full of conceptual and practical pitfalls. Yet an output method based on the quantity of teaching alone would be difficult to justify given that significant differences in the quality of education are thought to exist between countries. The Eurostat handbook recommends using outcomes to adjust for quality, stating that "the quality of the output lies in its results, that is, in the outcome. The most appropriate way of adjusting for quality is to investigate changes in outcome indicators."[7] For education, this implies investigating international examination or test results such as those conducted for international studies of student attainment levels.

8.9 Three such studies were reviewed to determine which would best provide the outcome indicators required for the Eurostat-OECD output method. These were PISA[8], PIRLS[9] and TIMSS[10].

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4 Chapter 1, paragraph 1.6.

5 Paragraph 16.137, *System of National Accounts 1993,* Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

6 Section 4.12.

7 Section 3.1.2.2.

8 The Programme for International Student Assessment (PISA) is managed by the OECD. Tests are administered to 15 year olds in schools and cover three topics: mathematics, reading and science. Typically between 4,500 and 10,000 students sit the tests per country. The first assessment was in 2000 and covered 43 countries, the second was in 2003 and covered 41 countries, the third was in 2006 and covered 57 countries, and fourth was in 2009 and covered 65 countries. 43 out of the 47 countries participating in the Eurostat–OECD PPP Programme were covered in the 2009 assessment.

9 The Progress in International Reading Literacy Study (PIRLS) gives qualitative indicators for primary schools. PIRLS 2001 covered 35 countries and tested 150,000 9 and 10 year olds in schools. PIRLS 2006 covered 40 countries and PIRLS 2011 covered 50 countries (of which 30 participate in the Eurostat-OECD PPP Programme). The project is managed by the International Study Centre at Boston College in partnership with the International Association for the Evaluation of Education Achievement.

10 The Trends in International Mathematics and Science Study (TIMSS) tests 9 year olds and 13 year olds. The study was conducted in 1995 (45 countries), 1999 (38 countries), 2003 (49 countries), 2007 (60 countries) and 2011 (65 countries of which 34 participate in the Eurostat-OECD PPP Programme). Like PIRLS, it is managed by the International Study Centre at Boston College and the International Association for the Evaluation of Education Achievement.

Of the three, PISA was found to have the widest coverage of education fields, of education levels and of countries participating in the PPP Programme. PISA also provides assessments that are corrected for the economic, social and cultural status (ESCS) of students thereby making possible a better evaluation of the quality of the teaching. The quality adjustments made at the primary and secondary levels of education for the Eurostat-OECD output method are based on ESCS corrected PISA scores.

8.10 The Eurostat-OECD output method requires education to be stratified into homogeneous groups by education levels and educational fields as this will improve comparability between countries and facilitate quality adjustments. The international classification of education currently used in participating countries is ISCED-97[11]. It identifies seven education levels and 25 education fields. In practice, a lack of comparable basic data across participating countries limits detailed stratification. Only the following levels of education are used by Eurostat and the OECD:

- ISCED 0 Pre-primary education;
- ISCED 1 Primary education;
- ISCED 2 Lower secondary education;
- ISCED 3+4 Upper secondary education and post-secondary non-tertiary education;
- ISCED 5+6 First and second stage of tertiary education (and unclassified).

8.11 For the purpose of calculating PPPs and volume measures for education, the ISCED levels can be regarded as products under the basic heading AICE. Eurostat and OECD make quality adjustments only for education levels ISCED 1 and ISCED 2. Together these two levels account for between 40 to 50 per cent of the total number of FTE students in most participating countries. In a few countries, they account for 55 to 60 per cent. This coverage illustrates that, the Eurostat-OECD output method, while an improvement on the input-price approach employed previously, is still a work in progress. Quality adjustments for the upper secondary and tertiary levels of education have to be investigated and, as can be seen from the next section, the basic data on which the method is based need improvement.

8.3 Data Sources

8.12 The Eurostat-OECD output method is a quantity method with partial quality adjustments. Quantity measures are based on the number of FTE students per head of population, price measures are based on AICE expenditures per FTE student and quality adjustments are based on PISA ESCS corrected scores. In its simple form, the method does not require student numbers or expenditure data by ISCED level, but then the price and volume measures that result would not be quality adjusted. Eurostat and the OECD calculate these measures, but only as checks on those from the more complex method actually applied. This method requires data on FTE student numbers by ISCED level, AICE by ISCED level, PISA scores (both with and without the ESCS correction), population totals and exchange rates.

8.13 The source for numbers of FTE students by ISCED level is the UNESCO-OECD-Eurostat (UOE) education database. It covers almost all the countries participating in the PPP Programme. Data for the few countries that are not included are obtained from their national statistical institutes. The FTE student numbers comprise both public sector students and private sector students. Occasionally the breakdown by ISCED level is available only for the public sector. When this happens, it is adjusted by the ratio between total public sector FTEs and total (public plus private) FTEs of a previous year.[12]

[11] International Standard Classification of Education 1997, United Nations Educational, Scientific and Cultural Organisation Institute for Statistics, May 2008, Re-edition. See also Classifying Educational Programmes: Manual for ISCED-97 Implementation in OECD Countries, Organisation for Economic Co-operation and Development, Paris, 1999.

[12] The UOE database records the number of students registered at education institutions in each country. This includes students from other countries. For consistency sake, the expenditures used to calculate the PPPs should follow the same domestic concept.

8.14 Usually student numbers in the UOE database are one year behind the reference year of the current comparison. FTE student numbers by ISCED level for the reference year are obtained by extrapolating the FTE numbers for the previous year in line with population growth. In other words, if t is the reference year, the latest FTE student numbers in the UOE database will refer to t-1. They will be extrapolated to t with population growth between t-1 and t as the extrapolator. FTE student numbers should refer to the calendar year and mostly do. In cases where numbers for the calendar year are not available, then those of the overlapping academic year are taken instead - that is, the FTE numbers for the academic year t-1 to t are taken for the calendar year t.

8.15 Sometimes student numbers are lacking completely for a country in year t-1 in which case reference has to be made to t-2 and the extrapolation made accordingly. It is more common for the ISCED breakdown to be incomplete. For example, a country reports primary and lower secondary student numbers together. This requires reference back to a previous year or, if that is unsuccessful because the country always reports the two levels together, then the breakdown of similar countries is applied. Sometimes the FTE numbers at the ISCED levels do not sum to the total. Consistency is imposed by defining the total as the sum of its components.

8.16 AICE expenditures by ISCED level are not usually available in the national accounts. Only totals - that is, the sum of the three basic headings covering the individual consumption expenditures on education by households, NPISHs and general government - are available. These are taken from the detailed expenditure data that participating countries report specifically for the calculation of PPPs and real expenditures. For a breakdown of education expenditure by ISCED level an alternative source is used. This is the UOE database. The education expenditures in the UOE database do not necessarily conform to national accounting concepts and definitions, but they are acceptable proxies and provide the structure with which to allocate the total AICE taken from the national accounts database over ISCED levels.

8.17 The expenditure data in the UOE database are not as up to date as the data on student numbers. They can be two if not three years behind the comparison reference year. This is not a serious drawback since it is the structure of the expenditure and not the level of expenditure that is required. The structure used for the reference year is that for latest year available in the UOE database. As with student numbers, the ISCED expenditure breakdowns can be incomplete with two ISCED levels being reported as one or inconsistent with the expenditures at the ISCED levels not adding up to the total. These omissions and inconsistencies are treated in the same way as they are for student numbers.

8.18 Expenditure on tertiary education, ISCED 5+6, in the UOE database includes expenditure on education and expenditure on research. Since it is education expenditure that is being compared, the expenditure on research has to be deducted. Data on research expenditure are available from the UOE database, but coverage of participating countries is incomplete and updates are infrequent. With the data that are available, an initial set of coefficients with which to adjust the expenditure share of tertiary education has been established for the year 2005. Recently, the UOE data has been combined with more recent data originating from R&D statistics to update the coefficients. In order to include all participating countries in the set, the coefficients for countries for which there is no information on research expenditure have been assumed to be the same as the average coefficient for all participating countries for which research expenditure is available.

8.19 Original PISA scores and the ESCS corrected PISA scores are extracted from the reports covering PISA 2000, PISA 2003, PISA 2006 and PISA 2009. The scores for participating countries not included in all PISA rounds, are assumed to be the same as their scores for the rounds in which they were included. The scores for participating countries not covered by any PISA round are assumed to be the same as the average scores of all participating countries covered by the round or the average scores of a subset of similar participating countries covered by round, whichever is the more appropriate.

8.20 Population totals and exchange rates are taken from in-house databases. Population totals refer to the average annual resident population of the economic territories covered by the GDPs of participating countries. The exchange rates are the annual averages of daily market or central rates compiled by the European Central Bank or the International Monetary Fund.

8.4 Quality adjustment factors

8.21 PISA measures students' levels of attainment at the age of 15 by testing them in mathematics, reading and science. The tests are the same in each country. Scores are placed on a scale with 500 as the average of OECD countries and 100 as the standard deviation. The choice of scale is arbitrary, any number could be set as average and any number as standard deviation. The choices have an impact on the perceived differences (distances) between countries, but not on their ranking nor on the ratios of their deviations from the average. The PISA score of a country can be seen as a measure of the level of skills and knowledge of 15 year olds. This level is not just the result of the most recent year of education, but rather the sum of all formal education received up to the age of 15, the knowledge and skills contributed by the student's family and social environment and the student's inherited skills.

8.22 The output measure should only reflect the skills and knowledge transferred by the school system through teaching, only skills and knowledge that can be attributed to formal education should be taken into account. PISA scores need to be corrected or adjusted so that the knowledge and skills contributed by the student's family and social environment and the student's inherited skills are excluded from the quality adjustment. To correct for the impact of family and social environment, a PISA score – the ESCS corrected score or ESCS score - has been developed that takes account of the differences in economic, social and cultural status. The original PISA scores are adjusted by assuming that the ESCS indicator is equal to the OECD average. Scores are thus adjusted for differences in the impact of ESCS across countries, but not for the average impact. The ESCS scores are assumed to reflect better the actual contribution of schools to the outcome of formal education and are therefore more suitable for quality adjustments. Ideally, the ESCS scores would also have to be corrected for the inherited skills of the student, but this is not feasible at the moment and no adjustment is made. It is assumed that inherited skills have the same impact in all countries.

8.23 For the Eurostat-OECD output method, the PISA ESCS scores are transformed into quality adjustment factors by normalising them to the average for the EU27 set to 100. The quality adjustments factors are used to adjust expenditure per student for ISCED levels 1 and 2. This is because the PISA tests are taken at the age of 15 and the results only capture the skills and knowledge acquired up to that age.

8.24 Box 8.1 provides a worked example of how quality adjustment factors are calculated for a single country, country A. The example covers the years 2004 and 2005, but the procedure illustrated is independent of the choice of year. The main steps are as follows:

- The calculation begins with the original scores and the ESCS scores for mathematics, science and reading for PISA 2006 and PISA 2009. The scores are taken from the reports on PISA 2006 (rows 01 to 04 and row 10) and PISA 2009 (rows 05 to 08 and row 15). The calculation also requires data based on PISA 2003. These are taken from a previous worksheet (rows 17 and 20).
- Original scores are available for the three subjects tested, but ESCS scores are only available for sciences in 2006 (row 10) and reading in 2009 (row 11). This is because in a PISA study ESCS corrections are only established for one of the three subjects surveyed. Reading was covered in PISA 2000 and PISA 2009, mathematics in PISA 2003 and science in 2006. ESCS scores have to be imputed for the missing subjects: mathematics and reading for 2006, mathematics and sciences for 2009.
- The imputations are done by assuming that the ESCS scores for the missing subjects retain the same relationship with the original scores as they had when ESCS scores were established for them. In other words, the ratio between the ESCS score for mathematics and the original score for mathematics of 2003 (row 17) holds for 2006 and 2009; the ratio between the ESCS score for sciences and the original score for sciences of 2006 (row 18) holds for 2009; and the ratio between the ESCS score for reading and the original score for reading of 2009 (row 19) holds for 2006. Multiplying the original scores for the subjects for which ESCS scores are missing by the corresponding ratio provides the ESCS scores required (rows 09, 11, 13 and 14).

Box 8.1: Calculating the quality adjustment factors for 2004 and 2005

Row	Year		Country A	Comments
1.	**PISA scores before ESCS correction**			
01	2006	Mathematics	520	PISA 2006
02		Sciences	510	PISA 2006
03		Reading	501	PISA 2006
04		Overall	510	Average of rows 01 to 03
05	2009	Mathematics	515	PISA 2009
06		Sciences	507	PISA 2009
07		Reading	506	PISA 2009
08		Overall	509	Average of rows 05 to 07
2.	**PISA scores after ESCS correction**			
09	2006	Mathematics	517	Row 01 multiplied by row 17
10		Sciences	503	PISA 2006
11		Reading	494	Row 03 multiplied by row 19
12		Overall	505	Average of rows 09 to 11
13	2009	Mathematics	512	Row 05 multiplied by row 17
14		Sciences	500	Row 06 multiplied by row 18
15		Reading	499	PISA 2009
16		Overall	504	Average of rows 13 to 15
3.	**Ratio ESCS corrected score/uncorrected scores**			
17	2003	Mathematics	0.9943	PISA 2003 from previous worksheet
18	2006	Science	0.9863	Row 10 divided by row 02
19	2009	Reading	0.9862	Row 15 divided by row 07
4.	**Quality adjustment factors**			
20	2003		1.035823	PISA 2003 from previous worksheet
21	2006		1.028691	Row 12 divided by the EU27 geometric mean for the row (490.6299)
22	2009		1.023632	Row 16 divided by the EU27 geometric mean for the row (492.0782)
5.	**Quality adjustment factors**			
23	2004	ISCED 1	1,0240	1/15 PISA 2006 +14/15 PISA 2009 or 1/15 row 21 + 14/15 row 22
24	2005	ISCED 1	1,0236	PISA 2009 or row 22
25	2004	ISCED 2	1,0301	3/12 PISA 2003 + 8/12 PISA 2006 + 1/12 PISA 2009 or 3/12 row 20 + 8/12 row 21 + 1/12 row 22
26	2005	ISCED 2	1,0280	1/12 PISA 2003 + 8/12 PISA 2006 + 3/12 PISA 2009 or 1/12 row 20 + 8/12 row 21 + 3/12 row 22

Box 8.2: Derivation of weights for quality adjustment factors for 2004 and 2005

Grade	2004 weights				2005 weights			
	Will be 15 in	PISA 2003	PISA 2006	PISA 2009	Will be 15 in	PISA 2003	PISA 2006	PISA 2009
01	2012			3/3	2013			3/3
02	2011			3/3	2012			3/3
03	2010			3/3	2011			3/3
04	2009			3/3	2010			3/3
05	2008		1/3	2/3	2009			3/3
ISCED 1			1/15	14/15				15/15
06	2007		2/3	1/3	2008		1/3	2/3
07	2006		3/3		2007		2/3	1/3
08	2005	1/3	2/3		2006		3/3	
09	2004	2/3	1/3		2005	1/3	2/3	
ISCED 2		3/12	8/12	1/12		1/12	8/12	3/12

- Summing and averaging the ESCS scores in rows 09 to 11 and in rows 13 to 15 provides overall ESCS scores respectively for 2006 and 2009 for country A (rows 12 and 16). Overall ESCS scores are established for each participating country in the same way as for country A. Once this is done the overall scores are converted into quality adjustment factors (row 21 and row 22) by dividing them by the geometric mean of the overall scores for the EU27. These quality adjustment factors refer to 2006 and 2009. They have to be converted into quality adjustment factors for ISCED levels 1 and 2 for 2004 and 2005.
- The conversion requires the quality adjustment factors for 2003, 2006 and 2009 (rows 17 to 19) to be combined using weights. How the weights are derived is shown in Box 8.2. The PISA test is taken when students are 15 years old and in the ninth grade. This means that, if 2004 is the reference year, a student in the first grade will take the test in 2012, a student in the second grade will take the test in 2011, and a student in the fifth grade will take the test in 2008. The nearest test for 2012 is that for 2009 and so the quality adjustment factor used for 2012 is that for 2009 (row 22). It is also used for 2010 and 2011 for the same reason. 2008, however, is between two tests - PISA 2006 and PISA 2009 – and the quality adjustment factor is obtained by taking the weighted average of the adjustment factors for 2006 and 2009 (rows 21 and 22). Weights are determined by which test is closest. In the case of 2008, 2009 is closer, so its adjustment factor is given a weight of 2/3 and the adjustment factor for 2006 is given a weight of 1/3. Summing the weights across grades gives the weights for their ISCED level.
- Finally, having established ISCED level weights as demonstrated in Box 8.2, the quality adjustment factors for 2003, 2004 and 2005 (rows 20 to 22) are weighted and summed accordingly. The quality adjustment factors that result are the ones to be applied at ISCED level 1 and ISCED level 2 for the years 2004 (row 23 and 25) and 2005 (row 24 and 26).

8.5 Calculating PPPs for education

8.25 In order to be able to calculate a weighted quantity index and to apply quality adjustments at ISCED 1 and 2 levels, the practical implementation of the output method for education is similar to the price approach followed for actual and imputed rents in Chapter 6, Section 6.4.1. The PPPs for AICE are calculated on the basis of quality-adjusted expenditure per student at each ISCED level as unit prices and total expenditure for each ISCED level as weights. The derivation of the expenditure weights and unit prices is illustrated by the worked example in Box 8.3. The example covers a single country, country A, but the procedure is the same for all participating countries. Similarly the procedure is not affected by the choice of reference year which is 2010 in the example.

- The procedure starts after data on FTE student numbers by ISCED level (rows 01 to 06), private and public expenditure on education by ISCED level (rows 07 to 12), AICE in national currency (row 13), average annual resident population (row 14), and euro exchange rates (row 15) have been extracted from the UOE and other relevant in-house databases. The FTE numbers and expenditure data taken from the UOE database may not be up to date, with incomplete ISCED breakdowns and ISCED breakdowns that do not sum to the total. To help with the updating and the imputations needed to fill gaps and remove inconsistencies, as well as to assist with intra-country and inter-country plausibility checks, the shares at ISCED level of FTE student numbers of total FTE numbers are calculated (rows 16 to 20).
- After the extraction and cleaning of the price and expenditure data, a preliminary volume index (row 23) can be calculated by first expressing the total number of FTE students (row 06) as a percentage of total population (row 14) and then dividing the percentage (row 22) by the student/population percentage for the EU27. Similarly, a preliminary price level index (row 23) can be obtained by first calculating AICE per FTE student in national currency (row 24), then converting the per capita figure to euros (row 25) and finally expressing the per capita figure in euros as a index relative to the geometric mean of the per capita figures in euros for the EU27 (row 26). These two measures are used to check the volume indices and price level indices obtained by the EKS calculation that follows the procedure described here.

Box 8.3: Derivation of expenditure weights and unit prices for 2010

Row		Year	Country A	Comments
1.1	**ISCED FTE student numbers**			
01	ISCED 0	2010	428 515	UOE database
02	ISCED 1	2010	737 909	UOE database
03	ISCED 2	2010	306 042	UOE database
04	ISCED 3+4	2010	769 368	UOE database
05	ISCED 5+6	2010	370 885	UOE database
06	Total	2010	2 612 698	UOE database
1.2	**Public and private education expenditures by ISCED**			
07	ISCED 0	2008	1 994	UOE database
08	ISCED 1	2008	5 185	UOE database
09	ISCED 2	2008	2 702	UOE database
10	ISCED 3+4	2008	6 835	UOE database
11	ISCED 5+6	2008	4 562	UOE database
12	Total	2008	21 278	UOE database
1.3	**Actual individual consumption of education (AICE) in national currency (millions)**			
13		2010	22 242	NA database
1.4	**Population (1 000)**			
14		2010	10 883	Population database
1.5	**Exchange rate (national currency per euro)**			
15		2010	1.0000	Exchange rate database
2.1	**ISCED FTE student numbers as shares - for imputations and plausibility checks within and between countries**			
16	ISCED 0	2010	16.4%	Row 01 divided by row 06
17	ISCED 1	2010	28.2%	Row 02 divided by row 06
18	ISCED 2	2010	11.7%	Row 03 divided by row 06
19	ISCED 3+4	2010	29.4%	Row 04 divided by row 06
20	ISCED 5+6	2010	14.2%	Row 05 divided by row 06
21	Total	2010	100.0%	
3.1	**FTE students as a percentage of total population**			
22		2010	24.0%	Row 06 divided by row 14
3.2	**Preliminary volume index**			
23		2010	116.4	Row 22 divided by the student percentage of total population for the EU27 (20.6%)
3.3	**AICE per FTE student in national currency**			
24		2010	8 513	Row 13 divided by row 06
3.4	**AICE per FTE student in euros**			
25		2010	8 513	Row 24 divided by row 15
3.5	**Preliminary price level index (EU27=100)**			
26		2010	173.6	Row 25 divided by the EU27 geometric mean for the row (4905)
4.1	**ISCED expenditure shares**			
27	ISCED 0	2008	9.4%	Row 07 divided by row 12
28	ISCED 1	2008	24.4%	Row 08 divided by row 12
29	ISCED 2	2008	12.7%	Row 09 divided by row 12
30	ISCED 3+4	2008	32.1%	Row 10 divided by row 12
31	ISCED 5+6	2008	21.4%	Row 11 divided by row 12
32	Total	2008	100.0%	

Row		Year	Country A	Comments
4.2	**Adjustment for research expenditure**			
33		2005	33.8%	UOE database and R&D statistics
34	ISCED 5+6		14.2%	Row 31 multiplied by (100 minus row 33)
4.3	**ISCED expenditure shares rescaled after adjustment for research expenditures**			
35	ISCED 0	2008	10.1%	Row 27 divided by the sum of rows 27, 28, 29, 30, 34
36	ISCED 1	2008	26.3%	Row 28 divided by the sum of rows 27, 28, 29, 30, 34
37	ISCED 2	2008	13.7%	Row 29 divided by the sum of rows 27, 28, 29, 30, 34
38	ISCED 3+4	2008	34.6%	Row 30 divided by the sum of rows 27, 28, 29, 30, 34
39	ISCED 5+6	2008	15.3%	Row 31 divided by the sum of rows 27, 28, 29, 30, 34
40	Total	2008	100.0%	
4.4	**AICE by ISCED in national currency (millions) – used as expenditure weights in the calculation of PPPs**			
41	ISCED 0	2010	2 247	Row 13 multiplied by row 35
42	ISCED 1	2010	5 843	Row 13 multiplied by row 36
43	ISCED 2	2010	3 044	Row 13 multiplied by row 37
44	ISCED 3+4	2010	7 703	Row 13 multiplied by row 38
45	ISCED 5+6	2010	3 405	Row 13 multiplied by row 39
46	Total	2010	22 242	
5.1	**AICE per FTE student by ISCED before quality adjustment**			
47	ISCED 0	2010	5 244	Row 41 divided by row 01
48	ISCED 1	2010	7 918	Row 42 divided by row 02
49	ISCED 2	2010	9 945	Row 43 divided by row 03
50	ISCED 3+4	2010	10 013	Row 44 divided by row 04
51	ISCED 5+6	2010	9 181	Row 45 divided by row 05
5.2	**Quality adjustment for ISCED 1 and ISCED 2**			
52	ISCED 1		1.0236	PISA 2009 (row 22 in quality adjustment worksheet)
53	ISCED 2		1.0236	PISA 2009 (row 22 in quality adjustment worksheet)
5.3	**AICE per FTE student by ISCED after quality adjustment – used as unit prices in the calculation of PPPs**			
54	ISCED 0	2010	5 244	
55	ISCED 1	2010	7 736	Row 48 divided by row 52
56	ISCED 2	2010	9 716	Row 49 divided by row 53
57	ISCED 3+4	2010	10 013	
58	ISCED 5+6	2010	9 181	

- The next step is to adjust the ISCED expenditures (rows 07 to 11) for research expenditure and to determine the expenditure weights with which to calculate PPPs. First, the expenditure on research is removed from the expenditure on ISCED 5+6 level. The expenditure data on which the adjustment is based are not current; they refer to an earlier year. Research expenditure is expressed as a percentage of total expenditure at the ISCED 5+6 level (row 33). The percentage is used to adjust the share of ISCED 5+6 level expenditure of the current year (row 31). As a result of the adjustment, the ISCED expenditure shares (rows 27 to 31) have to be rescaled. The rescaled shares (rows 35 to 39) are used to distribute AICE in national currency (row 13) by ISCED level (rows 41 to 45). The AICE at the ISCED levels are the expenditure weights used in the calculation of PPPs.
- The final step is to determine the unit prices for the PPP calculation. This involves the quality adjustment discussed in the previous section. Before the quality adjustment can be made, the AICE at ISCED levels (rows 41 to 45) have to be converted to AICE per FTE student by ISCED level (rows 47 to 51). The quality adjustment factor for ISCED level 1 (rows 52) is applied to the AICE per FTE student for ISCED level 1 (row 48) and the quality adjustment factor for ISCED level 2 (row 53) is applied to the AICE per FTE

student for ISCED level 2 (row 49). (In this example, the two quality adjustment factors are the same, but, as can be seen from Box 8.2, they can be different.) The AICE per FTE student at ISCED levels following the quality adjustments to ISCED levels 1 and 2 are the unit prices used to calculate the PPPs.

8.26 PPPs for AICE are calculated with the matrix of unit prices and the matrix of expenditure weights derived above. The matrices, defined as ISCED levels by participating countries, are complete.

8.27 The usual way of calculating bilateral PPPs for a basic heading is to calculate a Laspeyres type PPP, a Paasche type PPP and a Fisher type PPP between each pair of participating countries. The Fisher type PPP between two countries is the geometric mean of their Laspeyres type PPP and their Paasche type PPP. The Fisher type PPPs are not transitive. They are made transitive by the Èltetö-Köves-Szulc (EKS) procedure (see Chapter 12).

8.28 Expenditure weights are not usually employed to calculate the bilateral PPPs for a basic heading. But, when they are, as in the case of education, the Laspeyres type PPP between two countries is calculated as the arithmetic mean of the price ratios weighted with the weights of the base country.

$$L(j/h) = \sum_{i=1}^{k} \left(\frac{P_{ij}}{P_{ih}}\right) * w_{ih} \Big/ \sum_{i=1}^{k} w_{ih} \qquad (1)$$

And the Paasche type PPP is calculated as the harmonic mean of the price ratios weighted with the weights of partner country.

$$P(j/h) = \sum_{i=1}^{k} w_{ij} \Big/ \sum_{l=1}^{m} w_{ij} \Big/ \left(\frac{P_{ij}}{P_{ih}}\right) \qquad (2)$$

In both equations, *h* is the base country and *j* the partner country, P_{ij} and P_{ih} are the prices of product i in countries *j* and *h* (in this case, the AICE per FTE for each ISCED level), w_{ih} is the weight as a percentage for product *i* in the base country *h* (that is, the share in total AICE expenditure of the ISCED level), w_{ij} is the weight as a percentage for product i in partner country *j*, and *k* is the number of products for which price ratios exist between *j* and *h*.

8.29 In practice, Paasche type PPPs are not calculated directly. Instead they are derived as the reciprocal of the transpose of the Laspeyres type PPPs when *j* is the base country and *h* is the partner country. In other words,

$$P(j/h) = 1/L(h/j) \qquad (3)$$

where *P* is the Paasche type PPP between *j* and *h* when *h* is the base country and *L* is the Laspeyres type PPP between *j* and *h* when *j* is the base country.

8.30 PPPs for AICE are calculated as follows. First, equation 1 is employed to obtain a matrix of Laspeyres type PPPs. These Laspeyres type PPPs are then transposed and their reciprocals taken to derive a matrix of Paasche type PPPs. The geometric means of the two sets of PPPs provide a matrix of Fisher type PPPs which, as explained in Chapter 12 and Annex V, are made transitive by the EKS process. The EKS PPPs are used to convert the national expenditures[13] that participating countries report for AICE to real expenditures. The real expenditures are subsequently expressed as volume indices and per capita volume indices. The same PPPs are used to convert the national expenditures of households, NPISHs and general government on education into real expenditures and the volume measures to which they give rise.

[13] Final expenditures valued at national price levels and expressed in national currencies.

8.6 Validation of education data

8.31 The entire process of calculating PPPs and volume indices for education is carried out by Eurostat and the OECD. There is no need for participating countries to submit data because all input data are obtained from international databases (UOE and PISA). The advantage of this approach is the reduced survey burden on countries, but the disadvantage is that countries are less involved in this survey than in other surveys. It is important for the credibility of the PPP Programme that all participating countries accept and approve the results obtained.

8.32 For this purpose, the files detailing the calculation of education PPPs and volume indices are submitted to participating countries for checking and approval. Even though countries cannot change their input data, except by changing their data in the international databases, they are requested to check the correctness of their data and the calculations made and to confirm their agreement. In particular, where imputations need to be made to fill gaps in input data, the countries concerned are requested to confirm that they accept the imputations made.

Collective services

9

9.1 Introduction

9.1 The services that general government provides to households comprise individual services and collective services. Individual services are the services that general government provides to specific identifiable households – that is, services, such as health and education, which are consumed by households individually. Collective services are those that general government provides simultaneously to all members of the community – that is, services, such as defence and public order and safety, which are consumed by households collectively. The principal individual services are covered elsewhere in the manual: health in Chapter 7 and education in Chapter 8. Collective services are covered in this chapter.

9.2 Expenditure on collective services by general government is called *collective consumption expenditure by government*. It is one of the seven main aggregates in the Eurostat-OECD expenditure classification and its share of GDP is around 8 or 9 per cent in most EU Member States and OECD Member Countries. *General government* is the term used in the SNA 93[1] and the ESA 95[2] to describe the institutional sector that consists of central, regional, state and local government units together with the social security funds controlled by these units. Non-profit institutions engaged in non-market production that are controlled and mainly financed by government units or social security funds are also included in the general government sector. Throughout this chapter *government* means *general government* unless specifically stated otherwise.

9.3 The chapter explains how PPPs for collective consumption expenditure by government are obtained within the framework of a Eurostat and OECD comparison. It starts by defining the services covered by the aggregate. This is followed by an outline of the basic methodology. The chapter continues by describing the survey of compensation of employees which is the only price collection conducted specifically for the calculation of PPPs for government expenditure. It concludes with a brief discussion on productivity differences.

9.2 Collective services

9.4 Collective services are comprehensively defined in COFOG 98[3] and these are the definitions that are followed in the Eurostat-OECD expenditure classification. Broadly speaking, collective services are general public services, defence, public order and safety, economic affairs, environment protection, and housing and community amenities. Box 9.1 gives a more precise definition in terms of COFOG groups. All the shaded COFOG groups are collective services. They include the research and development (R&D) for individual services.[4] They include as well the overall policy-making, planning, regulatory, budgetary, co-ordinating and monitoring responsibilities of ministries overseeing individual services. These activities, unlike the services to which they relate, cannot be identified with specific individual households and are considered to benefit households collectively.

1 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

2 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

3 "Classification of the Functions of Government (COFOG)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

4 As stated in Chapter 4, most participating countries will have adopted the SNA 2008 or the ESA 2010 by 2014 and, as a result, a significant portion of government expenditure on R&D for both collective and individual services will be removed from intermediate consumption and reclassified as gross fixed capital formation.

Box 9.1: Collective services (CS) and individual services (IS)

COFOG 98 Groups	
01.	**GENERAL PUBLIC SERVICES**
01.1	Executive & legislative organs, financial & fiscal affairs, external affairs (CS)
01.2	Foreign economic aid (CS)
01.3	General services (CS)
01.4	Basic research (CS)
01.5	R&D General public services (CS)
01.6	General public services n.e.c. (CS)
01.7	Public debt transactions (CS)
01.8	Transfers of a general character between different levels of government (CS)
02.	**DEFENCE**
02.1	Military defence (CS)
02.2	Civil defence (CS)
02.3	Foreign military aid (CS)
02.4	R&D Defence (CS)
02.5	Defence n.e.c. (CS)
03.	**PUBLIC ORDER & SAFETY**
03.1	Police services (CS)
03.2	Fire-protection services (CS)
03.3	Law courts (CS)
03.4	Prisons (CS)
03.5	R&D Public order & safety (CS)
03.6	Public order & safety n.e.c. (CS)
04.	**ECONOMIC AFFAIRS**
04.1	General economic, commercial & labour affairs (CS)
04.2	Agriculture, forestry, fishing & hunting (CS)
04.3	Fuel & energy (CS)
04.4	Mining, manufacturing & construction (CS)
04.5	Transport (CS)
04.6	Communication (CS)
04.7	Other industries (CS)
04.8	R&D Economic affairs (CS)
04.9	Economic affairs n.e.c. (CS)
05.	**ENVIRONMENT PROTECTION**
05.1	Waste management (CS)
05.2	Waste water management (CS)
05.3	Pollution abatement (CS)
05.4	Protection of biodiversity & landscape (CS)
05.5	R&D Environment protection (CS)
05.6	Environment protection n.e.c. (CS)

COFOG 98 Groups	
06.	**HOUSING & COMMUNITY AMENITIES**
06.1	Housing development (CS)
06.2	Community development (CS)
06.3	Water supply (CS)
06.4	Street lighting (CS)
06.5	R&D Housing & community amenities (CS)
06.6	Housing & community amenities n.e.c. (CS)
07.	**HEALTH**
07.1	Medical products, appliances & equipment (IS)
07.2	Out-patient services (IS)
07.3	Hospital services (IS)
07.4	Public health services (IS)
07.5	R&D Health (CS)
07.6	Health n.e.c. (CS)
08.	**RECREATION, CULTURE & RELIGION**
08.1	Recreational & sporting services (IS)
08.2	Cultural services (IS)
08.3	Broadcasting & publishing services (CS)
08.4	Religious & other community services (CS)
08.5	R&D Recreation, culture & religion (CS)
08.6	Recreation, culture & religion n.e.c. (CS)
09.	**EDUCATION**
09.1	Pre-primary & primary education (IS)
09.2	Secondary education (IS)
09.3	Post-secondary non-tertiary education (IS)
09.4	Tertiary education (IS)
09.5	Education not definable by level (IS)
09.6	Subsidiary services to education (IS)
09.7	R&D Education (CS)
09.8	Education n.e.c. (CS)
10.	**SOCIAL PROTECTION**
10.1	Sickness & disability (IS)
10.2	Old age (IS)
10.3	Survivors (IS)
10.4	Family & children (IS)
10.5	Unemployment (IS)
10.6	Housing (IS)[1]
10.7	Social exclusion n.e.c. (IS)
10.8	R&D Social protection (CS)
10.9	Social protection n.e.c. (CS)

[1] In the Eurostat-OECD classification of final expenditure on GDP, housing is not included under social protection. Instead, both are identified as separate expenditure categories.

9.5 Collective services are produced by government. Because they are supplied free or at prices that are not economically significant, the services are called *non-market services* [5] and government, as their producer, is considered a *non-market producer*. Economically-significant prices are prices that determine the amounts producers supply and purchasers buy[6] and, as such, they can be used to value the outputs of market producers by multiplying the quantities produced by the prices at which they are sold. The absence of economically-significant prices for non-market services means that it is not possible to value the outputs of non-market producers in the same way as the outputs of market producers are valued. Because of this, national accountants have adopted the convention of valuing the outputs of non-market producers by totalling up the costs to produce them. The value of the output of non-market producers is equal to the sum of their expenditures on the non-market services they produce or, if there have been sales, to the sum of their expenditures less the value of their sales. Consistency with the prices underlying these expenditures is maintained by using the prices of inputs to calculate the PPPs for non-market services. This is called the *input-price approach*.

9.3 Input-price approach

9.6 The input-price approach requires a breakdown of the expenditure on non-market services by the following basic cost components: compensation of employees, intermediate consumption, gross operating surplus, net taxes on production and receipts from sales. The breakdown is based on the assumption that the data will be taken from the government production account. Receipts from sales is required to net off gross output to obtain government final consumption expenditure on the production of these services. Gross operating surplus and net taxes on production are included for completeness. In practice, gross operating surplus will be equal to consumption of fixed capital since net operating surplus is expected to be negligible.

9.7 Of the cost components, compensation of employees is by far the largest and most important. It accounts on average for over 50 per cent of government expenditure on collective services in EU Member States and OECD Member Countries. For the input-price approach, prices are collected only for compensation of employees. Prices are not collected for the other cost components, so no PPPs are calculated for them and, as explained below, reference PPPs are used instead.

Box 9.2: Collective services by basic heading

BH Code	Basic heading	PPPs used
14.01.11.1	Compensation of employees (collective services relating to defence)	PPP for compensation of employees (collective services other than defence)
14.01.11.2	Compensation of employees (collective services other than defence)	*PPPs calculated with prices from the annual survey of compensation of government employees*
14.01.12.1	Intermediate consumption (collective services relating to defence)	PPPs for gross fixed capital formation in machinery and equipment
14.01.12.2	Intermediate consumption (collective services other than defence)	PPPs for individual market consumption (see Box 13.3B for coverage)
14.01.13.1	Gross operating surplus	PPPs for gross fixed capital formation

[5] They are also called *comparison resistant services* because not only do they have no economically-significant prices with which to value output, their units of output cannot be otherwise defined and measured, the institutional arrangements for their provision and the conditions of payment differ from country to country, and their quality varies between countries but the differences cannot be identified and quantified.

[6] Or, as defined in the ESA 95, prices that cover over 50 per cent of the costs of production.

BH Code	Basic heading	PPPs used
14.01.14.1	Net taxes on production	PPPs for production of collective services by government (without net taxes on production and receipts from sales)
14.01.15.1	Receipts from sales	PPPs for production of collective services by government (without receipts from sales)

9.8 Box 9.2 shows the actual cost structure used for collective services in Eurostat and OECD comparisons. Defence expenditures are separated from expenditures on other collective services. Expenditures on compensation of employees and intermediate consumption are divided according to whether or not they relate to defence. Originally it was intended that the PPPs applied to defence expenditures would be different from those applied to expenditures on other collective services. This has only been possible for intermediate consumption. Collecting the compensation of employees paid to defence personnel has not proved feasible for a number of reasons, including the comparability of equivalent ranks across countries and the confidentiality surrounding their pay and allowances, and is no longer attempted. The collection of compensation of employees is limited to a selection of occupations employed in the production of other collective services.

9.9 As stated already, no prices are collected for the six shaded basic headings in Box 9.2. The PPPs for these basic headings are based on price data, but price data that have been collected for other basic headings. Such PPPs are called *reference PPPs*. They are taken from elsewhere in the comparison to serve as proxies for the PPPs that would have been calculated for the basic headings had prices been collected for them. Reference PPPs are discussed in Chapter 12, Section 12.3.4.

9.10 The reference PPPs used for collective services are listed in Box 9.2. The choice of reference PPP is self-explanatory in most cases. For example, the reference PPPs for gross operating surplus - which in practice equals consumption of fixed capital since net operating surplus is generally minimal - are the PPPs for gross fixed capital formation. The choice of the PPPs for gross fixed capital formation in machinery and equipment as the reference PPPs for the intermediate consumption of collective services relating to defence is less evident. The explanation is that the major part of intermediate consumption of defence consists of expenditure on machinery and equipment that are not dual purpose – that is, they are for military use only and cannot be put to civilian use as well. Such expenditure is classified as intermediate consumption - and not as gross fixed capital formation - in the SNA 93 and the ESA 95.[7]

9.4 Survey of compensation of government employees

9.11 The basic heading that is not shaded in Box 9.2 covers the compensation paid to government employees producing collective services other than defence services. PPPs for this basic heading are calculated with the compensation of employees that participating countries are required to report for a selection of occupations employed in the production of these collective services. Each year, at the end of February of t+1, an electronic questionnaire is sent to participating countries asking for the compensation of employees and other related data for each occupation selected. Information is requested for three years: t, t-1 and t-2. There is a reporting form for each year. An example of the reporting form is shown in Box 9.3A.

9.12 Seventeen occupations are listed in column 6 of the reporting form in Box 9.3A: six in public order and safety, eleven in other collective services not elsewhere classified (n.e.c.). The occupations have been selected because they are comparable across countries and are generally representative within them. The occupations are defined using job descriptions taken from the ISCO-

[7] When participating countries adopt the SNA 2008 or the ESA 2010, all expenditure on military machinery and equipment, irrespective of whether or not the machinery and equipment are dual purpose, will be classified as gross fixed capital formation. And, as pointed out in Chapter 4, Section 4.5.1, this will make the split between defence and other collective services redundant.

08[8]. These descriptions specify the occupations in terms of the kind of work done. A table cross-referencing the occupations and their ISCO job descriptions is given in Box 9.4. In the questionnaire, the table has hyperlinks to the job descriptions such as that for a statistician in Box 9.5. Each occupation is also defined by a skill level. It indicates the minimum level of education that a person should have to carry out the tasks and duties of the occupation. Four broad skill levels are defined in ISCO-08 based on ISCED-97[9]. These are given in Box 9.6.

[8] International Standard Classification of Occupations 2008, International Labour Office, Geneva.

[9] *International Standard Classification of Education 1997*, United Nations Educational, Scientific and Cultural Organization, Paris.

Box 9.3A: Reporting form for the survey of compensation of government employees (collective services)

SURVEY OF COMPENSATION OF GOVERNMENT EMPLOYEES

Country: **Year:** **2012**

only the shaded fields are to be filled in by the countries

Basic heading code Basic heading	Weight group	Percentage weight within the basic heading	Occupation code	Occupation (see Box 9.4 for references to ISCO-08)	Requested skill level	Observed skill level	Average annual gross salary	Employers' actual social contributions		Employers' imputed social contributions		Annual average compensation	Contractual working week	Holiday entitlement	Public holidays	Annual contractual hours worked	Adjusted annual average compensation
								national accounts ratio	value	national accounts ratio	value		(number of hours)	(number of days)	(number of days)		
(1)(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
				EXAMPLE	4	4	10000	10%	1000	5%	500	11500	37,5	30	10	1650	11918
14.01.11.2 Other collective services	Public order and safety		14.01.11.2.01.aa	Judge	4				0		0	0				0	0
			14.01.11.2.01.ab	Law clerk	3				0		0	0				0	0
			14.01.11.2.01.ac	Police inspector	3				0		0	0				0	0
			14.01.11.2.01.ad	Police officer	2				0		0	0				0	0
			14.01.11.2.01.ae	Fire-fighter	2				0		0	0				0	0
			14.01.11.2.01.af	Prison guard	2				0		0	0				0	0
	Other Collective services n.e.c.		14.01.11.2.02.ba	Statistician	4				0		0	0				0	0
			14.01.11.2.02.bb	Database administrator	4				0		0	0				0	0
			14.01.11.2.02.bc	Executive official	3				0		0	0				0	0
			14.01.11.2.02.bd	Customs inspector	3				0		0	0				0	0
			14.01.11.2.02.be	Tax officer	3				0		0	0				0	0
			14.01.11.2.02.bf	Computer operator	3				0		0	0				0	0
			14.01.11.2.02.bg	Secretary	2				0		0	0				0	0
			14.01.11.2.02.bh	Maintenance electrician	2				0		0	0				0	0
			14.01.11.2.02.bi	Driver	2				0		0	0				0	0
			14.01.11.2.02.bj	Building caretaker	1				0		0	0				0	0
			14.01.11.2.02.bk	Cleaner	1				0		0	0				0	0

Box 9.3B: Completing the reporting form

Percentage weight within the basic heading (column 4)	The occupations listed for the basic heading are divided into two groups: those working in public order and safety and those working in other collective services n.e.c. Countries are required to provide the weight that each group has within the basic heading. The weights should be expressed as percentages: for example, 55 per cent public order and safety, 45 per cent other collective services n.e.c. They should be expenditure shares, but if expenditures shares are not available, weights based on the numbers employed in each group should be given instead. If neither expenditure nor employment shares are available, countries should estimate the weights by other means and explain the basis of the estimate.
Observed skill level (column 8)	The skill level associated with an occupation is given in column 7. Countries are required to provide the average annual gross salary for the skill level indicated and to report that they have done so in column 8. In other words, the requested skill level indicated in column 7 and the observed skill level recorded in column 8 should be the same. It may not always be possible to provide the average annual gross salary for the skill level indicated because only higher or lower skill levels are found for the occupation or because skill level information is not available. In the first situation, the actual skill level found should be reported in column 8; in the second, the education level of job holders can be used as a proxy for skill level and reported in column 8.
Average annual gross salary (column 9)	The average annual gross salary to be reported for an occupation is that defined in Box 9.7. It is the amount paid for contractual working hours and excludes payments for overtime. If it is not possible to exclude overtime, it is necessary to include the hours of overtime worked when reporting contractual working time in column 15. Countries should obtain the average annual gross salary from one of the following sources that are listed in order of preference: government payroll records, statistical surveys such as a structure of earnings surveys, government salary scales, other suitable statistical or administrative source.
Employers' actual social contributions (column 10)	Countries should report the employers' actual social contributions for an occupation as a ratio of its average annual gross salary in column 9. The ratio is to be extracted from the national accounts. As the national accounts do not usually provide actual social contribution rates at occupation level, the ratio will refer to a higher level of aggregation. Countries will have to use the ratio for the level of aggregation that comes closest to the occupation. The reporting form is programmed to complete column 11 by applying the ratio in column 10 to the average annual gross salary recorded for the occupation in column 9.
Employers' imputed social contributions (column 12)	Countries should report the employers' imputed social contributions for an occupation as a ratio of its average annual gross salary in column 9. The ratio is to be extracted from the national accounts. As the national accounts do not usually provide imputed social contribution rates at occupation level, the ratio will refer to a higher level of aggregation. Countries will have to use the ratio for the level of aggregation that comes closest to the occupation. The reporting form is programmed to complete column 13 by applying the ratio in column 12 to the average annual gross salary recorded for the occupation in column 9.
Contractual working week (column 15)	Countries should report for each occupation the number of hours to be worked per week as specified in the contract between the government as an employer and the employee. These hours are not necessarily the actual number of hours worked as overtime is not to be included. If it has not be possible to exclude overtime payments from the average annual gross salary in column 9, the average number of hours of overtime worked per week should be added to the number of contractual hours worked per week.
Holiday entitlement (column 16)	For each occupation, countries should report the number of working days of holiday entitlement. This is usually specified in the contract between the government as an employer and the employee. Public holidays are not to be included.
Public holidays (column 17)	For each occupation, countries should report the number of days of public holidays that fall on working days during the reference year.

Box 9.4: References to ISCO-08

Code	Occupation	Skill level	ISCO-08	
14.01.11.2.01.aa	Judge	4	2612	Judges
14.01.11.2.01.ab	Law clerk	3	3411	Legal and related associated professionals
14.01.11.2.01.ac	Police inspector	3	3450	Police inspectors and detectives
14.01.11.2.01.ad	Police officer	2	5412	Police officers
14.01.11.2.01.ae	Fire-fighter	2	5411	Fire-fighters
14.01.11.2.01.af	Prison guard	2	5413	Prison guards
14.01.11.2.02.ba	Statistician	4	2120	Mathematicians, actuaries and statisticians
14.01.11.2.02.bb	Database administrator	4	2521	Database designers and administrators
14.01.11.2.02.bc	Executive official	3	3343	Administrative and executive secretaries
14.01.11.2.02.bd	Customs inspector	3	3351	Customs and border inspectors
14.01.11.2.02.be	Tax officer	3	3352	Government tax and excise officials
14.01.11.2.02.bf	Computer operator	3	3511	Information and communications technology operations technicians
14.01.11.2.02.bg	Secretary	2	4120	Secretaries (general)
14.01.11.2.02.bh	Maintenance electrician	2	7411	Building and related electricians
14.01.11.2.02.bi	Driver	2	8322	Car, taxi and van drivers
14.01.11.2.02.bj	Building caretaker	1	5153	Building caretakers
14.01.11.2.02.bk	Cleaner	1	9112	Helpers and cleaners in offices, hotels and other establishments

Box 9.5: Example of an ISCO 08 occupation description

2120 Mathematicians, actuaries and statisticians

Mathematicians, actuaries and statisticians conduct research and improve or develop mathematical, actuarial and statistical concepts, theories and operational methods and techniques and advise on or engage in their practical application in such fields as engineering, business and social and other sciences.

Tasks include -

(a) studying, improving and developing mathematical, actuarial and statistical theories and techniques;

(b) advising on or applying mathematical principles, models and techniques to a wide range of tasks in the fields of engineering, natural, social or life sciences;

(c) conducting logical analyses of management problems, especially in terms of input-output effectiveness, and formulating mathematical models of each problem usually for programming and solution by computer;

(d) designing and putting into operation pension schemes and life, health, social and other types of insurance systems;

(e) applying mathematics, statistics, probability and risk theory to assess potential financial impacts of future events;

(f) planning and organizing surveys and other statistical collections, and designing questionnaires;

(g) evaluating, processing, analyzing, and interpreting statistical data and preparing them for publication;

(h) advising on or applying various data collection methods and statistical methods and techniques, and determining reliability of findings, especially in such fields as business or medicine as well as in other areas of natural, social or life sciences;

(i) preparing scientific papers and reports;

(j) supervising the work of mathematical, actuarial and statistical assistants and statistical clerks.

Examples of the occupations classified here: Actuary; Operations research analyst; Demographer; Mathematician; Statistician.

This item excludes - some related occupations classified elsewhere: Actuarial assistant – 3314; Mathematical assistant – 3314; Statistical assistant- 3314; Actuarial clerk – 4312; Statistical clerk – 4312; Information systems analyst - 2511

Box 9.6: Skill levels of ISCO-08

Skill level	Definition
1	Primary level education which generally begins at the age of 5, 6 or 7 and lasts about five years.
2	First stage of secondary education which begins at the age of 11 or 12 and lasts about three years, followed by the second stage of secondary education which begins at the age of 14 or 15 and also lasts about three years. A period of on-the-job training and experience may be necessary, sometimes formalised in an apprenticeship.
3	Education which begins at the age of 17 or 18, lasts about four years and leads to an award which is not equivalent to a first university degree.
4	Education which begins at the age of 17 or 18, lasts for three or more years and leads to a first university degree or postgraduate degree.

Box 9.7: Compensation of employees

Compensation of employees includes all payments in cash and kind made by general government in a year. These payments in cash and kind comprise:

- **Gross salaries and wages** (before deduction of taxes and social contributions payable by employees) covering:
  - Basic salaries and wages;
  - Other cash payments, over and above the basic salary or wage, such as: cost of living allowances, local allowances, expatriation allowances, housing allowances, allowances for transport to and from work, holiday pay, 13th to 14th month pay and other bonuses, acting and special duty allowances, enhanced rates of pay for overtime, night work, weekend work, and work in disagreeable or hazardous circumstances. Note that as it is difficult to obtain data on overtime payments that are comparable across countries, overtime payments are not to be included when calculating the gross salaries and wages of selected occupations for Eurostat and OECD comparisons.
  - Benefits in kind - that is, goods and services that are provided free or at reduced prices to employees by employers - such as subsidised canteens, subsidised housing, the provision of sport, recreation or holiday facilities, transportation to and from work, car parking, crèches for employees' children, company cars for personal use, uniforms or other forms of special clothing which employees choose to wear outside the workplace as well as work.
- **Employers' actual social contributions** consisting of the payments made by general government institutions to insurers for the benefit of their employees. These payments cover contributions for old age pensions, as well as for insurance against sickness, accident and disability. They are calculated on the basis of the schemes in operation in the various countries.
- **Employers' imputed social contributions** representing the counterpart to social benefits paid directly by general government institutions without participating in, or establishing a fund, reserve or other special scheme for this purpose. Since these contributions do not involve actual cash flows, they have to be imputed. The imputations have to be done in line with the corresponding imputations made in the national accounts.

9.13 The compensation of employees that participating countries are to report for each occupation is defined in Box 9.7. It comprises gross salaries and wages (that is, the basic salary or wage, plus other cash payments over and above the basic salary or wage, plus benefits in kind, and before the deduction of tax or social contributions payable by the employee), employers' actual social contributions and employers' imputed social contributions. The definition is consistent with that of the SNA 93 and the ESA 95 except for the exclusion from gross salaries and wages of overtime payments. Experience has shown that it is too difficult to obtain data on overtime that are comparable across countries. This results in volume measures that are marginally inflated, but their comparability is judged to be improved by ignoring overtime.

9.14 In addition, the compensation of employees reported for the occupations should be the annual averages. They should also be national averages taking into account the differences in compensation paid by central, regional, state and local governments as well as the differences between ministries and departments within the same level of government.

9.15 When completing the reporting form in Box 9.3A, participating countries are only required to fill in the fields highlighted in blue. How this is to be done is explained in Box 9.3B. Fields that are not highlighted in blue are not to be touched. Those in columns 11, 13, 14, 18 and 19 are programmed to complete themselves on the basis of what is recorded in the highlighted fields. Hence, for each occupation, the values for employers' actual and imputed social contributions in columns 11 and 13 will be calculated from the average annual gross salary in column 9 and the national accounts ratios in columns 10 and 12. The annual average compensation in column 14 will then be computed as the sum of the average annual gross salary in column 9 and the values for social contributions in columns 11 and 13.

9.16 The annual average compensation in column 14 is not comparable across countries because it has not been adjusted for differences between countries in the number of hours worked. To make this adjustment, the number of annual contractual hours actually worked has to be established. This is done using the information on the number of contractual hours worked per week (column 15) and the number of working days not worked through holiday entitlement (column 16) or through public holidays falling on working days (column 17). The formula applied is: (52*X)-[(X/5)*(Y+Z)] where X is the number of contractual hours worked per week, Y is the number of working days of holiday entitlement and Z is the number of public holidays falling on working days. It gives the number of annual contractual hours worked in column 18.

9.17 The next step is to obtain an hourly rate of annual average compensation by dividing the annual average compensation in column 14 by the annual contractual hours worked in column 18. The hourly rate is then multiplied by 1710 hours[10] which is the norm used in Eurostat and OECD comparisons to standardise compensation of employees across participating countries. This gives the adjusted annual average compensation in column 19. It is the adjusted compensation that is used to calculate the PPPs for the basic heading covering the compensation of employees paid by government to those producing collective services other than defence services.

9.18 Completed reporting forms for t-2, t-1 and t should be returned to Eurostat by 30 June t+1.[11] Before returning the forms, participating countries should carry out two edits. The questionnaire provides a summary sheet to facilitate both. The first is to check the internal coherency of the data set for each of the three years covered in the questionnaire. For example, it is usually the case that judges earn more than most, if not all, of the occupations specified; that police inspectors earn more than police officers, fire-fighters and prison guards; that executive officials customs inspectors and tax officers earn similar amounts; and that maintenance electricians and drivers earn more than building caretakers and cleaners. Income differentials between occupations that are contrary to expectations should be verified. Errors identified in this way should be corrected. The second edit is to check the consistency of the compensation of employees reported over the three years covered in the questionnaire. Some differences can be expected between three data sets usually because there have been pay increases, although not necessarily for all the occupations listed. Discrepancies that

[10] 52 working weeks, each of 38 hours duration, less 7 working weeks (or 35 working days) of paid leave and public holidays.

[11] The completed questionnaire should be imported into the Data Entry Tool (DET) that converts the file to the standard xml format. The dataset needs to be finalised in the DET before submission to Eurostat via eDAMIS.

cannot be explained in this way should be verified and errors corrected. Note that it may just be one year that is wrong, but it could also be that all three years are wrong.

9.19 On receipt of the reporting forms, Eurostat[12] will repeat these two edits and undertake two others. The first involves comparing the responses to the current questionnaire with the responses to the questionnaire of the previous survey. The second consists of checking the ratios reported for employers' actual and imputed social contributions against the ratios in the in-house national accounts database. Countries are asked to explain or correct the discrepancies observed. Eurostat will also apply the Quaranta editing procedure to compare the price levels of the compensation of employees reported for the selected occupations across countries. The outliers identified through this procedure will be returned to the countries reporting them for verification. Countries are required to either correct the compensation of employees originally reported or to confirm that they are correct.

9.5 Productivity differences

9.20 The input-price approach as applied by Eurostat and the OECD does not take into account differences in productivity between government producers of collective services in different countries. It assumes that the producers are equally efficient and that the same level of input will yield the same volume of output regardless of the country in which the producer is operating. This assumption might be tenable when countries are at similar levels of economic development, but, when levels of economic development vary to the extent they do among countries participating in Eurostat and OECD comparisons, the assumption is difficult to defend and the anomalies it gives rise to have at least to be recognised.

9.21 Some of the differences in the per capita volume indices for collective services are real differences that can be explained by the varying political, cultural, demographic and institutional circumstances of the countries. Others are not real. They arise because the productivity differences that exist between the producers of collective services in the countries were not taken into account when the indices were calculated. Differences in productivity are being disguised as price differences. When this happens, the volumes of output of producers in countries whose cost of inputs are relatively low are being overestimated and the volumes of output of producers in countries whose cost of inputs are relatively high are being underestimated.

9.22 Failure to take account of productivity differences between the producers of collective services in different countries does not only affect the PPPs and volume indices for collective services. It also affects the PPPs and volume indices of GDP. It is the effect on the volume indices of GDP that is the primary concern. Productivity differences are not specifically a problem for international spatial comparisons. They are also a problem for national temporal comparisons. But it is a much more serious problem for international comparisons. Differences in the productivity of producers of collective services between countries are significantly larger than the year-to-year changes in productivity of producers of collective services of individual countries.

9.23 One solution would be to complement the input-price approach with adjustments for differences in productivity.[13] But EU Member States and OECD Member Countries have not been in favour of such adjustments being made in Eurostat and OECD comparisons. They argue that there are no generally agreed methods for making such adjustments and that those proposed are based on assumptions which are difficult to verify in practice.

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12 Or, more precisely, the contractor to whom Eurostat has outsourced the task of conducting, validating and processing the survey.

13 See *Purchasing Power Parities for Non-Market Services: An Assessment of Alternative Methods*, E. Dean, unpublished paper presented at the Conference of the International Comparison Programme, World Bank, Washington, March 2002.

9.24 Efforts by Eurostat and the OECD to develop alternatives to the input-price approach have concentrated on non-market health and education services. New methods focusing on output are explained in Chapters 7 and 8. With regard to collective services, it is unlikely that either Eurostat or the OECD will find an acceptable replacement for the input-price approach in the foreseeable future.

10

Equipment goods

10.1 Introduction

10.1. Gross fixed capital formation (GFCF) is one of the seven main aggregates in the Eurostat-OECD expenditure classification and accounts for around 20 per cent of GDP in most EU Member States and OECD Member Countries. It comprises three expenditure categories: *machinery and equipment*, *construction* and *other products*[1]. This chapter concerns the pricing of machinery and equipment and other products. The pricing of construction is dealt with in Chapter 11. Of the other products detailed in footnote 1, only computer software is priced; reference PPPs are used for the rest. Machinery and equipment and computer software are referred to as *equipment goods* in the manual and the price survey conducted to collect their prices is called the *equipment goods price survey.*

10.2 Eurostat and OECD comparisons involve comparing the prices actually paid for comparable and representative products in the countries participating in the comparisons. Therefore, the products priced for a comparison of equipment good prices should be both comparable across participating countries and representative of their price levels. In addition, the prices collected for these products should be transaction prices – that is, the prices that purchasers actually pay for the products to be delivered in working order at the time and the place required by the purchasers. They should also be consistent with the prices underlying the GFCF expenditures they are used to deflate – that is, they should be national annual averages that reflect the level of prices over the whole of the country and over the whole of the reference year. This chapter describes how national annual purchasers' prices are collected for a comparable and representative set of equipment goods within the framework of a Eurostat and OECD comparison.

10.3 Collecting internationally comparable and representative prices for equipment goods is both difficult and costly. The complexity and variability of the products being priced require the product specifications for equipment goods to be drawn up by specialists and not by statisticians. Moreover, the expertise needed to draw up the product specifications is also required to match and price them. In the absence of such expertise in house, Eurostat outsources the coordination of the equipment goods price survey to a firm of consultants (referred to as *EU consultants* in the chapter). Similarly, when the required expertise is not available in the national statistical institutes (NSIs) of participating countries, they too have to contract out the pricing of equipment goods to consultants.[2]

10.4 Up until 2001, Eurostat surveyed equipment good prices every year. The prices were inputs into Eurostat's annual calculation of GDP PPPs for EU Member States. Since 2001, as part of an exercise to reduce the overall cost of the PPP Programme, Eurostat has priced equipment goods once every two years.[3] The first two-yearly survey was conducted in 2003. Eurostat continues to calculate GDP PPPs for EU Member States annually and, as before, the calculation requires PPPs for equipment goods. The chapter concludes by describing how these PPPs are estimated for the years in which there is no equipment goods price survey.

10.2 General approach

10.5. The approach adopted for the equipment goods price survey is specification pricing. This is the pricing methodology that involves the selection of a basket of precisely-defined products with a view to having comparable products priced in each country. The selection is made in consultation with the countries participating in the comparison. The products are defined in terms of characteristics that influence their purchasers' price. The objective is to price to constant quality in order to produce price relatives between countries that reflect pure price differences. The

[1] Plantation, orchard and vineyard development; change in stocks of breeding stock, draught animals, dairy cattle, animals raised for wool clippings, etc.; computer software that a producer expects to use in production for more than one year; land improvement including dams and dikes which are part of flood control and irrigation projects; mineral exploration; acquisition of entertainment, literary or artistic originals; other intangible fixed assets.

[2] This is less prevalent than in the past. Just under a third of the 37 NSIs participating in the Eurostat equipment goods survey for 2011 hired an external specialist.

[3] Since 1990, the OECD has surveyed equipment good prices once every three years (previously it had been once every five years).

characteristics specified cover both the product (performance, operation and quality) and the transaction (order size, discounts, delivery, installation and taxes). The products priced by countries should be identical, but, if they are not, they should at least be equivalent. For equipment goods, this means that the products priced do not necessarily have to be the same make and model and that some deviation from the technical parameters is tolerated. But transaction characteristics have to be respected because countries are required to report transaction prices and not list or catalogue prices.

Box 10.1: Timetable for the equipment goods price survey of year t

Phase	Step		Who	When
Preview and Planning	01.	Preparation of documentation for PPP Working Group; preparation of pre-survey product-item list started	EU consultants; Eurostat	Jul-Sep (t-1)
	02.	PPP Working Group meeting: evaluation of results of previous survey; preview of forthcoming survey	Countries; EU consultants; Eurostat; OECD	Nov (t-1)
Pre-survey and item list creation	03.	Finalisation of pre-survey product-item list and other pre-survey materials	EU consultants	Nov (t-1)
	04.	Pre-survey	Countries	Dec (t-1)-Feb (t)
	05.	Preparation and distribution of final product-item list and other survey materials	EU consultants	Feb–Mar (t)
Price collection and reporting	06.	Price collection	Countries	Apr-Jun (t)
	07.	Price file and sections 1, 2 and 3 of survey report sent to Eurostat	Countries	Jun (t)
Inter-country validation	08.	Data cleaning and checking	Countries; EU consultants	Jul (t)
	09.	Calculation of 1st Quaranta table	EU consultants; Eurostat	Aug (t)
	10.	Analysis of 1st Quaranta table	Countries; EU consultants	Aug-Sep (t)
	11.	Calculation of 2nd Quaranta table	EC consultants; Eurostat	Oct (t)
	12.	Analysis of 2nd Quaranta table	Countries; EU consultants	Oct-Dec (t)
	13.	Calculation of 3rd Quaranta table	EU consultants; Eurostat	Jan (t+1)
	14.	Analysis of 3rd Quaranta table	Countries; EU consultants	Jan-Feb (t+1)
	15.	Calculation of 4th Quaranta table	EU consultants; Eurostat	Mar (t+1)
	16.	Resolution of remaining data issues	Countries; EU consultants	Mar-Apr (t+1)
	17.	Calculation of final Quaranta table	EU consultants; Eurostat	Apr (t+1)
	18.	Approval of survey results and closure of validation	Countries; EU consultants	Apr (t+1)
	19.	Section 4 of survey report sent to Eurostat	Countries	May (t+1)
Evaluation	20.	Validated survey results used in the calculation of preliminary PPPs for GDP for t	Eurostat	June (t+1)
	21.	Evaluation of survey results at PPP Working Group meeting	Countries; EC consultants; Eurostat; OECD	Nov (t+1)

10.3 Survey process

10.6 The equipment goods price survey has five distinct phases. These are the pre-view and planning phase, the pre-survey and item list creation phase, the price collection and price reporting phase, the inter-country validation phase and the evaluation phase. Each phase has a number of steps. These are listed in the timetable in Box 10.1 together with who carries out the step – countries, EU consultants or Eurostat - and the month when the step is to be implemented. From the timetable it can be seen that the survey takes 24 months from start to finish. Creation of the item list to be priced takes five month, pricing the item list takes three months and validation of the prices collected takes eleven months. The remaining five months are taken up by planning and evaluation. The validation period is long because of the complexity of the items being surveyed and the need to optimise the matching across countries of the items priced.

10.7 The EU consultants visit each participating country once during the 24 month survey period. The missions take place either during the pre-survey and item list creation phase when there are pre-survey results to consider or during the inter-country validation phase when there are price survey results to review.

10.4 Pre-survey and item list creation

10.4.1 Products, items and SPDs

10.8 The terms *product* and *item* are generally used interchangeably[4], but in the context of the equipment goods price survey they are not synonymous. When drawing up the product-item list for the survey, first the products to be surveyed are selected. Then, for each product selected, items are specified. It is the items that are priced. For example, in a recent survey, the product *diesel tractor* had five items specified: *Massey Ferguson 6457, Massey Ferguson 6470, Massey Ferguson 8670, Zetor 7441* and *New Holland 7030*. Countries choosing to price a diesel tractor priced one or more of these items depending on their availability in the national market.

10.9 Underlying the item specifications are product definitions called *structured product descriptions* (SPDs). SPDs are designed to standardise the item specifications for different types of products so that all item specifications for a particular type of product are defined in the same way and specify the same parameters. Standardising item specifications helps to improve their precision making it easier to determine the degree to which the item priced matches the item specified. Also, by identifying the parameters that need to be specified for different products, SPDs provide a framework within which countries can present their proposals for new items during the pre-survey.

[4] For example, in the glossary in Annex IX, *item*, *item specification* and *item list* are defined as synonyms of *product*, *product specification* and *product list*.

Box 10.2: Item specification and price reporting form in the Data Tool[1]

EQUIPMENT GOODS PRICE SURVEY 20XX				Country
15.01.21.1.17.35 16.11(a): Tractor unit				***Sweden***
Product		**Proposed**		**Priced**
Make (and nationality):		Mercedes Benz (German)		***Scania (Swedish)***
Model:		ABC–18-4x2		***XYZ-19-4x2***
Specifications		**Metric**	**Imperial**	**National**
01	Engine Euro 5 compliant	Yes	Yes	***yes***
02	GVW	18000 kg	17.7 tons	***19000 kg***
03	Engine capacity	12.0 l	731 cu. ins	***11.7 l***
04	Power of engine	265 kw	360 bhp	***280 kw***
05	Gearbox: number of forward speeds	8 + 1 crawler	8 + 1 crawler	***14 + 2 crawler***
06	Braking system	ABS	ABS	***ABS***
07	Type of suspension: front	spring	spring	***spring***
08	Type of suspension: rear	air	air	***air***
09	Wheelbase	3600 mm	141.7 ins	***3300 mm***
10	With standard sleeper cab: length	2250 mm	88.6 ins	***2230 mm***
11	With standard roof	yes	yes	***yes***
12	Fixed fifth wheel coupling	included	included	***included***
13				
14				
15				
16				
17				
18				
19	Type of price information	(1 to 4)[2]	(1 to 4)[2]	***1***
20	Price from the internet	yes/no	yes/no	***yes***
Terms and conditions				
a	Order quantity	one	one	***one***
b	Currency	specify	specify	***krona***
c	Unit price	one	one	***180,000***
d	Installation costs to be included	no	no	***0.0***
e	Delivery costs to be included	yes	yes	***0.0***
f	Discount to be included	yes (%)	yes (%)	***5.00***
g	Non-deductible taxes (other than VAT)	yes	yes	***0.0***
Total unit price net of discount				***171,000***
Representativity and comparability				
Is item priced representative (yes) or unrepresentative (no)?				***yes***
Are the item priced and the item specified identical (1) or equivalent (2)?				***2***
Comments				
The model specified is not available and so have priced the domestically produced equivalent. Delivery costs are not invoiced separately and are included in the unit price. Price of standard model without options.				
Notes				
This item was found in many countries in the pre-survey. Some reported differences in technical specifications reflecting national situations and options. The same model can therefore be country specific. These models should be priced as equivalent with differences in the technical parameters noted. www.mercedesbenz.com				

[1] Price reporting forms can evolve from price survey to price survey. This example illustrates their basic format and content.

[2] The options: 1 = Unit price is a list price, discount separate; 2 = Unit price is a list price, no discount offered; 3 = Unit price includes the discount; 4 = Unknown.

10.4.2 Item specifications

10.10 An example of an item specification for an equipment good is given in Box 10.2. First, the type of product is identified - a tractor unit in this case. Next, the proposed make and model to be priced are identified, though for some items no make and model are proposed. The nationality of the manufacturer is also given, but, with globalisation, the location of a manufacturer's headquarters does not necessarily imply that this is where the item or its various components are manufactured or even assembled. The characteristics of the item follow the identifiers. They are given in two parts. The first part specifies the technical parameters in both metric and imperial measures. These are ranked in approximate order of importance to assist matching. Information about the type of price being reported and whether or not the price was obtained through the internet is recorded in this part as well. The second part specifies terms and conditions of sale - that is, the characteristics of the transaction. These are followed by two questions: one on the representativity of the item priced, the other on its comparability with the item specified. Finally, there are two boxes: one for comments, the other for notes. The comments box is for countries to explain deviations from the specification or the pricing guidelines. The notes box is for the EU consultants to provide additional information. For example, the website address of the manufacturer is given for most items. This can be visited by country experts for further information, including pictures and lists of distributors of the items being surveyed.

10.11 Items specified for the equipment goods price survey are new – that is, unused. Sales of used or second-hand equipment goods between resident producers cancel out for the economy as a whole and do not need to be taken into account when comparisons are made from the expenditure side.[5] But imports of used or second-hand equipment goods are purchases from non-residents and are recorded as GFCF and imports by the importing country.[6] For some countries participating in Eurostat and OECD comparisons, a significant proportion of their GFCF in equipment goods comprises imports of reconditioned second-hand items. Experimental pricing of second-hand equipment goods shows that quality varies quite considerably both between and among the items priced by different countries. It is difficult to price comparable second-hand goods. Countries participating in Eurostat and OECD comparisons are required to price new, unused items only. Prices of second-hand items are not accepted even when such items are the more representative.

10.12 The item specifications are accompanied by briefing notes and pricing guidelines. The briefing notes provide a short summary of the products and items that have been added to or removed from the product-item list of the previous survey to obtain the product-item list for the forthcoming survey. They also describe in detail the modifications that have been introduced to the Data Tool[7] since the last survey. The pricing guidelines repeat the explanations and instructions contained in this chapter.

10.4.3 Representativity

10.13 The items that participating countries price during the equipment goods price survey should be both representative of their price levels for equipment goods and comparable between them. The two requirements are not necessarily complementary. Items that are representative of the price levels of one country are not necessarily representative of the price levels of other countries, while items that are comparable across countries are unlikely to be equally representative of them all. Failure to observe either requirement can result in an overestimation or underestimation of price levels and a corresponding underestimation or overestimation of volume levels.

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5 According to the SNA 93 and the ESA 95, when the ownership of an existing fixed asset, such as a used or second-hand equipment good, is transferred from one resident producer to another, the value of the asset transferred is to be recorded as negative GFCF for the seller and as positive GFCF for the purchaser. The value of the positive GFCF to be recorded for the purchaser will exceed the value of the negative GFCF to be recorded for the seller only by the value of the costs of ownership transfer incurred by both parties to the transaction. Over the whole economy, sales and purchases cancel each other out and only the costs of the transfer of ownership paid by both seller and purchaser are recorded as GFCF. (See paragraphs 10.39 to 10.43 in the SNA 93 for a more detailed description of the treatment of existing assets.)

6 The exporting country records them as negative GFCF and as exports. A country can report a negative expenditure weight for one or more of its basic headings under GFCF because of this.

7 An Excel file for countries to report the details of the items they priced and the prices they collected. Contains macros for checking the data.

10.14 In the surveys of consumer prices, comparability and representativity are obtained by countries pricing the items they have nominated for the item list - that is, their representative items - and a selection of the items that other countries have nominated for the item list - that is, the representative items of others. Subsequently, when reporting prices, countries flag the representative items that they priced so that their representativity to be taken into account when calculating the PPPs for consumer goods and services. The complexity of the items being priced, the variation in purchasing patterns among countries, the number of countries being compared and resource constraints means that this approach cannot be adopted for equipment goods price survey. Instead, the survey focuses initially on the pricing of comparable items - that is, items that are identical or equivalent. Countries are still expected to price representative items whenever feasible - that is, when it does not compromise comparability. They are also required to stipulate on the price reporting form whether the items they have priced are representative or not. The information is used both in the validation of prices and in the calculation of PPPs.

Box 10.3: Pricing schedule, 2011[1]

Code	Basic heading	Number of products selected	Number of Items specified	Minimum number of products to be priced[2]	Minimum number of items to be priced[3]
15.01.11.1	Fabricated metal products, except machinery and equipment	18	40	3	
15.01.12.1	Engines and turbines, pumps and compressors	9	20	3	
15.01.12.2	Other general purpose machinery	16	41	6	
15.01.13.1	Agricultural and forestry machinery	9	31	3	
15.01.13.2	Machine tools	16	38	3	
15.01.13.3	Machinery for metallurgy, mining, quarrying and construction	9	26	3	
15.01.13.4	Machinery for food, beverages and tobacco processing	15	39	4	
15.01.13.5	Machinery for textile, apparel and leather production	15	26	4	
15.01.13.6	Other special purpose machinery	14	34	4	
15.01.14.1	Office machinery	15	40	3	
15.01.14.2	Computers and other information processing equipment	11	31	6	
15.01.14.3	Electrical machinery and apparatus	10	23	4	
15.01.14.4	Radio, television and communications equipment/apparatus	13	29	5	
15.01.14.5	Medical, precision and optical instruments, watches, clocks	15	34	4	
15.01.15.1	Other manufactured goods n.e.c.	13	28	4	
15.01.21.1	Motor vehicles, trailers and semi-trailers	23	48	12	
15.03.12.1	Software	12	21	9	
	Total	233	549	80	150

[1] The pricing schedule is not fixed. It evolves from price survey to price survey.
[2] As required by the general rule. See Box 10.4.
[3] Distribution determined by countries

10.15 Representativity is introduced into equipment goods price survey by specifying alternative items for the same product. This allows the different factors that can influence a country's purchasing patterns – factors such as domestic producers, traditional trade links, and average size of farms and factories, etc. - to be accommodated. This approach is illustrated by the pricing schedule for a recent survey in Box 10.3. A total of 233 products have been selected to cover the seventeen basic headings listed and a total of 549 items have been specified. This is an average of two items per product with a range of one to five items depending on the product. The extent to which the products and the items included on the product-item list are representative of participating countries depends on the efforts that countries invest in the pre-survey they are required to make of their national markets prior to the finalising of the product-item list.

10.16 For the equipment goods price survey, representativity is two tiered. First, for each basic heading covered by the survey, products that are representative have to be identified. Then, for the products identified as representative, items that are representative have to be determined. When determining the representativity of an item it is the representativity of the brand rather than the representativity of the model that is the prime consideration. It is the representativity of the item and not the representativity of the product that is recorded on the price reporting form. In other words, if the item priced is unrepresentative but the product is representative, the item is still reported as unrepresentative.

10.17 Representativity concerns the importance of individual products within a basic heading where a product's importance is defined by its share of total expenditure on the basic heading. The larger the product's share the more important is the product. This is because the price levels of products with large expenditure shares can be expected to be closer to the average price level for the basic heading since it is they that largely determine what the average is. In other words, products with large expenditure shares usually represent the average price level of a basic heading better than products with small expenditure shares. The concept itself is not difficult; it is the application of the concept that is difficult. Usually there is no breakdown of expenditure below the basic heading level and in the absence of such a breakdown the relative importance of the various products priced for a basic heading has to be determined by other means. For consumer goods and services, it is suggested that the products specified on the pre-survey list that are volume sellers should be classified as representative. This information can be obtained by interviewing experienced sales personnel at the outlets visited during the pre-survey. A similar approach could be adopted during the pre-survey for the equipment goods price survey. Country experts could interview producers, importers and distributors of equipment goods to establish which products and which items are the most sold. As the products and items on the final product-item list will not necessarily be the same as those on the pre-survey list, the exercise may need to be repeated - at least for the products and items that were not on the pre-survey list - during price collection.

10.18 The representativity of the items identified as representative can be verified during inter-country validation of their prices by comparing the price level indices (PLIs) of the different items priced within a basic heading. An item designated as representative but having a PLI significantly higher or lower than the PLIs of other items priced for the basic heading is probably not representative and should be re-designated as unrepresentative. Conversely, an item designated as unrepresentative but with a PLI close to the PLIs of other products could well be representative and should be re-designated accordingly.[8]

[8] The concept of representativity, the assigning of representativity indicators and the validation of representativity indicators are discussed in more detail in Chapter 2, Section 2.3.2 and Chapter 5, Sections 5.5.6 and 5.6.2.

10.4.4 Pre-survey

10.19 The process of creating the product-item list for the equipment goods price survey takes place during the five months immediately prior to price collection. Central to the process is the pre-survey and the preparation of the pre-survey product-item list. The preparation starts with the EU consultants reviewing the product-item list from the previous survey. The review involves looking at the distribution of the products and items priced over the basic headings being surveyed to assess the overall balance and coverage of the list. It also involves examining the list basic heading by basic heading with the purpose of removing item specifications that are out-of-date, updating item specifications that are to be retained and introducing new item specifications either for existing products or for new products. The EU consultants are assisted in this by the input they receive from participating countries during the missions they make to the countries and during the PPP Working Group Meeting that Eurostat convenes just before the pre-survey begins. At the end of the review the EU consultant produces the product-item list that countries are to pre-survey. It is made available to countries through the Item List Management Tool (ILMT).

10.20 During the pre-survey countries have to assess the product-item list in the dual perspective of what is available in their national markets and what is representative of their national markets. Through the ILMT they can propose modifications to the list such as the elimination or updating of existing item specifications and the adding of specifications for new items for products already included on the list. Proposals for new products have first to be sent to the EU consultants who will draft SPDs and enter them in the ILMT for completion by their proposers. Once the pre-survey is finished, the EU consultants consolidate its results to produce the product-item list that is to be priced during April, May and June of the survey year. The success of the pricing exercise depends on the thoroughness of the pre-survey. Countries who have invested their time in conducting a comprehensive pre-survey should experience little difficulty in pricing the required number of representative items. More importantly, their dialogue with the EU consultants and the other participants during the pre-survey and prior to the finalising of the product-item list should greatly facilitate the pricing of identical items.

10.5 Price collection

10.5.1 Equivalent items

10.21 There are two types of item specifications in the product-item list: *brand specific* specifications that specify a make and model and *generic* specifications which do not specify a make and mode. Countries are expected to price items that are identical to those specified. For brand specific specifications, this means that the item priced should be the same make and model with the same technical parameters. For generic specifications, it means that the item priced should have the same technical parameters. This is not always possible. Either the make and model specified are unavailable on the national market or, if the make is available, the model specified is not. Or, in the case of generic specifications, items cannot be found in the national market with the required technical parameters. In these circumstances, countries are expected to price equivalent items instead. For brand specific items, this may mean that they price the same make, but a different model, or that they price a different make.

10.22 Pricing equivalent items necessitates some flexibility in the interpretation of item specifications, but flexibility exercised with caution. A too liberal interpretation will result in the loss of comparability. A too strict adherence to the specifications can mean that items cannot be priced. To avoid either of these extremes, the following should be borne in mind:

- Equivalent items should be selected by matching the technical parameters of items that are available on the national market and which correspond to the item specified with the technical parameters of the specified item.[9] The technical parameters listed in the

[9] When matching items and deciding whether or not the one observed is a close substitute to the one specified, it is not just the number of parameters not matching that needs to be taken into account, but also the degree to which they differ. Items with "near misses" on most, if not all, parameters could still be an acceptable substitute for the item specified.

specifications are ranked in approximate order of importance. They refer to performance (capacity, power, speed, size, output, etc.), to operation (number of speeds, source of power, type of controls, etc.), and to quality (materials of manufacture, weight, resistance, etc.). When matching technical parameters, countries should adhere to the performance parameters as closely as possible. The parameters relating to operation and quality can be interpreted with greater flexibility. Usually a substitution is acceptable when the parameter affected by the deviation accounts for only a small share of the total price.

- If, after matching the technical parameters, more than one item is found to be equivalent, preference should be shown to the item that is the most representative all other things being equal. In this respect, countries should not hesitate to price a domestically-produced item when it is the most representative. That the item may not be exported and so cannot be priced elsewhere is not a consideration since the matching of equivalent items across countries is done on the basis of the technical parameters reported by countries.

10.5.2 Number of products and items to be priced

10.23 The pricing schedule in Box 10.3 reflects the 2011 survey. It gives the number of products selected, the number of items specified and the minimum number of products that should be priced for each of the seventeen basic headings covered by the equipment goods price survey. The minimum number of products to be priced at survey level is 80 in total. Its distribution over the basic headings is determined by the EU consultants. In doing so, they take account of the importance of the basic heading, as measured by its share of GDP, the degree of price variation within the basic heading, as measured by its price variation coefficient from the previous survey, and the minimum number of products it was assigned in the previous survey. The shares, the GDP and the variation coefficients are averages based on all countries participating in the survey. The mechanics of allocating the minimum number across the basic headings are described in Box 10.4. The distribution of the minimum number shown in Box 10.3 and Box 10.4 is referred to as the *general rule*.

Box 10.4: Establishing the general rule for the minimum number of products to be priced per basic heading

Basic heading	Basic heading code	Number of products to be priced in line with basic heading percentage shares of GDP	Basic heading price variation coefficients from previous survey	General rule minimum number of products to be priced in previous survey	General rule minimum number of products to be priced in current survey
(1)	(2)	(3)	(4)	(5)	(6)
01	15.01.11.1	3	18.2	4	**3**
02	15.01.12.1	3	17.6	3	**3**
03	15.01.12.2	7	17.3	7	**6**
04	15.01.13.1	3	13.4	3	**3**
05	15.01.13.2	3	13.6	3	**3**
06	15.01.13.3	3	12.9	3	**3**
07	15.01.13.4	2	16.5	4	**4**
08	15.01.13.5	1	15.1	4	**4**
09	15.01.13.6	5	15.0	4	**4**
10	15.01.14.1	1	18.2	3	**3**
11	15.01.14.2	6	12.8	6	**6**
12	15.01.14.3	4	17.0	4	**4**
13	15.01.14.4	5	14.8	5	**5**
14	15.01.14.5	5	13.9	5	**4**
15	15.01.15.1	4	16.0	4	**4**
16	15.01.21.1	16	12.0	12	**12**
17	15.03.12.1	9	17.0	6	**9**
Total		80		80	**80**

1. The general rule is that the minimum number of products to be priced in total for a survey is 80. These 80 products are distributed over the survey's seventeen basic headings according to their importance, as measured by their contribution to GDP, and their price variation, as measured by their variation coefficients from the previous survey. The general rule allocation of the previous survey is also taken into consideration.

2. In the table above, column 3 gives the distribution of the 80 products over the basic headings based on their percentage shares of GDP. The shares and the GDP refer to all countries participating in the survey. The bigger the share the more important the basic heading and larger the number of products that should be priced. Column 4 shows the coefficients of variation for the basic headings. They are taken from the final Quaranta table for the previous survey. The higher the variation coefficient the greater the price variation within the basic heading and larger the number of products that should be priced. Column 5 shows the minimum number of products that were allocated to the basic headings the last time they were surveyed. It provides the yardstick with which to determine the allocation for the forthcoming survey shown in column 6. For the final allocation, the minimum number of products for a basic heading is set at three.

10.24 The distribution established as the general rule is used by the EU consultants to determine for each participating country the minimum number of products that it should price for each basic heading. This minimum number is called the *recommended minimum number*. The mechanics of determining these country specific recommended minimum numbers are basically the same as those for the general rule except that the data used are country specific and, in addition to the importance of the basic heading and the price variation within it, account is taken of its general rule allocation and the number of products that were priced for the basic heading in the previous survey. The total recommended minimum number of products to be priced at country level is 90. Countries are expected to price this minimum in line with the specific distribution over the basic headings determined for them. It is of course a minimum and countries are encouraged to price more than the minimum.

10.25 The minimum number of items that participating countries are required to price is 150. Each country makes its own allocation across basic headings. Again, it is a minimum number and countries should price more than the minimum number whenever possible.

10.5.3 Sources of prices

10.26 The prices can be obtained directly from producers, importers or distributors or from their catalogues. They may even be obtained from actual purchasers which, although preferable in principle, is difficult in practice. The prices can be collected by whichever method, or combination of methods, countries find the most convenient - personal visit, telephone, letter, internet, etc. But whatever the source, whatever the method, strict conformity to the concept of purchasers' price as defined below in Section 10.6.1 - that is, purchasers' price without VAT - is essential in all cases.

10.27 The internet is becoming more and more important as a source both for ascertaining availability of items during the pre-survey and for the collection of prices during the survey itself. For comparability between countries, it is better that prices are obtained from the manufacturers' websites rather than non-official sites in order to be sure that the same associated service and guarantees are provided. If the source of a price is the internet, it should be indicated on the reporting form. This will help with the matching of prices during validation.

10.28 Some participating countries obtain prices through their producer price index (PPI). Either they are able to match the equipment good specifications directly with product specifications used for the PPI or they request the PPI respondents who are producers of the types of equipment goods being surveyed to price the equipment good specifications. PPIs generally collect basic prices or producers' prices. Basic prices need to be reduced by any subsidies on products and increased by any non-deductible taxes on products paid by producers to obtain producers' prices. It is then necessary to add on any trade margins, transport and delivery costs, and assembly and installation costs paid by purchasers to obtain purchasers' prices net of VAT.

10.5.4 Cars and motor cycles

10.29 The product-item list for the equipment goods price survey includes vans, pick-ups, lorries, tractor units and minibuses, but it does not include motor cars or motor-cycles. In principle the equipment goods price survey should collect the prices of these two types of motor vehicles because, when purchased for business rather than personal use or for both business and personal use, they are a part of GFCF. In practice they are not collected in order to reduce costs and avoid duplication of price collection. Prices for motor cars and motor cycles are surveyed once every three years during the cycle of consumer price surveys. The PPPs generated for personal transport equipment by these prices are used in the calculation of the PPPs for motor vehicles under equipment goods.

10.30 The prices collected for motor cars and motor cycles by the consumer price survey are not fully consistent with the prices for *other motor vehicles* (that is, motor vehicles other than motor cars and motor cycles) collected by the equipment goods price survey. The prices for motor cars and motor cycles are list prices and do not take account of discounts. Moreover, they include non-deductible VAT. The prices for other motor vehicles are net of discounts and do not include non-deductible VAT (see below). In addition, there can be other taxes on vehicles that can give rise to price differences between households and enterprises.

10.31 No adjustment for discounts is made to the PPPs for motor cars and motor cycles, but they are adjusted to reflect the differences in non-deductible VAT and other taxes. The adjusted PPPs for motor cars are combined with the PPPs for other motor vehicles to derive final[10] PPPs for GFCG in motor vehicles. The adjusted PPPs for motor cycles are used as proxies for the PPPs for GFCF in road transport.

[10] That is, final for the equipment goods price survey and before the adjustment for non-deductible VAT explained in Section 10.8.

10.6 Reporting prices

10.6.1 Reporting items and their prices

10.32 Countries are required to use the Data Tool (an Excel file with macros for checking the data) to report the details of the items they priced and the prices they collected. The reporting forms in the Data Tool have the same layout as the item specification in Box 10.2. Countries complete the shaded areas. When completing the price reporting form for an item, countries are required:

- *To state the make and model priced and to provide its technical parameters* so as to facilitate the matching of models across countries. The provision of technical parameters is necessary even when countries price the make and model specified. Experience has shown that the same make and model may not be sold with the same technical parameters in all countries. The provision of technical parameters is particularly important when countries select and price a model different from that specified.

- *To state whether the item priced is representative (yes) or unrepresentative (no).* In other words, to indicate whether or not the item's price level is representative of the price level in the country for that type of product. Representative items are usually those most frequently sold. As representative items generally have lower price levels than unrepresentative items, it is necessary to know about their representativity when validating their prices and calculating their PPPs.

- *To state whether the item priced is identical (1) or equivalent (2) to the item specified.* In other words, to indicate whether the characteristics of the item priced match exactly those of the item specified or whether the characteristics of the item priced deviate in some degree from those of the item specified. For a brand specific item, an exact match requires the make and model priced to be the same as that specified.

- *To report unit prices.* The unit prices reported should be transaction or purchasers' prices - that is, the total of the amounts that purchasers actually pay for the item of equipment to be delivered, assembled and installed in working order at the production site where it will be used. The price reported should include trade margins, transport and delivery costs, assembly and, when relevant, installation costs because these are all considered to be part of capital expenditure. The price should also be net prices inclusive of all discounts, surcharges and rebates.

  Purchasers' prices should also include the amounts of VAT that are not deductible and entail actual expenditure for the purchaser. For many capital items, VAT is wholly or partly deductible for most purchasers. The country experts pricing the equipment goods will not know the actual rate of VAT paid. And the information will not be available at the time the equipment goods are priced. ***Countries are therefore required to report unit prices without VAT***. After the close of the survey year, the national statistical agencies responsible for their national accounts will report the rate of non-deductible VAT on equipment goods for the survey year – that is, they will report the rate of VAT actually paid by purchasers of equipment goods in the survey year. Eurostat will use this global rate to adjust the PPPs calculated with the unit prices without VAT to reflect the inclusion of non-deductible VAT (see Section 10.8).[11]

  Often it is not feasible to collect actual transaction prices for equipment goods. When this is the case, pricing starts with their list prices and then adjusting them to arrive at an estimate of what the purchasers' prices would be. The adjustment involves adding on transport and delivery costs (if not already included in the list price), assembly and installation costs (if specified and if not already included in the list price), non-deductible taxes other than VAT (if not already include in the list price) and subtracting discounts. These adjustments are listed on the reporting forms.

[11] This approach is not followed by the OECD. Countries participating in OECD comparisons are expected to report prices that include the actual rate of non-deductible tax on products paid.

Transport and delivery costs are influenced by the circumstances of national geography and economic development. They depend as well on the type of good and the way it is marketed. When prices of equipment goods do not already include transport and delivery costs, they should be added. In the absence of detailed information about these costs, they should be estimated by countries selecting their own average distance over which the items priced are transported and delivered.

The cases where equipment goods have to be *assembled and installed* are indicated in the item specifications. If there is an extra charge for erection or start up supervision by the manufacturer this should be added to the price.

Discounts depend on a number of variables: national practices, the prevailing economic climate, the size of the order, the purchaser's negotiating power, etc. Although it is not possible to produce identical conditions in all countries, certain variables, such as the number of units bought or the period allowed for payment, can be fixed uniformly. These variables are listed in the specifications. Otherwise, only general discounts - that is, those that are available for most of the year and which are granted to the majority of purchasers should be taken into account.

Non-deductible taxes other than VAT include taxes such as import duties.

- *To report unit prices without VAT that are national averages* - that is, prices that reflect the level of prices over the whole of the national territory and take into account any regional disparities in prices. Generally, it is easy to report national averages because, in the case of most equipment goods, the national market is dominated by national producers or by international companies which either sell their product on the same terms throughout the country or can give information about any price differences that apply.

- *To report unit prices without VAT that are annual averages* - that is, prices that reflect the level of national prices over the whole year. But, as it would be too costly to record prices throughout the year, countries are only required to provide national average prices for the months the equipment goods price survey is conducted – that is, April, May and June of the survey year.[12] Providing inflation is low, prices in these months will be good approximations of mid-year prices which are acceptable alternatives to annual averages.

10.33 Countries report only one price per item. This may be an average of a number of price observations collected, but in most cases the collection of one price observation is sufficient. The markets in many smaller countries are such that there is only one producer or importer of a particular product.

10.6.2 Survey report

10.34 Participating countries transmit their prices to Eurostat via eDAMIS. At the same time as they submit their prices, countries are required to complete a survey report and send it to Eurostat. Like the prices, the report is transmitted through eDAMIS. The standard report form for the equipment goods price survey is shown in Box 10.5. The form has four sections, each covering a survey phase: the pre-survey phase, the price collection phase, the intra-country validation phase and the inter-country validation phase. All sections have two questions in common: one on timing, organisation and resources used; the other on problems encountered. Otherwise the questions are specific to survey phase under consideration.

10.35 Only sections 1, 2, and 3 – pre-survey, price collection and intra-country validation - are to be completed and sent with the price data. These sections assist Eurostat and the EU consultants to evaluate the quality of the prices received. Section 4 – inter-country validation – is to be completed and submitted to Eurostat through eDAMIS after the inter-country validation is finished and countries

[12] Countries participating in OECD comparisons report mid-year (July) prices.

have approved the survey results. This section helps Eurostat and the EU consultants to assess the effectiveness of the inter-country validation.

Box 10.5: Standard report form equipment goods price surveys

Country: **Survey year:**

Note: Please enter information in this survey report that is <u>complementary</u> to your PPP Inventory and describes specific aspects related to this survey, especially if they are different from what is in the Inventory. If the PPP Inventory describes accurately the procedures for a certain section, it suffices to make a reference.

1. PRE-SURVEY

1.1 Timing, organisation and resources used (Describe when and how the pre-survey was carried out and how much (human or other) resources were spent.)

1.2 Sources of information (Describe the sources used to determine availability and importance of the products and to determine new products. How have you tried to ensure that the list will become sufficiently representative for your country?)

1.3 Problems encountered and lessons learned (Describe any problems encountered during the pre-survey, solutions found and lessons learned for the next survey (for individual basic headings, if needed).

2. PRICE COLLECTION

2.1 Timing, organisation and resources used (Describe when and how the price collection was carried out and how much (human or other) resources were spent. Describe also the preparations for the price collection (translation, etc.).)

2.2 Sampling of products and items (Describe how the selection of products and items was made.)

2.3 Data sources (Describe the sources of information for the prices reported and for any adjustment factors (non-deductible taxes, delivery costs, installation costs, discounts, etc.). Explain how you ensure that the reported prices reflect the annual national average prices levels.)

2.4 Allocation of representativity and comparability indicators (Describe the sources and methods that were used to determine which items are marked as representative and which items are marked as identical.)

2.5 Problems encountered and lessons learned (Describe any problems encountered during the price collection, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

3. INTRA-COUNTRY VALIDATION

3.1 Timing, organisation and resources used (Describe when and how the intra-country validation was carried out (before the submission of data to Eurostat) and how much (human or other) resources were spent. Provide the date of the first delivery of the data file through eDAMIS and any potential problems related to the first transmission.)

3.2 Checks performed and changes made (Describe the validation checks performed before submitting the data file to Eurostat via eDAMIS. For example, how is it decided which prices to keep and which to delete? How is it checked that all input data (e.g. observed quantities) are correct? Are changes made to the asterisk allocation during this stage?)

3.3 Problems encountered and lessons learned (Describe any problems encountered during the intra-country validation, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

4. INTER-COUNTRY VALIDATION

To be filled after the validation process as an update of the earlier version of the survey report.

4.1 Timing, organisation and resources used (Describe when and how the inter-country validation was carried out (after the submission of data to Eurostat) and how much (human or other) resources were spent.)

4.2 Checks performed and changes made ([1] Describe the validation checks performed in the Validation Tool in analysing your country's data against those of other countries. List the countries you compare your prices against. [2] Describe the procedures followed in responding to the validation queries. [3] Describe the main changes (deletions, modifications or additions) made to your data and the reasons for these changes.)

*4.3 Problems encountered and lessons learned (*Describe any problems encountered during the inter-country validation, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

10.7 Validation of prices

10.7.1 Intra-country validation

10.36 Participating countries provide the EU consultants and Eurostat with a price for each of the items they priced. For most items the price is obtained from a single source and the price reported is based on one price observation only. Countries cannot implement the same checks for internal consistency that they apply to the price observations and average prices for consumer products prior to reporting them. Intra-country validation of the equipment goods price survey is concerned primary with making sure that the data to be submitted meet the needs of inter-country validation.

10.37 The inter-country validation procedures followed by EU consultants and Eurostat for equipment good prices rely heavily on the reporting forms being filled out in full. Before transmitting their prices, countries are expected to ensure that their reporting forms are complete with each make and model priced having its name and number, its technical and transaction characteristics, its representativity and its comparability recorded. The Data Tool is programmed to indicate when reporting forms and price adjustment factors are incomplete. The EU consultants and the countries spend the month immediately following the survey (July) in checking and cleaning the data supplied before starting inter-country validation.

10.7.2 Inter-country validation

10.38 The Quaranta editing procedure is used to validate the prices of equipment goods. The procedure is explained in detail in Annex IV. It is designed to establish the comparability of the items priced by examining the price ratios their prices generate. Verifying the prices of equipment goods by price alone is not sufficient because of the complexity of the items surveyed. The fact that prices for an item appear consistent across countries does not mean that the items priced are comparable across countries. The technical parameters of the items will still have to be checked against each other in order to establish which of the items priced are comparable and which are not.

10.39 To do this, the EU consultants start by sorting the items priced into two groups: one for those items that have been reported as identical to the item specified, the other for those items that have been reported as equivalent to the item specified. Next the technical parameters of the items reported as equivalent are checked against those of the item specification to see whether or not they are comparable. If they are considered comparable they are reclassified as identical. The technical parameters of equivalent items are also matched against those of other equivalent items for the same item specification to see whether any are identical or comparable with each other. Equivalent items with identical or comparable technical parameters are treated as new item specifications providing that at least three countries have priced the same item. The new items specifications are called *splittings* because they are split off from the item specifications with which they were initially associated to become specifications in their own right. Equivalent Items assigned to a splitting are reclassified as identical.

10.40 As a result of this edit, the items priced can be classified as:

- Those with technical parameters that are identical or comparable to those of an item specification established prior to the price survey.
- Those with technical parameters that are identical to or comparable to those of an item specification established retrospectively – that is, a splitting;
- Those with technical parameters that are neither identical nor comparable with an original item specification or with a splitting. (These will eventually be dropped from the comparison.)

There will be movement between the three groups of items during the course of validation. In particular, Items originally considered to be comparable may be found not to be. Although the

matching of technical parameters is done by specialists, there remains an element of subjectivity in the matching.

10.41 Dividing the items priced into identical/comparable and equivalent/non-comparable items makes it easier to interpret the Quaranta editing procedure. If the prices reported for an item specification are shown to be consistent across countries, it is reasonable to assume that they refer to comparable items. Outliers identified during the initial rounds of validation could be either an incorrect price or an incorrect match. However, as validation progresses, the error is more likely to be an incorrect price than an incorrect match. Outliers are referred back to the reporting country. It is asked to confirm or to correct the price. Depending on the country's response, the price of the outlier is either retained, replaced or dropped.

10.42 Since 2009 the whole process of validation of the equipment goods price survey is performed in the Validation Tool. This is a web-based tool, developed to help the participating countries to compare their price levels using Quaranta tables. It is also possible to export the required tables into Excel format for further verification. During the validation process, the EU consultants insert in the tool specific questions to the various countries. The latter are able to reply online and the output is visible to all users.

10.8 Adjustment for non-deductible VAT

10.43 Producers are required to charge VAT on their products to most of their customers. Before paying the VAT to the tax authorities they can deduct the VAT paid by them on most of the goods and services they purchased in the course of the production process. Hence, most of the VAT paid on capital goods is deductible. Even so, some producers are exempt from charging VAT and therefore cannot deduct any. In addition, VAT rates differ from product to product and some products can be exempt or zero-rated.

10.44 In the national accounts, GFCF is recorded at purchasers' prices and includes all non-deductible VAT paid by purchasers. For the reasons given above, the rate of non-deductible VAT – that is, the rate of VAT purchasers actually pay - is lower than the rate of VAT specified by the tax authorities. For the PPPs to be consistent with the national accounts expenditure values, the PPPs for equipment goods should reflect the level of non-deductible VAT paid. However, it is not possible to collect the rates of non-deductible VAT paid by purchasers directly from producers and sellers of equipment goods.

10.45 As explained in Section 10.6.1, participating countries report prices for equipment goods that exclude VAT. In a separate exercise, Eurostat collects from the countries on an annual basis the actual rates of non-deductible VAT for machinery and equipment broken down by two expenditure groups: *metal products and equipment* and *transport equipment*. The rates are used to adjust the PPPs from the equipment goods price survey for all basic headings covered by the two expenditure groups. After adjustment the PPPs reflect the required inclusion of non-deductible VAT.

10.9 Estimation of PPPs for equipment goods in non-survey years

10.46 Eurostat is required to calculate PPPs for GDP and its component expenditures every year for EU Member States. To do this, it has to have PPPs for all basic headings, including those for equipment goods, for the year in question. Although the programme of price collection is continuous, not all goods and services are priced each year. Most consumer products are priced once every three years and equipment goods are priced once every two years. PPPs cannot be calculated for all basic headings every year. Other means have to be employed to obtain the PPPs for those basic headings for which PPPs cannot be calculated. For consumer products that are priced every three years, the basic heading PPPs they generate are advanced through time using corresponding sub-indices from the consumer price index. A similar approach is followed for the basic heading PPPs for equipment goods.

10.47 PPPs for any given reference year, t, are finalised over three years: t+1, t+2 and t+3. The first estimates of equipment good PPPs for the non-survey year t are needed in June t+1. They are obtained by extrapolating the basic heading PPPs for equipment goods for the survey year t-1 with the implicit price deflators for year t for machinery and equipment (or for GFCF if detailed deflators are not available) from the national accounts. The second estimates of equipment good PPPs for t are needed in December t+1. These are effectively the same as those of June t+1, except that the deflators may have changed due to national accounts revisions. The third estimates of equipment good PPPs for t are needed in December t+2. But by this time the PPPs for the survey year t+1 are also available. PPPs for t are obtained by extrapolating the PPPs for t-1 to t and retropolating the PPPs for t+1 to t and taking the geometric mean of the two. Implicit price deflators for machinery and equipment from the national accounts are used for the extrapolation and retropolation. The final estimates of equipment good PPPs for t are produced in December t+3, with the same method as that of December t+2 but with revised national accounts implicit price deflators.

11

Construction

11.1 Introduction

11.1 The chapter, like the previous chapter, concerns gross fixed capital formation (GFCF) and the pricing of capital goods for Eurostat and OECD comparisons. Chapter 10 deals with the equipment goods price survey and the collection of prices for machinery and equipment and computer software. This chapter deals with the *construction price survey* and the pricing of construction projects. As the chapter explains, pricing a construction project involves collecting unit prices with which to value its components and summing the values obtained to arrive at a total price for the project. PPPs for construction are calculated with the total prices for a set of construction projects. The set covers three types of structures: *residential buildings*, *non-residential buildings* and *civil engineering works*.

11.2 Construction projects are basically unique products even within the same country. This makes the collection of internationally comparable and representative prices for construction both difficult and costly. The complexity and variability of construction projects means that the product specifications for the construction price survey have to be drawn up by construction experts. Moreover, the expertise needed to draw up the specifications is also required to price them. As Eurostat does not have the required expertise in house, it outsources the construction price survey to a firm of consultants (referred to as *EU consultants* in the chapter). National statistical institutes (NSIs) of participating countries do not normally have the required expertise either and contract out the pricing of construction projects to consultancy firms specialising in construction.

11.3 Eurostat and OECD comparisons are made with the prices actually paid in the countries participating in the comparison for a selection of comparable and representative products. Hence, the projects priced for a comparison of construction prices should be comparable across participating countries and representative of the price levels within them. The prices paid for the projects should be transaction prices. Transaction prices are the prices that purchasers actually pay for the projects to be built in working order at the time and the place required by the purchasers. The prices collected should also be consistent with the prices underlying the GFCF expenditures they are used to deflate – that is, they should be national annual averages that reflect the level of prices over the whole of the country and over the whole of the reference year.

11.4 The chapter explains how national annual purchasers' prices are collected for a comparable and representative set of construction projects within the framework of a Eurostat and OECD comparison.

11.2 General approach

11.5 There are three main types of construction price indices. The first, which is not a price index but a cost index, involves collecting the prices of a basket of inputs covering different labour skills (general labourer, bricklayer, carpenter, electrician, plumber, etc.), standard building materials (cement, sand, gravel, metal rods, bricks, etc.) and the hire of plant (trucks, bulldozers, excavators, graders, cranes, etc.).[1] The second, which is half way between a cost index and a price index, entails pricing a set of standard components or operations such as constructing so many square metres of brick wall or laying so many square metres of roofing tiles or installing a hot water boiler of a given capacity.[2] The third, which is a price index, requires pricing actual or model construction projects. Of the methods underlying these indices, only that of the third type of index is capable of generating the purchasers' prices required for Eurostat and OECD comparisons of construction prices.

[1] Construction cost indices generally do not reflect the full range of factors that determine market prices – factors such as overhead costs, preliminary expenses, sub-contractors' margins, prime contractor's profit (or loss), architects' and engineers' fees and non-deductible taxes on products.

[2] Construction price indices based on standard components or operations do not reflect all the factors that influence market prices. Although, for example, they include sub-contractors' margins, they will not include prime contractor's profit (or loss).

Box 11.1: Timetable for construction price survey of year t

Phase		Step	Who	When
Preparation and planning	01.	Preparation of documentation for PPP Working Group meeting	EU consultant; Eurostat	Jul-Sep (t-1)
	02.	PPP Working Group meeting: planning of survey	Countries; EU consultants; Eurostat; OECD	Nov (t-1)
	03.	Preparation and distribution of project specifications and other survey materials	EU consultants; Eurostat	Jan-Apr (t)
Price collection and reporting	04.	Price collection	Countries	May-Jul (t)
	05.	Price file and sections 1 and 2 of survey report sent to Eurostat	Countries	Jul (t)
Inter-country validation	06.	Data cleaning and checking	Countries; EU consultants	Aug (t)
	07.	Calculation of 1st Quaranta table	EU consultants; Eurostat	Sep (t)
	08.	Analysis of 1st Quaranta table	Countries; EU consultants	Sep-Nov (t)
	09.	PPP Working Group meeting: discussion of interim results	Countries; EU consultants; Eurostat; OECD	Nov (t-1)
	10.	Calculation of 2nd Quaranta table	EU consultants; Eurostat	Dec (t)
	11.	Analysis of 2nd Quaranta table	Countries; EU consultants	Dec (t)-Mar (t+1)
	12.	Calculation of 3rd Quaranta table	EU consultants; Eurostat	Mar (t+1)
	13.	Analysis of 3rd Quaranta table	Countries; EU consultants	Mar-Apr (t+1)
	14.	Calculation of final Quaranta table	EU consultants; Eurostat	Apr (t+1)
	15.	Approval of survey results and closure of validation	Countries; EU consultants	Apr (t+1)
	16.	Section 3 of survey report sent to Eurostat	Countries	Apr (t+1)
Evaluation	17.	Validated survey results used in calculation of preliminary PPPs for GDP for t	Eurostat	Jun (t+1)
	18.	PPP Working Group meeting: evaluation of survey results	Countries; EU consultants; Eurostat; OECD	Nov (t+1)

11.6 The objective of Eurostat and OECD comparisons of construction prices is to compare the purchasers' prices actually paid for comparable and representative buildings and civil engineering works across participating countries. In practice the complexity and the country-specific nature of the products of the construction industry make it difficult to achieve both complete comparability and representativity in the same comparison. In the comparison of consumer prices, comparability and representativity are obtained when countries price both their own representative products - that is, the products they have proposed for the product list - and the representative products of others - that is, the products other countries have proposed for the product list. Given the number of countries being compared, the types of structures covered and the fact that the pricing has to be contracted out

to experts, it would be prohibitively expensive to apply this approach in the construction price survey. Another approach has to be employed instead.

11.7 The main approaches to international comparisons of construction prices are as follows. First, an identical structure can be priced by experts in each country. With this approach, the structures and their prices will be comparable across countries but not necessarily representative of any country or group of countries. Second, the experts can provide the price for a typical structure of a specified type in their country. With this approach, the structures and their prices will be representative of each country although not necessarily comparable across countries. Third, a standard structure, that may be modified to accommodate different national circumstances and practices, can be priced by experts in each country. With this approach, the structures and their prices will be less comparable across countries but more representative of each country. Of these approaches, the first emphasises comparability, the second representativity and the third is a compromise between the two. It is the third approach - the pricing of standard structures or standard construction projects - that Eurostat and the OECD have adopted for the construction price survey.

11.3 Survey process

11.8 The construction price survey is conducted every year.[3] It has four phases: the preparation and planning phase, the price collection and price reporting phase, the inter-country validation phase and the evaluation phase. Each phase has a number of steps. These are listed in the timetable in Box 11.1 together with who carries out the step – countries, EU consultants or Eurostat - and the month when the step is to be implemented. From the timetable it can be seen that the survey takes 24 months to complete. Price collection takes three months – May, June and July of the reference year – and inter-country validation takes nine months. The validation period is long in order to ensure that the unit prices with which the components of the standard construction projects are valued – and which themselves are composite prices – are comparable.

11.9 It is during the validation phase that the EU consultants make missions to groups of participating countries to review with their construction experts the component specifications of the standard construction projects and the unit prices reported. The groups are small, comprising between two to four countries, usually neighbours, and each group is visited once every two years. The missions help to establish whether countries in the group have interpreted and priced the component specifications the same way. The discussions also help to clarify and update the component specifications. More generally, the missions complement the inter-country validation providing the EU consultants with additional means of improving the quality and comparability of survey data across participating countries.

11.10 Unlike the price surveys for consumer goods and services and the equipment goods price survey, the construction price survey has no pre-survey phase. The pre-survey approach to updating product lists is not applicable to the component specifications of the standard construction projects. A programme of assessment and renewal, whereby each standard construction project is reviewed in turn, is followed instead. Every year, the EU consultants, in consultation with the construction experts of participating countries, examine the specifications for one of the standard construction projects with the object of modernising them. This may mean modifying the existing specifications, replacing the specifications with other specifications for the same standard construction project or providing specifications for a different standard construction project. The changes proposed by the EU consultants are presented to the PPP Working Group for final discussion and approval at the annual meeting that Eurostat convenes each November.

11.11 In the years that they are not being reviewed, the component specifications for the standard construction projects are revised to accommodate the developments that the country construction experts encounter during price collection and validation.

[3] The OECD has surveyed construction prices once every three years since 1990. Prior to 1990 it was once every five years.

11.4 Bills of quantities

11.4.1 Standard construction projects

11.12 Countries participating in Eurostat and OECD construction price comparisons are required to price a number of standard, but fictitious, construction projects covering different types of residential buildings, non-residential buildings and civil engineering works. The standard construction projects are listed by basic heading in Box 11.2. The list reflects the view of construction experts that representativity - when assessed in terms of variation among countries - is an important consideration for residential buildings, but less important for non-residential buildings and even less so for civil engineering works. The standard construction projects for the single-family house are specific to individual countries or groups of countries while the projects for other constructions are, with the exception of a factory building, common to all. Countries are expected to price a minimum of seven projects in total – at least three residential buildings, both non-residential buildings and both civil engineering works.

Box 11.2: Standard construction projects by basic heading

15.02.11.0 Residential buildings	
01.	European single-family house
02.	Portuguese single-family house
03.	Nordic single-family house
04.	Apartment block
05.	*North American single-family house*
06.	*Japanese single-family house*
15.02.21.0 Non-residential buildings	
07.	European factory building
08.	Office building
09.	*Japanese factory building*
15.02.31.0 Civil engineering works	
10.	Asphalt road
11.	Bridge

Countries working with Eurostat have to price projects 01, 04, 07, 08, 10 and 11. They also have to price either project 02 or project 03 or both. The choice of pricing projects 05, 06 and 09 is restricted to countries working directly with the OECD.

11.13 Although not real structures, the standard construction projects are based on actual construction methods and practices. Like actual construction projects, they consist of a number of major components or chapters, such as earthworks, concrete, masonry, roofing, etc. Each major component comprises a number of elementary components, such as: the mechanical excavation of the terrain; the mechanical excavation of foundation trenches; the supply, transport, dumping and compacting of spoil for foundation trenches; the supply, transport, dumping and compacting of crushed aggregate for foundation trenches; etc. Each standard construction project has its major components and their elementary components itemised and defined in a product specification called a *bill of quantities*.[4] In addition to detailing the components, the bill of quantities also provides a preamble describing the project, its location and other factors that need to be taken into account when pricing it. Each bill is accompanied by a set of technical drawings. There are as well pricing

[4] A common classification of major components is followed in Eurostat and OECD bills of quantities. It consists of nine major components: earthworks, concrete, masonry, roofing, wood and metal joinery, finishings, mechanical installations, electrical installations and drainage.

guidelines. These are common to all the bills of quantities and reiterate the explanations and instructions given in this chapter.

Box 11.3: An example of a major component and its elementary components

Item specification		Unit	Quantity	Unit Price (national currency)	Total Price (national currency)
3.	**Masonry**				
3.1	Ground floor double-skin external wall:				
	➢ 20 cm sand-lime brickwork + 11 cm facing brickwork, inclusive of pointing and acid cleaning	m^2	257	17	4369
	➢ Plastering	m^2	257	8	2056
3.2	Upper floors double skin external wall:				
	➢ 11 cm sand lime brickwork + 10 cm facing brickwork, inclusive of pointing and acid cleaning	m^2	413	18	7434
	➢ Plastering	m^2	413	8	3304
3.3	Gable ends, 11 cm facing bricks, inclusive of pointing and acid cleaning	m^2	625	18	11250
3.4	Fair-finish 7 cm plaster block work	m^2	585	7	4095
Total					**32508**

Box 11.4: An example of a summary sheet detailing major components

Major component	(national currency)
01. Earthworks	2489
02. Concrete	28985
03. Masonry.	**32508**
04. Roofing	16220
05. Carpentry, joinery, steel and metal working	29175
06. Finishings	35097
07. Mechanical installations	19602
08. Electrical installations	10182
09. Drainage	715
A. Overall price of work done (01 + 02 + …….. + 11)	174973
B. Architect's and engineer's fees (5%[1] of A)	8749
Total price without VAT (A + B)	183722

[1] Standard rate prevailing in the country. The 5% is for illustration only.

11.14 For pricing purposes, the elementary components of the standard projects are detailed in bills of quantities as shown in Box 11.3. The total price for the elementary component is computed by multiplying the unit price in national currency units (NCUs) by the quantity specified. For example, the total price of brickwork for the ground floor external wall as specified in Box 11.3 is 4,369 NCUs – that is, 257 square metres multiplied by a unit price of 17 NCUs per square metre. By summing the total prices of its elementary components, a total price can be determined for each major component. The total price for masonry as detailed in Box 11.3 is 32,508 NCUs. By summing the total prices of the major components, an overall price for work done can be obtained. Each bill of quantity has a summary sheet, such as that in Box 11.4, specifically for this purpose. The overall price for work done is not the final price of the project. It needs to be augmented by architects' and engineers' fees and by non-deductible taxes on products in order to arrive at the desired purchasers' price. But, as explained below, countries are required to exclude non-deductible VAT and only supply the overall price for work done and the architects' and engineers' fees when completing the summary sheet.

11.4.2 Flexibility in interpretation

11.15 For each standard construction project the same bill of quantities is priced in each country so that, in principle, all countries pricing a specific bill of quantities are pricing a comparable product. In practice, this is not necessarily so. Materials and methods of construction can vary between countries. National standards and regulations can also differ between countries. Some flexibility of interpretation has to be allowed if countries are to provide prices that are representative.

11.16 The general rule to be followed with regard to flexibility of interpretation is that, if strict adherence to the specification means that the component cannot be easily priced or leads to special pricing, a more readily available substitute should be priced instead because the aim of the exercise is to avoid unrepresentative prices as far as possible. For example:

- Wall thicknesses are often governed by the sizes of bricks and, since standard measurements of bricks are not identical in all countries, each country should price the national standard brick which gives the wall thickness closest to that specified.

- The type of brick may also vary from country to country. Countries should price the type of brick which for them is most usual.

- Standard measurements of doors, windows and other joinery work are not the same in all countries. Countries should price the national standard measurements which are closest to those specified.

- National standards and regulations applicable to electrical and other fittings also differ. Countries should comply with their own regulations when pricing these items.

11.17 Care should be taken that flexible interpretation does not become too liberal and result in marked differences in quality or in a different construction being priced. Substituting concrete bricks for clay bricks is allowed, replacing a brick wall by one of reinforced concrete is not. The dividing line between these two extremes is a grey area and it is left to the individual countries themselves to decide what can or can not be substituted. Usually substitutions are acceptable when the components affected represent only a small share of the total price and the basic features of the construction remain unchanged. When substitutions are made, they should be clearly identified and explained in the bill of quantities.

11.5 Rolling survey approach

11.18 Experience shows that about 50 per cent of the elementary components specified in a bill of quantities account for around 90 per cent of the overall price. It has also been established that PPPs based on this 50 per cent do not differ significantly from PPPs based on all elementary components. By identifying these elementary components or key items and pricing only them, the response burden of the construction price survey can be eased without a serious loss of reliability. By reducing the number of bills of quantities priced for its comparisons from twelve to seven and by adopting a rolling survey approach to key items, Eurostat has been able to return to collecting construction prices annually without additional cost. Annual construction price surveys were reintroduced in 2009. [5]

11.19 For this to happen, the EU consultants chose a set of key items for each of the bills of quantities priced for Eurostat comparisons. Selection was based on the item's contribution to the bill of quantities' total price and on its variability across countries. Items with large percentage shares of the total price were identified and, if their variability across countries was low, selected. Items with a large share and high variability were not selected. The EU consultants made sure that the key items were spread over the major components comprising the bill of quantities so that they would not all come from one major component or cover the same type of elementary component. They also made sure that the values of the key items chosen summed to between 60 to 70 per cent of the bill of quantities' total price. As a result, the 684 elementary components making up the eight bills of quantities currently priced for Eurostat comparisons were reduced by 82 per cent to 123 key items.

Box 11.5: Pricing schedule for Eurostat construction price surveys

Bill of quantities	Year t	Year t+1	Year t+2	Year t+3
15.02.11.0 Residential buildings				
01. Detached house	All items (110)	Key items (23)	All items (110)	Key items (23)
02. Portuguese house	Key items (23)	All items (93)	Key items (23)	All items (93)
03. Nordic house	Key items (23)	All items (81)	Key items (23)	All items (81)
04. Apartment	Key items (14)	All items (108)	Key items (14)	All items (108)
15.02.21.0 Non-residential buildings				
07. Factory building	All items (135)	Key items (9)	All items (135)	Key items (9)
08. Office building	Key items (17)	All items (114)	Key items (17)	All items (114)
15.02.31.0 Civil engineering works				
10. Asphalt road	Key items (5)	All items (16)	Key items (5)	All items (16)
11. Bridge	All items (27)	Key items (9)	All items (27)	Key items (9)
Total number of items (if Portuguese house priced)	331	372	331	372
Total number of items (if Nordic house priced)	331	360	331	360

Countries have to price either the Portuguese house or the Nordic house or both. The item numbers are based on 2011 bills of quantities. They may vary over time due to modifications to the bills of quantities or the introduction of new bills of quantities.

[5] Up until 2001, Eurostat surveyed construction prices every year. After 2001, between 2002 and 2009, Eurostat priced the construction projects every two years - in 2003, 2005, 2007 and 2009 – as part of the exercise to reduce the overall cost of the PPP Programme. In 2009, acting on the proposals of the *Task Force for Improving the Construction Survey Methodology 2008*, Eurostat reverted to conducting the construction price survey every year.

11.20 Previous experience with key items suggested that, even when only key items are priced, PPPs should still be calculated using total prices based on all elementary components.[6] To enable this, the unit prices of non-key items in a bill of quantities are assumed to move in line with the unit prices of key items as measured by the overall change in key item total prices between two consecutive surveys. For example, if the total price estimated with key items for a bill of quantities in the year t is 100 and the key item total price for the same bill of quantities in year t+1 is 105, the increase is five per cent and the unit prices of the non-key items in the bill of quantities for t are grossed up by five per cent and recorded in the bill of quantities for t+1. The total price for the bill of quantities in the year t+1 can then be derived using the unit prices of both key elementary components and non-key elementary components.

11.21 Previous experience also suggests that prices for non-key items should be collected on a regular if less frequent basis. Eurostat has adopted a rolling survey approach to do this. It involves pricing key items every year and non-key items every other year. In other words, a bill of quantities is fully priced once every two years. Not all bills of quantities are fully priced in the same year in order to spread the workload evenly over the two years. A pricing schedule is given in Box 11.5. For each bill of quantities, it shows when all items are to be priced and when only key items are to be priced. The total number of items to be priced each year is also shown. From the schedule it can be seen that for each basic heading at least one bill of quantities is fully priced each year.

11.6 Collection and reporting of prices

11.6.1 Prices to be collected

11.22 When pricing the bills of quantities, a distinction has to be drawn between *producer's cost* and *purchaser's price*. The producer's cost of a structure is what it costs the contractor to build it. The purchaser's price of a structure is what the purchaser pays the contractor for it. The prices that countries should provide for the standard construction projects are purchasers' prices - that is, the prices that purchasers would pay for the standard construction projects if they were actually built and marketed.

11.23 The unit prices used in the bills of quantities must cover not only the producer's direct cost for each of the specified elementary components (such as materials, labour, hire of equipment, sub-contractors' fees), but also the contractor's profits (or losses), and the general expenses (including share of main office overheads) and preliminary expenses (including the cost of site preparation) connected with the construction. The unit prices do not include architects' and engineers' fees and non-deductible VAT. These are added after the overall price of work has been established. Nor do the unit prices include the expenditure incurred for the purchase of the land. But in this case no addition is made to the overall price of work either for the cost of the land itself or for the financial and other costs associated with the transfer of ownership.

- *General and preliminary expenses* comprise overhead costs, start up costs and contractor's profit (or loss). Although they are not specified in the bills of quantities, these costs are to be included in the unit prices all the same. Annex 11.1 lists the items which general and preliminary expenses usually cover. The general guideline to be followed by countries with regard to such costs is that they are to be included if the contractor is obliged by law to pay them or required by the standard contracting practice of the country to pay them.

[6] Eurostat introduced *reduced bills of quantities* during the 2001 construction price survey which were retained for the 2003, 2005 and 2007 construction price surveys. Country construction experts were required to price only those elementary components that were identified as key components in the reduced bills of quantities. Many of the experts did not like the approach as it did not allow them to "feel" whether or not the price they were building up for the bill of quantities was realistic for prevailing market conditions. They could not, for example, check the total price of reduced bill of quantities against the prices for actual projects.

- *Architects' fees and engineers' fees* are percentage additions made after all the components specified in the bill of quantities have been priced and summed. The fees are to cover both the realisation of the project and the supervision of works. Annex 11.2 details the services which the fees should normally cover though these may be subject to some variation in line with standard practice in the country concerned.

- *Non-deductible VAT* entails actual expenditure for the purchaser and should be covered in the purchasers' prices of the standard construction projects. Usually it is levied on the overall cost of the construction - that is, the overall price of work done plus architects' and engineers' fees - and treated as a percentage addition. VAT is wholly or partly deductible for most purchasers of capital goods and so the standard rate of VAT is not the same as the rate based on what was actually paid. The experts pricing the bills of quantities will not know the actual rate of VAT paid. And the information will not be available at the time the bills of quantities are priced. ***Countries are required to report the prices of the standard construction projects without VAT***. Following the close of the survey year, the national statistical agencies that are responsible for their national accounts will report the rate of non-deductible VAT on buildings and civil engineering works for the survey year – that is, they will report the rate of VAT actually paid by purchasers of buildings and civil engineering works in the survey year. Eurostat will apply this global rate to adjust the PPPs calculated with project prices without VAT to reflect the inclusion of non-deductible VAT.[7]

11.24 Countries are required to report unit prices that are *national averages* - that is, prices that reflect the level of prices over the whole of the national territory and take account of any regional disparities in prices. In principle, the national unit prices should be the weighted averages of regional unit prices, with regional unit prices being weighted by regional shares of national construction output. In practice, this may not be possible and the national unit prices will have to be estimated. How this is done should be clearly explained on the price reporting form.

11.25 Countries should also report unit prices that are *annual averages* - that is, prices that reflect the level of national prices over the whole year. But, as it would be too costly to record prices throughout the year, countries are required to provide the national average prices for the months the construction price survey is conducted – that is, May, June and July of the survey year.[8] As long as inflation is low, prices in these months will be good approximations of mid-year prices which are acceptable alternatives to annual averages.

11.6.2 Sources of prices

11.26 The unit prices with which to value the elementary components of the bills of quantities can be obtained either from actual bills of quantities that have been valued for tenders submitted by construction companies or from one of the computerised systems of unit costs that major consultancy firms and research institutes maintain for the construction industry. If the first source is adopted, only unit prices from tenders that have been successful - or from tenders that can be considered realistic because they would permit the carrying out of work in good condition - should be used to value the standard construction projects. Tenders may vary by quite considerably and so not reflect actual prices accurately. Extreme prices, be they high or low, must be excluded.

11.27 If the second source is employed, the standard construction projects will be valued at resource cost and not at purchasers' prices. It is necessary to adjust the underlying unit costs to unit prices using the total prices of successful tenders to establish the level to which the unit costs have to be raised. Of the two sources, the second is preferable to the first because it provides internationally comparable unit prices. Total tender prices may be realistic, but the unit prices used to value individual elementary components may not be. Contractors modify unit

[7] This approach is not followed by the OECD. Countries participating in OECD comparisons are expected to report prices that include the actual rate of non-deductible tax on products paid.

[8] Countries participating in OECD comparisons report mid-year (July) prices.

prices - understating some, overstating others - for a number of reasons such as improving their cash flow. The first objective of the pricing exercise is to obtain internationally comparable total prices for the standard construction projects so either source is acceptable.

11.6.3 Reporting prices

11.28 The bills of quantities are also the price reporting forms. They are provided to countries in an electronic file. When filling out the bills of quantities, countries need only to enter the unit prices for the elementary units and the percentages that need to be added for architect's and engineer's fees as the bills of quantities are programmed to complete themselves. Completed bills of quantities are to be returned to Eurostat via eDAMIS.

11.6.4 Survey report

11.29 At the same time as they submit their prices, participating countries are required to complete a survey report and send it to Eurostat. Like the prices, the report is transmitted through eDAMIS. The standard report form for the construction price survey is shown in Box 11.6. The form has three sections, each covering a survey phase: the price collection phase, the intra-country validation phase and the inter-country validation phase. All sections have two questions in common: one on timing, organisation and resources used; the other on problems encountered. Otherwise the questions are specific to survey phase under consideration.

11.30 Only sections 1 and 2 dealing with price collection and intra-country validation are to be completed and sent with the price data. These sections assist Eurostat and the EU consultants to evaluate the quality of the prices received. Section 3 on inter-country validation is to be completed and submitted to Eurostat through eDAMIS after the inter-country validation is finished and countries have approved the survey results. This section helps Eurostat and the EU consultants to assess the effectiveness of the inter-country validation.

Box 11.6: Standard report form construction price surveys

Country: **Survey year:**

Note: Please enter information in this survey report that is complementary to your PPP Inventory and describes specific aspects related to this survey, especially if they are different from what is in the Inventory. If the PPP Inventory describes accurately the procedures for a certain section, it suffices to make a reference.

1. SURVEY

1.1 Timing, organisation and resources used (Describe when and how the price collection was carried out and how much (human or other) resources were spent. Describe also the preparations for the price collection (translation, etc.).)

1.2 Sources of information (Describe the sources of information for the prices reported. List all direct costs (materials, labour, etc.) that are included in the unit prices. Describe which general and preliminary expenses are taken into account in the unit prices and how architects' and engineers' fees are estimated.)

1.3 Problems encountered and lessons learned (Describe any problems encountered during the survey, solutions found and lessons learned for the next survey (for individual basic headings, if needed).**)**

2. INTRA-COUNTRY VALIDATION

2.1 Timing, organisation and resources used (Describe when and how the intra-country validation was carried out (before the submission of data to Eurostat) and how much (human or other) resources were spent. Provide the date of the first delivery of the data file through eDAMIS and any potential problems related to the transmission.)

2.2 Checks performed and changes made (Describe the validation checks performed before submitting the data file to Eurostat via eDAMIS.)

2.3 Problems encountered and lessons learned (Describe any problems encountered during the intra-country validation, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

3. INTER-COUNTRY VALIDATION

To be filled after the validation process as an update of the earlier version of the survey report.

3.1 Timing, organisation and resources used (Describe when and how the inter-country validation was carried out (after the submission of data to Eurostat) and how much (human or other) resources were spent.)

3.2 Checks performed and changes made ([1] Describe the validation checks performed, on the basis of the Quaranta tables and other validation material made available, in analysing your country's data against those of other countries. List the countries you compare your prices against. [2] Describe the procedures followed in responding to the validation queries. [3] Describe the main changes (deletions, modifications or additions) made to your data and the reasons for these changes.)

*3.3 Problems encountered and lessons learned (*Describe any problems encountered during the inter-country validation, solutions found and lessons learned for the next survey (for individual basic headings, if needed).)

11.7 Validation of prices

11.7.1 Intra-country validation

11.31 The bills of quantities are designed to provide a single total price – the national purchasers' price for May/June/July of the survey year - for each standard construction project. Since bills of quantities are priced only once within a country, countries cannot carry out the intra-country edits that they are required to make for consumer products prior to reporting prices. Unlike the price surveys for consumer products and equipment goods, the product list for the construction price survey is comparatively stable over time. Unless they have just undergone the periodic review, bills of quantities do not change radically from one survey to the next allowing countries to employ another edit instead.

11.32 This involves taking the summary sheets of the projects priced in the current survey and comparing them with the summary sheets for the same projects from the previous survey. The object of the review is to see whether the contribution to the total price of each major component is approximately the same in both surveys and, if it is not, to check the unit prices of its elementary components across the two surveys. There are three possible outcomes: both sets of unit prices are correct, the unit prices of the previous survey are wrong or the unit prices of the current survey are wrong. If the unit prices of the current survey are wrong, they should be corrected. If the unit prices are correct for both surveys or if the unit prices for the previous survey are wrong, EU consultants should be informed of this at the time of reporting prices. This will avoid additional response burden on countries when the edit is repeated by the EU consultants.

11.7.2 Inter-country validation

11.33 The Quaranta editing procedure is used for the inter-country validation of the prices provided by the construction price survey. The procedure, which is designed to establish the comparability of the items priced by examining the price ratios their prices generate, is explained in detail in Annex IV. It is employed to detect outliers among the total prices for the standard construction projects priced for each basic heading. It is also employed to find outliers among the unit prices collected for the elementary components of each standard construction project. In other words, two sets of Quaranta tables are generated. One set by basic heading in which the total prices of the standard construction projects are compared. The other set by standard construction project in which the unit prices of the project's elementary components are compared. In the later set of tables, the standard construction project takes the place of the basic heading.[9]

11.34 From the timetable in Box 11.1, it can be seen that there are three rounds of inter-country validation. The first round focuses on outliers among the unit prices of elementary components; the second and third rounds focus on outliers among the total prices of projects. Not all outliers identified among the unit prices in the first round of validation are verified. The EU consultants concentrate on outliers among the unit prices of elementary components that have a high weight and can influence the total price significantly. These are referred back to the countries reporting them for correction or confirmation that they are correct. Outliers among total prices identified in the second or third round of validation require the unit prices underlying them to be revisited. This time the EU consultants search for suspect unit prices, which may not

[9] The Quaranta editing procedure requires PPPs to be calculated with the prices being validated. The PPPs in the Quaranta tables produced for Eurostat and OECD comparisons are calculated by the Èltetö-Köves-Szulc (EKS) method. In the absence of actual weights for products, quasi-weights, which distinguish between representative and unrepresentative products, are used instead. The PPPs in the Quaranta tables comparing the total prices of standard construction projects within a basic heading are calculated with equal quasi-weights – that is, no distinction is made between representative and unrepresentative products. Actual weights, however, are available for the elementary components of the standard construction projects. And they are used to calculate the PPPs in the Quaranta tables comparing the unit prices of elementary components within a standard construction project. How actual weights, rather than quasi-weights, are used to calculate PPPs is explained in Chapter 6, Section 6.4.1.

necessarily be identified as outliers, among the unit prices for principal elementary components. Suspect unit prices are sent back to the countries reporting them. As in the first round of validation, countries are required either to correct the unit prices or to confirm that they are correct.

11.35 After three rounds of validation, the final Quaranta tables are produced. These contain the final results of the construction price survey and are sent to the NSIs of participating countries for approval.

11.36 Since 2011 the validation of the construction price survey is performed in the Validation Tool. This is a web-based tool, developed to help the participating countries to compare their price levels using Quaranta tables. It is also possible to export tables into Excel format for further editing and verification. During validation, the EU consultants insert in the Validation Tool specific questions to the various countries. The latter are able to reply online and the outcome is visible to all users.

11.8 Adjustment for non-deductible VAT

11.37 Producers are required to charge VAT on their products to most of their customers. Before paying the VAT to the tax authorities they can deduct the VAT paid by them on most of the goods and services they purchased in the course of the production process. Hence, most of the VAT paid on capital goods is deductible. Even so, some producers are exempt from charging VAT and therefore cannot deduct any. In addition, VAT rates differ from product to product and some products can be exempt or zero-rated.

11.38 In the national accounts, GFCF is recorded at purchasers' prices and includes all non-deductible VAT paid by purchasers. For the reasons given above, the rate of non-deductible VAT – that is, the rate of VAT purchasers actually pay - is lower than the rate of VAT specified by the tax authorities. For the PPPs to be consistent with the national accounts expenditure values, the PPPs for construction should reflect the level of non-deductible VAT paid. However, it is not possible to collect the rates of non-deductible VAT paid by purchasers directly.

11.39 As explained in Sections 11.4.1 and 11.6.1, participating countries report prices for the elementary components that exclude VAT. In a separate exercise, Eurostat collects from the countries on an annual basis the actual rates of non-deductible VAT for construction broken down by three basic headings: *residential buildings*, *non-residential buildings* and *civil engineering works*. The rates are used to adjust the PPPs from the construction price survey for the three basic headings. After adjustment the PPPs reflect the required inclusion of non-deductible VAT.

Annex 11.1: Coverage of general and preliminary expenses

The following are among the items not specified in the bills of quantities, but the cost of which should be included in the unit prices:

- The taking out of a builder's all-risk insurance which includes public liability cover, contractor's liability cover, fire insurance, earthquake insurance, and any other cover or insurance usually required by the standard contract.
- The giving and placing of all notices and notifications, the obtaining of the necessary permits, the paying of all associated charges and any other statutory fees or local taxes that may be required.
- The setting out of the works, including a set-out guide for subcontractors, and the paying of any registered surveyor's fees.
- The provision of a temporary power supply and the paying of all charges associated with its connection and use.
- The provision of a temporary water supply and the paying of all charges associated with its connection and use.
- The provision of a temporary telephone and the paying of all charges associated with its connection and use.
- The provision and maintenance of temporary toilet and washing facilities and the paying of all associated charges.
- The provision of a site office, a mess-room or other accommodation for the workers, and facilities for the storage of material and tools, and their subsequent removal on completion of the works.
- The provision and maintenance of a suitably placed job sign board and its subsequent removal on completion of the works.
- The provision and maintenance of competent managers or foremen to supervise the works.
- The provision and maintenance of any temporary fences or barriers required for the security of the works or for safety precautions.
- The provision of temporary scaffolding and trestles.
- The provision of a banker's guarantee or a performance bond as usually required by the standard contract.
- The removal of all rubbish from site as it accumulates and at the completion of the works.
- The cleaning of the building, inside and out, and the removal of all stains, etc., to the satisfaction of the supervisor.
- The protection of other property from damage.
- The share of main office overheads.
- Other preliminary expenses not elsewhere specified:
    - Provision of working drawings,
    - Plant which is not readily allocated to specific work items (such as a tower crane),
    - Furnished office for clerk of works (including telephone, telephone charges and heating)
    - Temporary roads or hard standing,
    - Compliance with statutory requirements in relation to working conditions.
    - Profit (loss) of the contractor.

Annex 11.2: Coverage of architects' and engineers' fees

Preliminary Services
Work stage A: Inception • Discuss the client's requirements including timescale and any financial limits; assess these and give general advice on how to proceed; agree the architect's services. • Obtain from the client information on ownership and any lessors and lessees of the site, any existing buildings on the site, boundary fences and other enclosures, and any known easement, encroachments, underground services, rights of way, rights of support and other relevant matters. • Visit the site and carry out an initial appraisal. • Advise on the need for other consultants' services and on the scope of these services. • Advise on the need for specialist contractors, sub-contractors and suppliers to design and execute part of the works to comply with the architect's requirements. • Advise on the need for site staff. • Prepare where required an outline timetable and fee basis for further services for the client's approval.
Work stage B: Feasibility • Carry out such studies as may be necessary to determine the feasibility of the client's requirements; review with the client alternative design and construction approaches and cost implications; advise on the need to obtain planning permissions, approvals under building acts or regulations, and other similar statutory requirements.
Basic Services
Work stage C: Outline proposals • With other consultants where appointed, analyse the client's requirements; prepare outline proposals and an approximation of the construction cost for the client's preliminary approval.
Work stage D: Scheme design • With other consultants where appointed develop a scheme design from the outline proposals taking into account amendments requested by the client; prepare a cost estimate; where applicable give an indication of possible start and completion dates for the building contract. The scheme design will illustrate the size and character of the project in sufficient detail to enable the client to agree the spatial arrangements, materials and appearance. • With other consultants where appointed, advise the client of the implications of any subsequent changes on the cost of the project and on the overall programme. • Make where required application for planning permission. The permission itself is beyond the architect's control and no guarantee that it will be granted can be given.
Work stage E: Detail Design • With other consultants where appointed, develop the scheme design; obtain the client's approval of the type of construction, quality of materials and standard of workmanship; co-ordinate any design work done by consultants, specialist contractors, sub-contractors and suppliers; obtain quotations and other information in connection with specialist work. • With other consultants where appointed, carry out cost checks as necessary; advise the client of the consequences of any subsequent change on the cost and programme. • Make and negotiate where required applications for approvals under building acts, regulations or other statutory requirements.
Work stages F and G: Production information and bills of quantities • With other consultants where appointed, prepare production information including drawings, schedules and specification of material and workmanship; provide information for bills of quantities, if any, to be prepared: all information complete in sufficient detail to enable a contractor to prepare a tender.

Work stage H: Tender action

- Arrange, where relevant, for other contracts to be let prior to the contractor commencing work.
- Advise on and obtain the client's approval to a list of tenderers.
- Invite tenders from approved contractors; appraise and advise on tenders submitted. Alternatively, arrange for a price to be negotiated with a contractor.

Work stage I: Project planning

- Advise the client on the appointment of contractor and on the responsibilities of the client, contractor and architect under the terms of the building contract; where required prepare the building contract and arrange for it to be signed by the client and the contractor; provide production information as required by the building contract.

Work stage J: Operations on site

- Administer the terms of the building contract during operations on site.
- Visit the site as appropriate to inspect generally the progress and quantity of the work.
- With other consultants where appointed, make where required periodic financial reports to the client including the effect of any variations on the construction cost.

Work stage K: Completion

- Administer the terms of the building contract relating to the completion of the work.
- Give general guidance on maintenance.
- Provide the client with a set of drawings showing the building and the main lines drainage; arrange for drawings of the services installations to be provided.

Calculation and aggregation of PPPs

12

12.1 Introduction

12.1 Previous chapters describe how price and expenditure data are collected and validated for the international price and volume comparisons of GDP that Eurostat and the OECD make with purchasing power parities (PPPs). This chapter explains how Eurostat and the OECD use the validated data to compute multilateral PPPs for GDP and its component expenditures. The computation has two stages. During the first stage, PPPs are calculated for basic headings. In the second stage, basic heading PPPs are aggregated with GDP expenditures as weights to obtain PPPs for each aggregation level up to and including GDP. Many methods have been developed to calculate and aggregate PPPs[1], but the chapter considers only the methods currently employed for Eurostat and OECD comparisons. It should be read in conjunction with Annex V which provides a numerical example to demonstrate how basic heading PPPs are calculated and subsequently aggregated.

12.2 Eurostat and the OECD use the *Èltetö-Köves-Szulc* or *EKS method* both to calculate basic heading PPPs and to aggregate them. The method is named after the three individuals who independently advocated its use in the mid-1960s.[2] The formula was actually proposed by Gini[3] some thirty years earlier and in recent literature the method is also called the *GEKS method*. Eurostat and the OECD have employed the method to calculate PPPs for basic headings since the start of the PPP Programme in 1980. They have used the method to aggregate basic heading PPPs since 1990.[4] Application of the EKS method in Eurostat comparisons is required by the PPP Regulation of 2007.[5]

12.3 Strictly speaking, the EKS is a procedure whereby any set of intransitive binary index numbers are made transitive. The procedure is independent of the method used to calculate the intransitive binary indices. But, as used in the manual and in most literature on the subject, EKS refers both to the way the intransitive binary PPPs are calculated and to the procedure to make them transitive and multilateral.

12.4 Eurostat and the OECD calculate PPPs for basic headings with quasi expenditure weights and PPP for aggregates with explicit expenditure weights. Usually there are no explicit expenditure weights below the basic heading with which to determine the relative importance of the products priced within the basic heading. In the absence of explicit expenditure weights**,** quasi expenditure weights that take account of the representativity of the products priced are used instead. The EKS method as originally proposed by Èltetö, Köves and Szulc did not take the representativity of products into consideration. This refinement was introduced later by Eurostat in its 1980 comparison. As a consequence, there are two versions of the method at the basic heading level: the classic version without representativity and the Eurostat-OECD version with representativity. In current

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1 See, for example, "Estimation of PPPs for Basic Headings within Regions", Chapter 11 of *ICP 2003-2006 Handbook*, http://siteresources.worldbank.org/ICPINT/Resources/270056-1183395201801/icp_Ch11rev.doc;

"Computation of Basic Heading Purchasing Power Parities for Comparisons within and between Regions", D. S. Prasada Rao, Chapter 4 of *Measuring the Size of the World Economy*, World Bank, http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/04_ICPBook_ComputationBHPPPs_Final.pdf;

"Methods of Aggregation above the Basic Heading Level within Regions", E. Diewert, Chapter 5 of *Measuring the Size of the World Economy*, World Bank, http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/05_ICPBOOK_AggregationAboveBH_Final.pdf;

"A Comparison of Ten Methods for Multilateral International Price and Volume Comparison," B. M. Balk, *Journal of Official Statistics*, 12, 1996, pages 199-222, http://www.jos.nu/Articles/article.asp;

"A taxonomy of multilateral methods for making international comparisons of prices and quantities", R. Hill, *The Review of Income and Wealth*, March 1997, http://www.roiw.org/1997/49.pdf;

"Axiomatic and Economic Approaches to International Comparisons", W. E. Diewert, pages 13-87, in "International and Interarea Comparisons of Income, Output and Prices", A. Heston and R.E. Lipsey (editors), *Studies in Income and Wealth*, Volume 61, University of Chicago Press, 1999, http://www.econ.ubc.ca/diewert/nber5559.pdf.

2 By Lazlo Drechsler in "Weighting of index numbers in multilateral comparisons", *The Review of Income and Wealth*, March 1973, http://www.roiw.org/1973/17.pdf.

3 In "On the circular test of index numbers", *International Review of Statistics*, Vol. 9, No. 2, 1931.

4 Prior to 1990 the Geary Khamis method was used to aggregate basic heading PPPs.

5 Regulation (EC) No 1445/2007 of the European Parliament and of the Council of 11 December 2007 establishing common rules for the provision of basic information on Purchasing Power Parities and their calculation and dissemination.

literature, the classic version is referred to as EKS or GEKS and the Eurostat-OECD version as EKS*[6] or GEKS*.

12.5 These changes in terminology have not been adopted for the manual. Eurostat and the OECD have always referred to the EKS method as EKS whether discussing the calculation of basic heading PPPs with quasi expenditure weights or the aggregation of basic heading PPPs with explicit expenditure weights. EKS is used in the PPP Regulation. It is also used throughout the papers and reports that Eurostat and the OECD have prepared relating to the PPP Programme. To preserve clarity and continuity, Eurostat and the OECD continue to use EKS instead of GEKS, EKS* or GEKS*.

12.2 Calculation of PPPs for a basic heading

12.2.1 Multilateral PPPs and their required properties

12.6 The methods used to calculate PPPs at the basic heading level should provide multilateral PPPs that have certain properties. These include:

- *Commensurability*: PPPs should be invariant to changes in the units of measurement for quantities. In other words, they do not change when the units of quantity to which their prices refer are changed – for example, when the price of petrol is quoted per gallon rather than per litre.
- *Base country invariance*: All participating countries should be treated symmetrically so that it makes no difference to the final results which country is chosen as the base. The country selected serves simply as the point of reference and its currency as the numéraire.
- *Transitivity*: Requires that every indirect multilateral PPP between a pair of countries calculated via a third country should always equal the direct multilateral PPP between the countries. Transitivity is regarded as a necessary property for a set of multilateral PPPs otherwise they would not be mutually consistent (see Section 12.2.4.).
- *Characteristicity*: A country's PPPs in a multilateral comparison are influenced by the data of all countries participating in the comparison. Characteristicity requires that the country's multilateral PPPs should reflect the essential features of the structure of its input data. For multilateral methods, such as the EKS, that are based on the averaging of the binary PPPs, characteristicity is the property that the resulting multilateral PPPs differ as little as possible from the original binary PPPs.[7]

12.2.2 Overview of the calculation procedure

12.7 The lowest aggregation level for which PPPs are calculated is the basic heading level. This level of aggregation is generally determined by the lowest level of final expenditure for which explicit expenditure weights can be estimated. As expenditure weights are not available below the basic heading, the relative importance of the products priced for a basic heading cannot be established by comparing their shares of total expenditure on the basic heading. Instead, quasi expenditure weights that distinguish between representative and unrepresentative products are employed in the calculation. Eurostat and the OECD assign a weight of 1 to products that are representative and a weight of 0 to products that are not representative[8].

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6 The asterisk denotes *with representativity*. In Eurostat and OECD comparisons asterisks are assigned to the prices of products that are representative. In discussion it is pronounced *star*. Hence *EKS star* or *GEKS star*.

7 For multilateral methods that are based on average international prices, such as the Country Product Dummy (CPD) method used for the ICP, characteristicity requires the structure of the average international prices to be as close as possible to the country's price structure.

8 With this choice of weights price relatives that are based on products that are unrepresentative of both countries will be excluded when calculating PPPs between them for a basic heading. Even so, the choice of 1 and 0 is arbitrary. Weights of 2

12.8 Participating countries are required to indicate whether or not the products they priced are representative of their national markets when they report their prices.[9] In this context, a product is said to be representative if it is sold in sufficient quantities for its price to be typical for that group of products in the national market.[10] Representative products usually have lower price levels than unrepresentative products and higher turnovers. By giving representative products a higher weight in the calculation than unrepresentative products, a potential bias is avoided.

12.9 The information on representativity, together with the prices to which it refers, is used to obtain PPPs at the basic heading level as follows:

- For each pair of countries, two binary PPPs are calculated. The first is the geometric mean of the price relatives for products representative of the first or base country – the Laspeyres type PPP. The second is the geometric mean of the price relatives for products representative of the second or partner country – the Paasche type PPP. The geometric mean of these two PPPs is then taken to derive a single binary PPP between the two countries – the Fisher type PPP.[11] [12]
- By following this procedure each basic heading is provided with a matrix of Fisher type PPPs. In some cases, the matrix is incomplete because it is not always possible to calculate a Fisher type PPP directly between each pair of countries. Moreover, the Fisher type PPPs in the matrix are intransitive.
- Gaps in the matrix are filled by taking the geometric mean of all the available indirect Fisher type PPPs bridging the pairs of countries for which direct Fisher type PPPs are missing.[13] This process does not always work. The circumstances for it not working and the alternatives employed when it does not work are outlined later in Section 12.2.5.
- The matrix is made transitive by applying the EKS procedure. Transitivity is attained by replacing the Fisher type PPP between each pair of countries by the geometric mean of itself squared and all the corresponding indirect Fisher type PPPs between the pair obtained using the other countries as a bridge (the direct Fisher PPP receives a higher weight than the indirect Fisher PPPs).

12.2.3 Calculation of binary PPPs: Fisher type PPPs

12.10 The Laspeyres type PPP for a basic heading is the geometric mean of the price ratios of the products priced in both countries that are representative of the base country:

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and 1, or any other similar combination, could also be used. Furthermore, when employing weights in this way, there is an assumption that products countries nominate as representative are equally representative and that products they nominate as unrepresentative are equally unrepresentative. In other words, the price differential between representative and unrepresentative products is the same for all countries and for all products within the basic heading.

9 Prices of representative products are reported with an asterisk. Prices of unrepresentative products are reported without an asterisk.

10 For a more complete explanation of representativity and the assigning of representativity indicators see Chapter 2, Section 2.3.2 and Chapter 5, Section 5.5.6.

11 The qualifier *type* is used for two reasons. The first is that standard Laspeyres, Paasche and Fisher indexes are generally used for temporal comparisons rather than spatial comparisons. Standard Laspeyres, Paasche and Fisher indexes have a base period and a current period, whereas Laspeyres, Paasche and Fisher type PPPs have a base country and a partner country. The second reason is that, whereas a standard Laspeyres index is a weighted arithmetic mean and a standard Paasche index is a weighted harmonic mean, the Laspeyres and Paasche type PPPs calculated for a basic heading are quasi-weighted geometric means. In this respect, the terminology is misleading. It would be more accurate and simpler to refer to the Laspeyres and Paasche type PPPs as Jevons type PPPs and to refer to the Fisher type PPPs as Törnqvist type PPPs. This terminology was introduced in "Estimation of PPPs for Basic Headings within Regions", Chapter 11 of *ICP 2003-2006 Handbook*, http://siteresources. worldbank.org/ICPINT/Resources/270056-1183395201801/icp_Ch11rev.doc.

12 In principle the binary PPPs between a pair of participating countries should be calculated on the basis of a product list tailored specifically to make a bilateral comparison between them. For practical reasons, the Fisher type PPP between any pair of participating countries in Eurostat and OECD comparisons is based on commonly-priced products selected from a product list designed to facilitate a multilateral comparison. The use of asterisks ensures that the binary PPPs are based only those commonly-priced products which are representative of either one or both countries.

13 The process is iterative. During the first round only the original Fisher type PPPs are used. If the matrix remains incomplete, there is a second round using both the original Fisher type PPPs and the new Fisher type PPPs derived indirectly during the first round. The process is continued until either the matrix is complete or it becomes clear that the matrix cannot be completed.

$$L(j/h) = \left(\prod_{i=1}^{k} \frac{{}_{*h}P_j^i}{{}_{*h}P_h^i} \right)^{1/k} = \left(\prod_{i=1}^{(n11+n01)} \frac{{}_{*h}P_j^i}{{}_{*h}P_h^i} \right)^{1/(n11+n01)} \quad (1)$$

And the Paasche type PPP for a basic heading is the geometric mean of the price ratios of the products priced in both countries that are representative of the partner country:

$$P(j/h) = \left(\prod_{l=1}^{m} \frac{{}_{*j}P_j^l}{{}_{*j}P_h^l} \right)^{1/m} = \left(\prod_{l=1}^{(n11+n10)} \frac{{}_{*j}P_j^l}{{}_{*j}P_h^l} \right)^{1/(n11+n10)} \quad (2)$$

In both equations, *h* is the base country and *j* the partner country. In the first equation, ${}_{*h}P_j^i$ and ${}_{*h}P_h^i$ are the prices in countries *j* and *h* of product *i* representative of the base country *h*. *k* is the number of products representative of the base country *h* and includes products representative in both countries (*n11*) and products representative in the base country only (*n01*). In the second equation, ${}_{*j}P_j^l$ and ${}_{*j}P_h^l$ are the prices in countries *j* and *h* of product *l* representative of the partner country *j*. *m* is the number of products representative of the partner country *j* and includes the products representative in both countries (*n11*) as well as products representative in the partner country only (*n10*).

12.11 The Fisher type PPP is the geometric mean of the Laspeyres type PPP and the Paasche type PPP.

$$F(j/h) = [(L(j/h) * P(j/h)]^{½} \quad (3)$$

L(j/h) and *P(j/h)* are given equal weight in calculating *F(j/h)*. Thus, equal weight is given to the average of the price relatives for each country's representative products, irrespective of the number of price relatives (or products) on which each average is based. This implies that, if there is a greater number of *j*'s representative products than *h*'s, each price relative for a representative product in *j* must carry a correspondingly smaller weight in *F(j/h)* than each of the price relatives for *h*'s representative products. This prevents the Fisher type PPPs for the basic heading from being dominated by the price relatives of the country which has the larger number of representative products.

12.12 Even though there are no explicit weights in the calculation, there are implicit ones whose pattern depends on the relative numbers of representative products in the two countries and also on the relative size of the overlap between them – that is, the set of products that are representative in both countries. The pattern of weights can vary substantially between different pairs of countries or for different sets of prices. Quite complex systems of weights may be generated even though there is no explicit information about the expenditure on the products (see Box 12.2).

12.2.4 Achieving transitivity: EKS PPPs

12.13 The Fisher type PPPs derived above are not transitive. The EKS formula is used to make them transitive. To explain the procedure, it is first necessary to introduce the concept of an indirect PPP. An indirect PPP between two countries is one obtained by calculating it indirectly through a third country. Let the three countries be A, B and C. Denote the direct Fisher type PPP between A on B as F_{AB} and the indirect Fisher type PPP for A on B via C as ${}_CF_{AB}$. Then, ${}_CF_{AB}$ is defined as follows:

$${}_C F_{AB} \equiv F_{AC} / F_{BC} \quad (4)$$

F_{AC} is the direct Fisher type PPP between A on C and F_{BC} is the direct Fisher type PPP between B on C.

12.14 More generally, and for a larger set of countries N = {A, B, C, …}, transitivity requires that every indirect PPP, ${}_{l}PPP_{jk}$ ($k, j, l \in N$), should always equal the direct PPP, PPP_{jk}. Transitivity is considered to be a necessary property for a set of multilateral PPPs because, if they were not transitive, they would not be mutually consistent.

12.15 The EKS PPP is defined as the geometric mean of the direct PPP and all the indirect PPPs between a pair of countries, with the direct PPP having twice the weight of each indirect PPP. In the case of three countries A, B and C, the EKS PPP between country A and country B is:

$$EKS_{AB} = \left\{ F_{AB}^{2} \times \frac{F_{AC}}{F_{BC}} \right\}^{\frac{1}{3}} = \left\{ F_{AB}^{2} \times_{C} F_{AB} \right\}^{\frac{1}{3}} \qquad (5)$$

12.16 A similar expression can be derived for the EKS PPPs between countries A and C, and B and C. The expression in (5) can be generalised for the larger set of countries N = {A, B, C, …}. Suppose that the number of countries in N is n. Then, the EKS PPP between countries j and k is given by equation (6) where transitivity is achieved by estimating the PPP between any pair of countries as a geometric mean of direct Fisher type PPPs and indirect Fisher type PPPs:

$$EKS_{jk} = \left\{ F_{jk}^{2} \cdot \prod_{l \neq j,k}^{N} \frac{F_{jl}}{F_{kl}} \right\}^{\frac{1}{N}} = \left\{ F_{jk}^{2} \cdot \prod_{l \neq j,k}^{N} {}_{l}F_{jk} \right\}^{\frac{1}{N}} \qquad (6)$$

$$EKS_{jj} = 1; \; j,k,l \in N$$

12.17 In addition to being transitive, EKS PPPs also satisfy characteristicity. The EKS procedure minimises the expression $\Sigma_{j\epsilon}N \, \Sigma_{k\epsilon}N \, (\log EKS_{jk} - \log F_{jk})^2$ and the multilateral PPPs that result differ as little as possible from the original binary Fisher type PPPs. The minimisation is for the sum of deviations for the whole set of countries so that the extent to which the EKS PPP and the Fisher type PPP for any specific pair of countries differ depends on the degree of homogeneity among the price structures of the group of countries being compared. [14]

12.2.5 Missing PPPs

12.18 The EKS aggregation procedure employed by Eurostat and the OECD requires the matrix of basic heading PPPs to be complete, that there are no missing basic heading PPPs for any country. If the matrix is not complete there is a risk that the resulting aggregate volume indices may be biased. In practice, however, there are basic headings for which PPPs cannot be calculated for a country with the price data available. Either the country has not priced any products for the basic heading or, if it has, it has not priced a representative product or, if it has, other countries have not priced its representative product or, if they have, it has not priced their representative products. Consequently, no direct binary PPP can be calculated between it and any other country. In such cases, the PPPs for the countries and basic headings are taken either from a comparable basic heading - such as *beef* for *veal* - or from the next level of aggregation - such as *meat* for *pork*.

Box 12.1: Fixity at the basic heading level and the aggregate level

EU-OECD Countries			EU27 Free	ECP37 Free	ECP37 Fixed	OECD47 Free	OECD47 Fixed
			A	B	C	D	E
EU27	01	Austria	1.02	1.04	1.02	1.06	1.02
	02	Belgium	1.00	1.00	1.00	1.00	1.00

[14] The EKS procedure is applied to intransitive binary Fisher type PPPs in Eurostat and OECD comparisons. But, as already mentioned in paragraph 12.3, the procedure can be applied to any set of intransitive binary PPPs.

	03	Bulgaria	0.91	0.94	0.91	0.95	0.91
	04	Cyprus	0.53	0.55	0.53	0.56	0.53
	05	Czech Republic	18.45	18.90	18.45	19.10	18.45
	06	Denmark	10.02	10.20	10.02	10.30	10.02
	07	Estonia	0.65	0.64	0.65	0.65	0.65
	08	Finland	1.16	1.19	1.16	1.20	1.16
	09	France	1.01	1.01	1.01	1.04	1.01
	10	Germany	1.00	1.00	1.00	1.00	1.00
	11	Greece	0.86	0.86	0.86	0.89	0.86
	12	Hungary	167.38	165.00	167.38	163.00	167.38
	13	Ireland	1.17	1.19	1.17	1.22	1.17
	14	Italy	1.01	1.00	1.01	1.03	1.01
	15	Latvia	0.41	0.43	0.41	0.45	0.41
	16	Lithuania	2.03	2.00	2.03	2.04	2.03
	17	Luxembourg	0.96	0.97	0.96	0.98	0.96
	18	Malta	0.33	0.35	0.33	0.36	0.33
	19	Netherlands	1.00	0.99	1.00	0.98	1.00
	20	Poland	2.64	2.67	2.64	2.70	2.64
	21	Portugal	0.85	0.87	0.85	0.88	0.85
	22	Romania	1.94	1.96	1.94	1.97	1.94
	23	Slovak Republic	0.77	0.77	0.77	0.78	0.77
	24	Slovenia	0.76	0.77	0.76	0.78	0.76
	25	Spain	0.87	0.89	0.87	0.90	0.87
	26	Sweden	10.72	10.87	10.72	10.95	10.72
	27	United Kingdom	0.74	0.73	0.74	0.72	0.74
		Geometric mean EU27	1.4973	1.5150			
		Ratio: 1.4973/1.5150		0.9883			
	28	Albania		68.62	67.82	68.9	67.82
	29	Bosnia-Herzegovina		1.08	1.07	1.1	1.07
	30	Croatia		5.53	5.47	5.51	5.47
	31	FYR Macedonia		29.41	29.07	29.7	29.07
ECP37	32	Iceland		114.83	113.49	112	113.49
	33	Montenegro		0.59	0.58	0.55	0.58
	34	Norway		11.49	11.36	11.2	11.36
	35	Serbia		41.04	40.56	40.43	40.56
	36	Switzerland		1.91	1.89	1.94	1.89
	37	Turkey		1.23	1.22	1.25	1.22
		Geometric mean ECP37			2.3644	2.3818	
		Ratio 2.3644/2.3818				0.9927	
	38	Australia				1.60	1.59
	39	Canada				1.39	1.38
	40	Chile				385.00	382.18
	41	Japan				157.98	156.82
OECD47	42	Korea				948.18	941.23
	43	Mexico				7.58	7.52
	44	New Zealand				1.77	1.76
	45	United States				1.06	1.05
	46	Israel				4.58	4.55
	47	Russian Federation				16.11	15.99

12.19 For a number of basic headings no prices are collected because, for various reasons, it is difficult to specify and to price products that are comparable across countries for them. PPPs based on price data that have been collected for other basic headings are used for these basic headings. Such PPPs are called *reference PPPs*. They serve as proxies for the PPPs that would have been calculated for the basic headings had prices been collected for them. They are considered in detail later in the chapter in Section 12.3.4.

12.2.6 Fixity

12.20 Eurostat results are calculated at average EU price levels and OECD results are calculated at average OECD price levels. The number of countries participating in the comparisons differs between Eurostat and OECD, which means that for countries that are covered by both calculations – that is, countries that are both EU Member States and OECD Member Countries - the relativities between them in the Eurostat comparison could differ from those in the OECD comparison. While it is a statistical fact of life that the relative position of countries can change as the composition of the group of countries being compared changes, the existence of two sets of results can confuse users. Generally, it is desirable to avoid such a situation, but it is particularly desirable if the results are used for administrative purposes as they are in the European Union.

12.21 The results for the European Union are used in the allocation of the Structural Funds which account for a third of the European Commission's budget. For this reason, Eurostat requires that only one set of results – that is, the set it calculates for EU Member States - be recognised as the official results for the European Union. To facilitate this, Eurostat and the OECD have agreed that the official results for EU Member States will remain unchanged when these countries are included in OECD comparisons. The agreement is referred to as the *fixity convention*. It has been observed since the 1980 comparison.

12.22 Fixity is first obtained at the basic heading level. This is done by taking the basic heading PPPs calculated for a specific sub-group of countries, for example the EU27 (in Box 12.1), substituting them for the basic heading PPPs calculated for the sub-group in a comparison covering a larger group of countries, such as the ECP37 or the OECD47 (in Box 12.1), and linking the substitute basic heading PPPs with the basic heading PPPs for the other countries included in the comparison. More precisely, fixity involves two groups of countries, one smaller than the other, with the smaller group being a sub-group of the larger group. There are two sets of basic heading PPPs for the smaller group. The first set is that calculated for the group on its own. The second set is that calculated for the group as a sub-group of the larger group. Fixity requires that the first set replaces the second set in the larger comparison. This is achieved by taking the ratio of the geometric means of the two sets of basic heading PPPs and multiplying the PPPs of those countries in the larger group that are not members of the sub-group by the ratio so as to put them at the same overall level as the first set of PPPs for the sub-group.

12.23 The procedure is illustrated by the worked example in Box 12.1. Column A shows the PPPs for a basic heading from a comparison free of fixity covering the EU27 countries and column B shows the PPPs for the basic heading from a comparison free of fixity covering the ECP37 countries. The object is to replace the PPPs for the EU27 countries in column B by their PPPs in column A. This is done by first calculating the ratio between the geometric mean of their PPPs in column A and the geometric mean of their PPPs in column B and then multiplying the PPPs for the ten non-EU27 countries in column B by the ratio. This rescales the PPPs for the ten non-EU27 countries to the same level as the PPPs for the EU27 countries in column A. The fixed PPPs for ECP37 countries that result are shown in column C. By repeating the procedure as shown in columns C, D and E, the fixed PPPs for the ECP37 countries can be substituted for their PPPs in a free comparison covering the OECD47 countries.

12.24 Fixity as illustrated preserves the relativities between the countries in the sub-group and the relativities between the other countries in the larger group. It also preserves the relativities between the other countries and the sub-group as a whole. But the relativities between individual countries in the sub-group and the individual countries outside the sub-group will not be the same.

Box 12.2: EKS weights and EKS-S weights

1. In the EKS, Fisher type PPPs are calculated as the geometric mean of Laspeyres type PPPs and Paasche type PPPs. For a comparison with the EKS-S, it is useful to present the formulas used for the EKS somewhat differently.

2. The formula for the Laspeyres type PPP can be broken down as follows:

$$(1)\ L_P = \left(\prod_{i=1}^{n_{11}} p_{i,11} \times \prod_{i=1}^{n_{10}} p_{i,10}\right)^{\frac{1}{n_{11}+n_{10}}} = \left(\prod_{i=1}^{n_{11}} p_{i,11}\right)^{\frac{1}{n_{11}+n_{10}}} \times \left(\prod_{i=1}^{n_{10}} p_{i,10}\right)^{\frac{1}{n_{11}+n_{10}}}$$

$$= \left(\left(\prod_{i=1}^{n_{11}} p_{i,11}\right)^{\frac{1}{n_{11}}}\right)^{\frac{n_{11}}{n_{11}+n_{10}}} \times \left(\left(\prod_{i=1}^{n_{10}} p_{i,10}\right)^{\frac{1}{n_{10}}}\right)^{\frac{n_{10}}{n_{11}+n_{10}}} = \tilde{p}_{11}^{\frac{n_{11}}{n_{11}+n_{10}}} \times \tilde{p}_{10}^{\frac{n_{10}}{n_{11}+n_{10}}}$$

where:

- $\boldsymbol{P}_{i,11}$ is the price relative for product i that is representative in both countries. n_{11} is the total number of these cases;
- $\boldsymbol{P}_{i,10}$ is the price relative for product i that is representative only in the first country. n_{10} is the total number of these cases;
- $\boldsymbol{P}_{i,01}$ is the price relative for product i that is representative only in the second country. n_{01} is the total number of these cases;
- $\tilde{p}_{11} \equiv \left(\prod_{i=1}^{n_{11}} p_{i,11}\right)^{\frac{1}{n_{11}}}$, $\tilde{p}_{10} \equiv \left(\prod_{i=1}^{n_{10}} p_{i,10}\right)^{\frac{1}{n_{10}}}$ and $\tilde{p}_{01} \equiv \left(\prod_{i=1}^{n_{01}} p_{i,01}\right)^{\frac{1}{n_{01}}}$ are geometric averages of the initial price relatives.

3. The formula for the Paasche type PPP can be broken down in a similar way:

$$(2)\ P_P = \tilde{p}_{11}^{\frac{n_{11}}{n_{11}+n_{01}}} \times \tilde{p}_{01}^{\frac{n_{01}}{n_{11}+n_{01}}}$$

4. The formula for the Fisher type PPP is then:

$$(3)\ F_P = \sqrt{L_P \times P_P} = \tilde{p}_{11}^{\frac{0.5\times n_{11}}{n_{11}+n_{10}}} \times \tilde{p}_{10}^{\frac{0.5\times n_{10}}{n_{11}+n_{10}}} \times \tilde{p}_{11}^{\frac{0.5\times n_{11}}{n_{11}+n_{01}}} \times \tilde{p}_{01}^{\frac{0.5\times n_{01}}{n_{11}+n_{01}}}$$

$$= \tilde{p}_{11}^{\left(\frac{0.5\times n_{11}}{n_{11}+n_{10}}+\frac{0.5\times n_{11}}{n_{11}+n_{01}}\right)} \times \tilde{p}_{10}^{\frac{0.5\times n_{10}}{n_{11}+n_{10}}} \times \tilde{p}_{01}^{\frac{0.5\times n_{01}}{n_{11}+n_{01}}}$$

5. Thus, the weighting scheme in the EKS is:

$$(4)\ w_{11} = \frac{0.5\times n_{11}}{n_{11}+n_{10}} + \frac{0.5\times n_{11}}{n_{11}+n_{01}}\ ;\ w_{10} = \frac{0.5\times n_{10}}{n_{11}+n_{10}}\ ;\ w_{01} = \frac{0.5\times n_{01}}{n_{11}+n_{01}}$$

6. The comparison between w_{10} and w_{01} shows the possible asymmetry of the EKS. The larger the difference between n_{10} and n_{01} the greater the asymmetry.

7. Using the same notation as above, the weights of various PPPs in the EKS-S are the following:

$$(5)\ w_{11} = \frac{2\times n_{11}}{2\times n_{11}+n_{10}+n_{01}}\ ;\ w_{10} = w_{01} = 0.5\times\frac{n_{10}+n_{01}}{2\times n_{11}+n_{10}+n_{01}}$$

12.2.7 EKS-S method

12.25 Unrepresentative products normally have higher price levels than representative products. Application of the EKS method as described earlier can lead to a bias in the Fisher type PPP when among the products priced by both countries being compared one country has a larger number of representative products than the other. There can be a downward bias in the Fisher type PPP for the country that provides prices for a larger number of representative products. Conversely, there can be an upward bias in the Fisher type PPP for the country that provides prices for a larger number of unrepresentative products. As explained below, the use of a Laspeyres - Paasche approach does not eliminate this possible bias from the Fisher type PPP.[15] A modified version of the EKS - the *EKS-S method*[16] - is designed to correct for this bias.

12.26 The method starts from the observation that a binary Fisher type PPP, *F(j/h)*, can be regarded as a geometric average of three and not two PPPs - namely, those based on:

- products that are representative in both countries, *h* and *j*;
- products that are representative in *h* but not in *j*;
- products that are representative in *j* but not in *h*.

12.27 In other words, as demonstrated in Box 12.2, the two sets of representative products introduced earlier, *k* (or *n11+n01*) and *m* (or *n11+n10*), can be re-organised into three sets: *n11*, *n01* and *n10*. The PPP based on the first set should provide an unbiased estimate of the basic heading PPP because representative products are being compared with representative products. The PPP for A relative to B based on the second set is likely to suffer from an upward bias, while the PPP based on the third set is likely to have a downward bias. If the second and the third set do not enter the calculation of the Fisher type PPP with the same weight, it can be argued that the result is a bias in the estimate of the PPP for the basic heading (see equation (4) in Box 12.2). In order to have an unbiased estimate, equal weight should be given to the PPPs for the second and third sets (see equation (5) in Box 12.2). In almost all cases, the weights for the second and third sets cannot be expected to be equal. And it can be argued that the EKS is liable to produce biased results in general.

12.28 The procedure that the EKS-S follows to avoid the bias is this:

- Divide the products and their PPPs into the three mutually exclusive sets defined above;
- Count each price relative in the first set twice on the grounds that PPPs between products that are representative in both countries are unbiased and likely to be more reliable;
- Adjust the total weights for the second and third sets to make them equal while keeping their combined weight unchanged (see equation (5) in Box 12.2);
- Take a weighted geometric mean of the PPPs for each of the three sets using the adjusted weights.

12.29 From a theoretical viewpoint, EKS-S seems to be marginally superior to the EKS. While the two methods are likely to produce similar results in most cases, there may be cases in which they yield significantly different results. Both methods introduce differential weights for the price relatives

[15] As mentioned in footnote 12, the binary PPPs between any pair of participating countries in Eurostat and OECD comparisons are based on a set of commonly-priced products selected from a product list for a multilateral comparison rather than from a product list designed specifically for a bilateral comparison between the two countries in question. The numbers of representative and unrepresentative products among the commonly-priced products depend on what the two countries have priced. And what the two countries have priced is determined by factors other than ensuring that the numbers of representative and unrepresentative products are suitably balanced for the bilateral comparison between them or with any other participating country.

[16] The second "S" stands for Sergey Sergeev who proposed the modification in *Equi-representativity and Some Modifications of the EKS Method at the Basic Heading Level* at the Joint Consultation on the ECP, ECE, Geneva, 2003, http://www.unece.org/fileadmin/DAM/stats/documents/2003/03/ecp/wp.8.e.pdf

that are by no means intuitively obvious, and which are liable to vary considerably depending on the relative sizes of each of three sets of products. These methods cannot be applied mechanically as other factors have to be taken into consideration, in particular the absolute number of products priced for the basic heading. Which method to use and when to use it has to be decided case by case. Not being able to specify the circumstances when each method should be used is clearly a disadvantage.

12.30 There can be difficulties in implementing either EKS or EKS-S if the absolute number of products in any of the three sets becomes very small or zero. For example, suppose there are seven products in the second set and one product in the third set. With EKS-S, the geometric mean for third set will be based on a single price relative. An average based on a single observation has to be erratic. It can be argued that it would not be optimal to reduce the seven price relatives in the second set to an average and then to give this average no more weight than the single price relative in the third set. If there are no products in the third set then the question arises of what use, if any, can be made of the price relatives in the second set when there are no counter-balancing price relatives for them in third set. The problem remains even if the EKS is used, although it is probably not as acute as it is for EKS-S. The inclusion of more products in an EKS calculation produces more robust results, but the bias persists if the imbalance between representative products and unrepresentative products is not addressed.

12.31 The EKS is used for the official calculation because the results are expected to be more robust. Even so, parallel calculations by the EKS-S will help their validation. Significant differences between EKS and EKS-S results will indicate that there are problems with input data or the assignment of asterisks which should be investigated and explained.

12.3 Aggregation of basic heading PPPs

12.3.1 Overview of the aggregation procedure

12.32 The procedure for calculating PPP for aggregates is similar to that for the calculation of PPPs for basic headings. First, a Laspeyres type PPP is calculated between each pair of participating countries, then a Paasche type PPP is calculated between each pair and finally a Fisher type PPP is calculated between each pair. The Fisher type PPP between two countries is the geometric mean of their Laspeyres type PPP and their Paasche type PPP. The Fisher type PPPs are not transitive. They are made transitive by the EKS procedure. Although the procedure followed is the same for both basic heading and aggregates, the definitions of the Laspeyres type PPP and the Paasche type PPP differ between the two processes.

12.33 For a basic heading, the Laspeyres type PPP and Paasche type PPP are geometric means (see equations (1) and (2)). But for an aggregate, the Laspeyres type PPP is the arithmetic mean of the PPPs of its constituent basic headings weighted by base country expenditure on the basic headings:

$$L(j/h) = \sum_{i=1}^{k} \left(\frac{PPP_{ij}}{PPP_{ih}}\right) * w_{ih} \Big/ \sum_{i=1}^{k} w_{ih} \qquad (7)$$

And the Paasche type PPP is the harmonic mean of the PPPs of its constituent basic headings weighted by partner country expenditure on the basic headings.

$$P(j/h) = \sum_{i=1}^{k} w_{ij} \Big/ \sum_{i=1}^{k} w_{ij} \Big/ \left(\frac{PPP_{ij}}{PPP_{ih}}\right) \qquad (8)$$

In both equations, h is the base country and j the partner country, PPP_{ij} and PPP_{ih} are the PPPs of basic heading i in countries j and h, w_{ih} is the weight for basic heading i in the base country h, w_{ij} is the weight for basic heading i in partner country j, and k is the number of basic headings making up the aggregate.

12.3.2 EKS aggregation

12.34 The aggregation of basic heading PPPs is undertaken separately for each level of expenditure up to the level of GDP as follows:

- For each pair of countries, the basic heading EKS PPPs (see equation (6)) are weighted, summed and averaged using first the expenditures on the basic headings of the first country as weights and then the expenditures on the basic headings of the second country as weights. This gives two weighted PPPs: a Laspeyres type PPP (see equation (7)) and a Paasche type PPP (see equation (8)). The geometric mean of these two PPPs gives a single Fisher type PPP between the two countries.
- By following this procedure each level of aggregation is provided with a matrix of intransitive Fisher PPPs. Application of the EKS formula makes the matrix transitive

$$ {}_hEKS_j = \left(\prod_{l=1}^{K} {}_hF_l \,/\, {}_jF_l \right)^{1/K}, \quad \forall\, h, j \qquad (9) $$

  where ${}_hEKS_j$ is the EKS PPP between countries *h* and *j*; ${}_hF_l$ and ${}_jF_l$ are Fisher PPPs between countries *h* and *l* and *j* and *l* respectively; *K* the number of countries involved.
- The EKS PPPs are then used to convert the national expenditures in national currencies for the corresponding aggregate to real expenditures in a common currency. The real expenditures are subsequently expressed as volume indices.

12.3.3 Specific properties of EKS results

12.35 EKS PPPs and volume indices are base country invariant and transitive. These are properties of most multilateral calculation and aggregation methods. Beside these properties EKS results have several specific properties described below

- *Characteristicity*: The EKS method attempts to provide PPPs that are close to the PPPs that would be obtained if each pair of countries had been compared separately. This is because the EKS procedure in making the Fisher PPPs transitive minimises the differences (in the proper logarithmic least-squares sense) between them and the resulting EKS PPPs.

$$ \Delta = \sum_{j=1}^{K} \sum_{h=1}^{K} (\log {}_jEKS_h - \log {}_jF_h)^2 \Rightarrow \min \qquad (10) $$

  However the differences are minimized at the general level so differences will not necessarily be small for each pair of countries in the comparison.
- *Absence of the Gerschenkron effect*: The Gerschenkron effect applies to aggregation methods that use either a reference price structure to obtain real values – that is, each country's quantities are valued by a uniform set of prices - or a reference volume structure to obtain PPPs – that is, each country's prices are used to value a uniform set of quantities. With methods employing a reference price structure, a country's share of total GDP - that is, the total for the group of countries being compared - will rise as the reference price structure becomes less characteristic of its own price structure. With methods employing a reference volume structure, a country's share of total GDP will fall as the reference volume structure becomes less characteristic of its own volume structure.

  The Gerschenkron effect arises because of the negative correlation between prices and volumes. In other words, expenditure patterns change in response to changes in relative prices because consumers switch their expenditure towards relatively cheap products. The EKS method does not use a reference price structure or a reference volume structure when estimating real expenditures. EKS real expenditures are not subject to the Gerschenkron effect (see also Annex VIII).

- *Non-additive*: The values of the expenditure aggregates of participating countries are equal to the sum of the values of their components when both aggregates and components are valued at national prices. Additivity requires this identity to be preserved when the values of the aggregates and their components are valued at international prices. An aggregation method is additive if, for each country being compared, it provides real expenditures for basic headings that sum to the real expenditures of the aggregates of which they are components. An additive aggregation method provides volumes that satisfy the average test for volumes – that is, the average volume lies between the maximum and minimum volumes.[17]

  The EKS provides real expenditures that are not additive. It is for this reason that PPPs have to be calculated for each level of aggregation. The average test does not hold for volumes nor does it hold for price indices. EKS PPPs and real expenditures are not suitable for comparing price and volume structures across countries.

12.3.4 Reference PPPs

12.36 EKS aggregation requires the national expenditure of each participating country to be re-valued by the price vector of each of the other participating countries. Therefore, before aggregation can begin, it is necessary to ensure that the matrix of basic heading PPPs is complete and that there is a PPP for every country for every basic heading. If the matrix is not complete, there is the danger that aggregation may produce biased volumes measures.

12.37 In practice there will always be basic headings with missing PPPs because, for the reasons given in paragraph 12.17, it is not always possible to calculate a direct binary PPP between a country and any of the other countries participating in the comparison even though prices were collected for the basic heading. Such gaps in the matrix are filled by taking the PPP from a comparable basic heading or from the next level of aggregation. This step is carried out prior to aggregation.

12.38 There could also be missing PPPs because no prices were collected for the basic heading. This can happen when it becomes difficult to specify comparable products that could be priced across countries for the basic heading. For such comparison resistant basic headings, PPPs based on price data that have been collected for other basic headings are used as proxies for the PPPs that would have been calculated had prices been collected for them. Such proxy PPPs are called *reference PPPs*. Aggregation includes the calculation of reference PPPs.

12.39 The basic headings requiring reference PPPs and the reference PPPs selected for them are listed in Annex 12.1.[18] From the Annex, it will be seen that the reference PPPs can be those of a single basic heading or they can be aggregations of a specified set of basic headings. It depends on which provides the better proxy PPPs for the basic heading in question or, in the absence of corresponding proxies, which provides an acceptable neutral average. Hence, the reference PPP for *package holidays* is a combination of the PPPs for different forms of passenger transport services, the PPPs for various catering services and the PPPs for accommodation services, while the reference PPPs for *narcotics*, *prostitution*, *insurance*, *FISIM*, *other financial services* and the *intermediate consumption* of various government services are the PPPs for individual market services which, as can be seen from Annex 12.2, is an aggregation of the PPPs of 132 basic headings. Similarly, as shown in Annex 12.3, the reference PPPs for *change in inventories* is an aggregation of the PPPs for consumer goods and equipment goods. Exchange rates are used for *net purchases abroad* and for *balance of exports and imports*; they are also used for *aircraft and aeronautical equipment* and for *acquisitions less disposals of valuables*.

[17] Additive aggregation methods generally use a reference price structure to value national expenditures on basic headings at international prices. The reference price structure consists of an international price for each basic heading. An international price for a basic heading is defined as the average of the national prices for the basic heading prevailing in participating countries. The average may be weighted or unweighted, PPP adjusted or PPP-unadjusted. It may be an average of prices or an average of price structures. For example, in the GK method which is discussed later, the average is defined as a quantity-weighted arithmetic average of the national prices adjusted by the global PPPs across all countries.

[18] The basic headings requiring reference PPPs are listed in the order they appear in the expenditure classification. But the reference PPPs are not necessarily calculated in that order. Some reference PPPs are used in the calculation of other reference PPPs and these have to be calculated first.

12.3.5 Fixity

12.40 Fixity is obtained at the level of an aggregate in the same way as it is obtained at the basic heading level. This has already been described in Section 12.2.6 and will not be repeated here.

Annex 12.1: Reference PPPs by basic heading

Basic Heading		Reference PPP	
INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS			
11.01.12.5	Other meats and edible offal	11.01.12.1	Beef and veal
		11.01.12.2	Pork
		11.01.12.3	Lamb, mutton and goat
		11.01.12.4	Poultry
11.02.31.1	Narcotics	Individual market consumption (Annex 12.2)	
11.04.42.1	Miscellaneous services relating to the dwelling	11.04.32.1	Services for the maintenance and repair of the dwelling
11.05.13.1	Repair of furniture, furnishings and other floor covering	11.05.11.1	Kitchen furniture
		11.05.11.2	Bedroom furniture
		11.05.11.3	Living-room and dining-room furniture
		11.05.11.4	Other furniture and furnishing
		11.05.12.1	Carpets and other floor covering
11.06.31.1	Hospital services	13.02.21.1	Physicians
		13.02.21.2	Nurses and other medical staff
		13.02.21.3	Non-medical staff
		13.02.22.1	Pharmaceutical products
		13.02.22.2	Other medical goods
		13.02.22.3	Therapeutic appliances and equipment
		13.02.22.4	Intermediate consumption n.e.c.
		13.02.23.1	Gross operating surplus
		13.02.24.1	Net taxes on production
11.07.14.1	Animal drawn vehicles	Individual market consumption (Annex 12.2)	
11.07.35.1	Combined passenger transport	11.07.31.1	Passenger transport by railway
		11.07.32.1	Passenger transport by road
11.08.21.1	Telephone and telefax equipment	11.09.11.1	Equipment for the reception, recording and reproduction of sound and pictures
		11.09.13.1	Information processing equipment
11.09.21.1	Major durables for outdoor recreation	11.07.11.1	Motor cars with diesel engine
		11.07.11.2	Motor cars with petrol engine of cubic capacity of less than 1200cc
		11.07.11.3	Motor cars with petrol engine of cubic capacity of 1200cc to 1699
		11.07.11.4	Motor cars with petrol engine of cubic capacity of 1700cc to 2999
		11.07.11.5	Motor cars with petrol engine of cubic capacity of 3000cc and over
11.09.22.1	Musical instruments and major durables for indoor recreation	11.09.11.1	Equipment for the reception, recording and reproduction of sound and pictures
11.09.23.1	Maintenance and repair of other major durables for recreation and culture	11.07.23.1	Maintenance and repair of personal transport equipment
		11.09.15.1	Repair of audio-visual, photographic and information processing equipment
11.09.43.1	Games of chance	Individual market consumption (Annex 12.2)	

Basic Heading		Reference PPP	
11.09.61.1	Package holidays	11.07.31.1 11.07.32.1 11.07.33.1 11.07.34.1 11.07.35.1 11.07.36.1 11.11.11.1 11.11.11.2 11.11.12.1 11.11.21.1	Passenger transport by railway Passenger transport by road Passenger transport by air Passenger transport by sea and inland waterway Combined passenger transport Other purchased transport services Restaurants services whatever the type of establishment Pubs, bars, cafes, tea rooms and the like Canteens Accommodation services
11.12.21.1	Prostitution	Individual market consumption (Annex 12.2)	
11.12.41.1	Social protection	13.05.11.1	Social protection
11.12.51.1	Insurance	Individual market consumption (Annex 12.2)	
11.12.61.1	FISIM		
11.12.62.1	Other financial services n.e.c.		
11.12.71.1	Other services n.e.c.		
11.13.11.1	Net purchases abroad	Exchange rate to euro	
INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHs			
12.01.11.1	Housing	11.04.11.1	Actual rental for housing
12.02.11.1	Health	11.06.31.1	Hospital services
12.03.11.1	Recreation and culture	11.09.41.1 11.09.42.2	Recreational and sporting services Other cultural services
12.04.11.1	Education	11.10.11.1	Education
12.05.11.1	Social protection	13.05.11.1	Social protection
12.06.11.1	Other services	12.01.11.1 12.02.11.1 12.03.11.1 12.04.11.1 12.05.11.1	Housing Health Recreation and culture Education Social protection
INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT			
13.01.11.1	Housing	11.04.11.1	Actual rental for housing
13.02.11.1	Health benefits and reimbursements - Pharmaceutical products	11.06.11.1	Pharmaceutical products
13.02.11.2	Health benefits and reimbursements - Other medical products	11.06.12.1	Other medical products
13.02.11.3	Health benefits and reimbursements - Therapeutic appliances and equipment	11.06.13.1	Therapeutic appliances and equipment
13.02.12.1	Health benefits and reimbursements - Out-patient medical services	11.06.21.1	Medical services
13.02.12.2	Health benefits and reimbursements - Out-patient dental services	11.06.22.1	Dental services
13.02.12.3	Health benefits and reimbursements - Out-patient paramedical services	11.06.23.1	Paramedical services
13.02.12.4	Health benefits and reimbursements - Hospital services	11.06.31.1	Hospital services

Basic Heading		Reference PPP	
13.02.22.1	Health services - Pharmaceutical products	11.06.11.1	Pharmaceutical products
13.02.22.2	Health services - Other medical goods	11.06.12.1	Other medical products
13.02.22.3	Health services - Therapeutic appliances and equipment	11.06.13.1	Therapeutic appliances and equipment
13.02.22.4	Health services - Intermediate consumption n.e.c.	Individual market consumption (Annex 12.2)	
13.02.23.1	Health services - Gross operating surplus	The 29 basic headings listed for 15.03.11.1 Products of agriculture, forestry, fisheries and aquaculture (see below) plus the following 3 basic headings:	
		15.03.11.1	Products of agriculture, forestry, fisheries and aquaculture
		15.03.12.1	Software
		15.03.13.1	Other products n.e.c.
13.02.24.1	Health services - Net taxes on production	13.02.21.1	Physicians
		13.02.21.2	Nurses and other medical staff
		13.02.21.3	Non-medical staff
		13.02.22.1	Pharmaceutical products
		13.02.22.2	Other medical goods
		13.02.22.3	Therapeutic appliances and equipment
		13.02.22.4	Intermediate consumption n.e.c.
		13.02.23.1	Gross operating surplus
13.02.25.1	Health services -Receipts from sales	11.06.31.1	Hospital services
13.03.11.1	Recreation and culture	12.03.11.1	Recreation and culture
13.04.11.1	Education	11.10.11.1	Education
13.05.11.1	Social protection	13.01.11.1	Housing
		13.02.11.1	Pharmaceutical products
		13.02.11.2	Other medical products
		13.02.11.3	Therapeutic appliances and equipment
		13.02.12.1	Out-patient medical services
		13.02.12.2	Out-patient dental services
		13.02.12.3	Out-patient paramedical services
		13.02.12.4	Hospital services
		13.02.21.1	Physicians
		13.02.21.2	Nurses and other medical staff
		13.02.21.3	Non-medical staff
		13.02.22.1	Pharmaceutical products
		13.02.22.2	Other medical goods
		13.02.22.3	Therapeutic appliances and equipment
		13.02.22.4	Intermediate consumption n.e.c.
		13.02.23.1	Gross operating surplus
		13.02.24.1	Net taxes on production
COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT			
14.01.11.1	Collective services relating to defence - Compensation of employees	14.01.11.2	Collective services other than defence – Compensation of employees

Basic Heading		Reference PPP	
14.01.12.1	Collective services relating to defence - Intermediate consumption	The 18 basic headings listed for 15.01.22.1 Ships, boats, steamers, tugs, floating platforms, rigs (see below) plus the following 2 basic headings:	
		15.01.22.1	Ships, boats, steamers, tugs, floating platforms, rigs
		15.01.22.2	Locomotives, rail-cars vans and wagons, other rail equipment
14.01.12.2	Collective services other than defence - Intermediate consumption	Individual market consumption (Annex 12.2)	
14.01.13.1	Collective services - Gross operating surplus	The 29 basic headings listed for 15.03.11.1 Products of agriculture, forestry, fisheries and aquaculture (see below) plus the following 3 basic headings:	
		15.03.11.1	Products of agriculture, forestry, fisheries and aquaculture
		15.03.12.1	Software
		15.03.13.1	Other products n.e.c.
14.01.14.1	Collective services - Net taxes on production	14.01.11.1	Collective services relating to defence - Compensation of employees
		14.01.11.2	Collective services other than defence - Compensation of employees
		14.01.12.1	Collective services relating to defence - Intermediate consumption
		14.01.12.2	Collective services other than defence - Intermediate consumption
		14.01.13.1	Collective service - Gross operating surplus
14.01.15.1	Collective services - Receipts from sales	The 5 basic headings listed for 14.01.14.1 Collective services - Net taxes on production plus the following basic heading:	
		14.01.14.1	Net taxes on production
GROSS FIXED CAPITAL FORMATION			
15.01.22.1	Ships, boats, steamers, tugs, floating platforms, rigs	15.01.11.1	Fabricated metal products, except machinery and equipment
		15.01.12.1	Engines and turbines, pumps and compressors
		15.01.12.2	Other general purpose machinery
		15.01.13.1	Agricultural and forestry machinery
		15.01.13.2	Machine tools
		15.01.13.3	Machinery for metallurgy, mining, quarrying and construction
		15.01.13.4	Machinery for food, beverages and tobacco processing
		15.01.13.5	Machinery for textile, apparel and leather production
		15.01.13.6	Other special purpose machinery
		15.01.14.1	Office machinery
		15.01.14.2	Computers and other information processing equipment
		15.01.14.3	Electrical machinery and apparatus
		15.01.14.4	Radio, television and communications equipment and apparatus

Basic Heading		Reference PPP	
		15.01.14.5	Medical, precision and optical instruments, watches and clocks
		15.01.15.1	Other manufactured goods n.e.c.
		15.01.21.1	Motor vehicles, trailers and semi-trailers
		15.01.21.2	Other road transport
		15.01.22.3	Aircraft, helicopters and other aeronautical equipment
15.01.22.2	Locomotives and rolling stock	15.01.22.1	Ships, boats, steamers, tugs, floating platforms, rigs
15.01.22.3	Aircraft, helicopters and other aeronautical equipment		Exchange rate to euro
15.03.11.1	Products of agriculture, forestry, fisheries and aquaculture	15.01.11.1	Fabricated metal products, except machinery and equipment
		15.01.12.1	Engines and turbines, pumps and compressors
		15.01.12.2	Other general purpose machinery
		15.01.13.1	Agricultural and forestry machinery
		15.01.13.2	Machine tools
		15.01.13.3	Machinery for metallurgy, mining, quarrying and construction
		15.01.13.4	Machinery for food, beverages and tobacco processing
		15.01.13.5	Machinery for textile, apparel and leather production
		15.01.13.6	Other special purpose machinery
		15.01.14.1	Office machinery
		15.01.14.2	Computers and other information processing equipment
		15.01.14.3	Electrical machinery and apparatus
		15.01.14.4	Radio, television and communications equipment and apparatus
		15.01.14.5	Medical, precision and optical instruments, watches and clocks
		15.01.15.1	Other manufactured goods n.e.c.
		15.01.21.1	Motor vehicles, trailers and semi-trailers
		15.01.21.2	Other road transport
		15.01.22.1	Ships, boats, steamers, tugs, floating platforms, rigs
		15.01.22.2	Locomotives and rolling stock
		15.01.22.3	Aircraft, helicopters and other aeronautical equipment
		15.02.11.1	Residential buildings
		15.02.21.1	Non-residential buildings
		15.02.31.1	Civil engineering works
15.03.13.1	Other products n.e.c.	15.03.11.1	Products of agriculture, forestry, fisheries and aquaculture

Basic Heading		Reference PPP
OTHER EXPENDITURES		
16.01.11.1	Change in inventories	Change in inventories (Annex 12.3)
16.02.11.1	Acquisitions less disposals of valuables	Exchange rate to euro
17.01.11.1	Balance of exports and imports	

Annex 12.2: Basic headings comprising individual market consumption

11.01.11.1	Rice
11.01.11.2	Other cereals, flour and other cereal products
11.01.11.3	Bread
11.01.11.4	Other bakery products
11.01.11.5	Pasta products
11.01.12.1	Beef and veal
11.01.12.2	Pork
11.01.12.3	Lamb, mutton and goat
11.01.12.4	Poultry
11.01.12.5	Other meats and edible offal
11.01.12.6	Delicatessen and other meat preparations
11.01.13.1	Fresh, chilled or frozen fish and seafood
11.01.13.2	Preserved or processed fish and seafood
11.01.14.1	Fresh milk
11.01.14.2	Preserved milk and other milk products
11.01.14.3	Cheese
11.01.14.4	Eggs and egg-based products
11.01.15.1	Butter
11.01.15.2	Margarine
11.01.15.3	Other edible oils and fats
11.01.16.1	Fresh or chilled fruit
11.01.16.2	Frozen, preserved or processed fruit and fruit based products
11.01.17.1	Fresh or chilled vegetables other than potatoes
11.01.17.2	Fresh or chilled potatoes
11.01.17.3	Frozen, preserved or processed vegetables and vegetable-based products
11.01.18.1	Sugar
11.01.18.2	Jams, marmalades and honey
11.01.18.3	Confectionery, chocolate and other cocoa preparations
11.01.18.4	Edible ice, ice cream and sorbet
11.01.19.1	Food products n.e.c.
11.01.21.1	Coffee, tea and cocoa
11.01.22.1	Mineral waters
11.01.22.2	Soft drinks and concentrates
11.01.22.3	Fruit and vegetable juices
11.02.11.1	Spirits
11.02.12.1	Wine
11.02.13.1	Beer
11.02.21.1	Tobacco
11.03.11.1	Clothing materials
11.03.12.1	Men's clothing
11.03.12.2	Women's clothing
11.03.12.3	Children's and infant's clothing
11.03.13.1	Other articles of clothing and clothing accessories
11.03.14.1	Cleaning, repair and hire of clothing
11.03.21.1	Men's footwear
11.03.21.2	Women's footwear
11.03.21.3	Children's and infant's footwear
11.03.22.1	Repair and hire of footwear
11.04.11.1	Actual rental for housing

11.04.21.1	Imputed rentals for housing
11.04.31.1	Materials for the maintenance and repair of the dwelling
11.04.32.1	Services for the maintenance and repair of the dwelling
11.04.41.1	Water supply
11.04.42.1	Miscellaneous services relating to the dwelling
11.04.51.1	Electricity
11.04.52.1	Gas
11.04.53.1	Liquid fuels
11.04.54.1	Solid fuels
11.04.55.1	Heat energy
11.05.11.1	Kitchen furniture
11.05.11.2	Bedroom furniture
11.05.11.3	Living-room and dining-room furniture
11.05.11.4	Other furniture and furnishing
11.05.12.1	Carpets and other floor covering
11.05.13.1	Repair of furniture, furnishings and other floor covering
11.05.21.1	Household textiles
11.05.31.1	Major household appliances whether electric or not
11.05.32.1	Small electric household appliances
11.05.33.1	Repair of household appliances
11.05.41.1	Glassware, tableware and household utensils
11.05.51.1	Major tools and equipment
11.05.52.1	Small tools and miscellaneous accessories
11.05.61.1	Non-durable household goods
11.05.62.1	Domestic services
11.05.62.2	Household services
11.06.11.1	Pharmaceutical products
11.06.12.1	Other medical products
11.06.13.1	Therapeutic appliances and equipment
11.07.11.1	Motor cars with diesel engine
11.07.11.2	Motor cars with petrol engine of cubic capacity of less than 1200cc
11.07.11.3	Motor cars with petrol engine of cubic capacity of 1200cc to 1699
11.07.11.4	Motor cars with petrol engine of cubic capacity of 1700cc to 2999
11.07.11.5	Motor cars with petrol engine of cubic capacity of 3000cc and over
11.07.12.1	Motor cycles
11.07.13.1	Bicycles
11.07.21.1	Spare parts and accessories for personal transport equipment
11.07.22.1	Fuels and lubricants for personal transport equipment
11.07.23.1	Maintenance and repair of personal transport equipment
11.07.24.1	Other services in respect of personal transport equipment
11.07.31.1	Passenger transport by railway
11.07.32.1	Passenger transport by road
11.07.33.1	Passenger transport by air
11.07.34.1	Passenger transport by sea and inland waterway
11.07.35.1	Combined passenger transport
11.07.36.1	Other purchased transport services
11.08.11.1	Postal services
11.08.21.1	Telephone and telefax equipment
11.08.31.1	Telephone and telefax services
11.09.11.1	Equipment for the reception, recording and reproduction of sound and pictures
11.09.12.1	Photographic and cinematographic equipment and optical instruments

11.09.13.1	Information processing equipment
11.09.14.1	Pre-recorded recording media
11.09.14.2	Unrecorded recording media
11.09.15.1	Repair of audio-visual, photographic and information processing equipment
11.09.21.1	Major durables for outdoor recreation
11.09.22.1	Musical instruments and major durables for indoor recreation
11.09.23.1	Maintenance & repair of other major durables for recreation & culture
11.09.31.1	Games, toys and hobbies
11.09.32.1	Equipment for sport, camping and open-air recreation
11.09.33.1	Gardens, plants and flowers
11.09.34.1	Pets and related products
11.09.35.1	Veterinary and other services for pets
11.09.41.1	Recreational and sporting services
11.09.42.1	Photographic services
11.09.42.2	Other cultural services
11.09.51.1	Books
11.09.52.1	Newspapers and periodicals
11.09.53.1	Miscellaneous printed matter, stationery and drawing materials
11.09.61.1	Package holidays
11.11.11.1	Restaurants services whatever the type of establishment
11.11.11.2	Pubs, bars, cafes, tea rooms and the like
11.11.12.1	Canteens
11.11.21.1	Accommodation services
11.12.11.1	Hairdressing salons and personal grooming establishments
11.12.12.1	Electric appliances for personal care
11.12.13.1	Other appliances, articles and products for personal care
11.12.31.1	Jewellery, clocks and watches
11.12.32.1	Other personal effects

Annex 12.3: Basic headings comprising inventories

11.01.11.1	Rice
11.01.11.2	Other cereals, flour and other cereal products
11.01.11.3	Bread
11.01.11.4	Other bakery products
11.01.11.5	Pasta products
11.01.12.1	Beef and veal
11.01.12.2	Pork
11.01.12.3	Lamb, mutton and goat
11.01.12.4	Poultry
11.01.12.5	Other meats and edible offal
11.01.12.6	Delicatessen and other meat preparations
11.01.13.1	Fresh, chilled or frozen fish and seafood
11.01.13.2	Preserved or processed fish and seafood
11.01.14.1	Fresh milk
11.01.14.2	Preserved milk and other milk products
11.01.14.3	Cheese
11.01.14.4	Eggs and egg-based products
11.01.15.1	Butter
11.01.15.2	Margarine
11.01.15.3	Other edible oils and fats
11.01.16.1	Fresh or chilled fruit
11.01.16.2	Frozen, preserved or processed fruit and fruit based products
11.01.17.1	Fresh or chilled vegetables other than potatoes
11.01.17.2	Fresh or chilled potatoes
11.01.17.3	Frozen, preserved or processed vegetables and vegetable-based products
11.01.18.1	Sugar
11.01.18.2	Jams, marmalades and honey
11.01.18.3	Confectionery, chocolate and other cocoa preparations
11.01.18.4	Edible ice, ice cream and sorbet
11.01.19.1	Food products n.e.c
11.01.21.1	Coffee, tea and cocoa
11.01.22.1	Mineral waters
11.01.22.2	Soft drinks and concentrates
11.01.22.3	Fruit and vegetable juices
11.02.11.1	Spirits
11.02.12.1	Wine
11.02.13.1	Beer
11.02.21.1	Tobacco
11.03.11.1	Clothing materials
11.03.12.1	Men's clothing
11.03.12.2	Women's clothing
11.03.12.3	Children's and infant's clothing
11.03.13.1	Other articles of clothing and clothing accessories
11.03.21.1	Men's footwear
11.03.21.2	Women's footwear
11.03.21.3	Children's and infant's footwear
11.04.31.1	Materials for the maintenance and repair of the dwelling
11.04.53.1	Liquid fuels
11.04.54.1	Solid fuels

11.05.11.1	Kitchen furniture
11.05.11.2	Bedroom furniture
11.05.11.3	Living-room and dining-room furniture
11.05.11.4	Other furniture and furnishing
11.05.12.1	Carpets and other floor covering
11.05.21.1	Household textiles
11.05.31.1	Major household appliances whether electric or not
11.05.32.1	Small electric household appliances
11.05.41.1	Glassware, tableware and household utensils
11.05.51.1	Major tools and equipment
11.05.52.1	Small tools and miscellaneous accessories
11.05.61.1	Non-durable household goods
11.06.11.1	Pharmaceutical products
11.06.12.1	Other medical products
11.06.13.1	Therapeutic appliances and equipment
11.07.11.1	Motor cars with diesel engine
11.07.11.2	Motor cars with petrol engine of cubic capacity of less than 1200cc
11.07.11.3	Motor cars with petrol engine of cubic capacity of 1200cc to 1699
11.07.11.4	Motor cars with petrol engine of cubic capacity of 1700cc to 2999
11.07.11.5	Motor cars with petrol engine of cubic capacity of 3000cc and over
11.07.12.1	Motor cycles
11.07.13.1	Bicycles
11.07.21.1	Spare parts and accessories for personal transport equipment
11.07.22.1	Fuels and lubricants for personal transport equipment
11.08.21.1	Telephone and telefax equipment
11.09.11.1	Equipment for the reception, recording and reproduction of sound and pictures
11.09.12.1	Photographic and cinematographic equipment and optical instruments
11.09.13.1	Information processing equipment
11.09.14.1	Pre-recorded recording media
11.09.14.2	Unrecorded recording media
11.09.21.1	Major durables for outdoor recreation
11.09.22.1	Musical instruments and major durables for indoor recreation
11.09.31.1	Games, toys and hobbies
11.09.32.1	Equipment for sport, camping and open-air recreation
11.09.33.1	Gardens, plants and flowers
11.09.34.1	Pets and related products
11.09.51.1	Books
11.09.52.1	Newspapers and periodicals
11.09.53.1	Miscellaneous printed matter, stationery and drawing materials
11.12.12.1	Electric appliances for personal care
11.12.13.1	Other appliances, articles and products for personal care
11.12.31.1	Jewellery, clocks and watches
11.12.32.1	Other personal effects
15.01.11.1	Fabricated metal products, except machinery and equipment
15.01.12.1	Engines and turbines, pumps and compressors
15.01.12.2	Other general purpose machinery
15.01.13.1	Agricultural and forestry machinery
15.01.13.2	Machine tools
15.01.13.3	Machinery for metallurgy, mining, quarrying and construction
15.01.13.4	Machinery for food, beverages and tobacco processing
15.01.13.5	Machinery for textile, apparel and leather production

15.01.13.6	Other special purpose machinery
15.01.14.1	Office machinery
15.01.14.2	Computers and other information processing equipment
15.01.14.3	Electrical machinery and apparatus
15.01.14.4	Radio, television and communications equipment and apparatus
15.01.14.5	Medical, precision and optical instruments, watches and clocks
15.01.15.1	Other manufactured goods n.e.c.
15.01.21.1	Motor vehicles, trailers and semi-trailers
15.01.21.2	Other road transport
15.01.22.1	Ships, boats, steamers, tugs, floating platforms, rigs
15.01.22.2	Locomotives and rolling stock
15.01.22.3	Aircraft, helicopters and other aeronautical equipment

13 Presentation and dissemination of results

13.1 Introduction

13.1 The chapter describes how Eurostat and the OECD present and disseminate the results of their comparisons. It also describes how Eurostat and the OECD update the disseminated results of the latest comparison before the results of the next comparison become available. In addition, the chapter explains the revision policy followed by Eurostat and the OECD with respect to results already disseminated for a comparison and subsequent revisions made by participating countries to their estimates of GDP for the year to which the comparison refers. This is an important consideration as such revisions can change the relativities originally established between countries. The chapter concludes by clarifying the access policy of the two organisations with regard to results and underlying basic data that are not in the public domain.

13.2 The term *results* is used in the chapter as shorthand for the *purchasing power parities (PPPs), the real and nominal expenditures and the associated price level indices (PLIs) and volume indices* that are generated by Eurostat and OECD comparisons of GDP expenditures. Except when specified otherwise, the results referred to are those calculated by the Èltetö-Köves-Szulc (EKS) method described in Chapter 12 and Annex V. The EKS results that Eurostat calculates for the EU Members States are the official results for the European Union.

13.3 Eurostat and OECD comparisons cover different, but overlapping, groups of countries. Eurostat comparisons focus on EU Member States; OECD comparisons focus on OECD Member Countries. Eurostat results are calculated at average EU price levels and OECD results are calculated at average OECD price levels. For countries that are covered by both calculations, this means that the relativities between them in the Eurostat comparison could differ from those in the OECD comparison. The existence of two sets of results can confuse users. In general, it is desirable to avoid such a situation, particularly if the results are used for administrative purposes as they are in the European Union[1]. To facilitate this, Eurostat and the OECD have agreed the fixity convention whereby the relativities between EU Member States established in a Eurostat comparison remain unchanged when these countries are included in a comparison with a wider group of countries such as the OECD comparison. How fixity is obtained is explained in Chapter 12, Section 12.2.6, and is not relevant here. What is relevant is that comparison results disseminated by Eurostat or by the OECD and discussed in this chapter respect fixity unless stated otherwise.

13.4 In the past, Eurostat and the OECD disseminated the results of their joint comparisons by publishing them in a report and by uploading them to a database accessible to the public. The last report published was the joint publication on the Eurostat-OECD comparison for 2005[2]. Comparison results in their entirety are now available through the public databases that each organisation maintains.[3] Selected results which are of interest to the general public are published by Eurostat in *Statistics in Focus*, *Statistics Explained* and in press releases on a regular basis. Its publication programme is discussed later in the chapter. The OECD also publishes selected results in *Statistics Brief* and in press releases, but publication is on a more ad hoc basis and does not a follow a strict timetable.

1 For example, the results for the European Union are used in the allocation of the Structural Funds which account for around a third of the European Commission's budget.

2 Purchasing Power Parities and Real Expenditures, 2005 Results, OECD and Eurostat, Paris, 2007.

3 Eurostat's Eurobase and OECD's StatsExtracts.

13.2 Presentation of results

13.2.1 Tables and analytical categories

13.5 Eurostat disseminates comparison results through the first set of tables listed in Box 13.1 and the OECD disseminates comparison results through the second set of tables listed. The coverage of both sets of tables is the same: nominal expenditures, real expenditures, PPPs, PLIs and volume indices (or indices of real expenditure).[4] In Eurostat tables, price and volume measures are presented at the average price levels of either EU27 or EU15[5], with either EU27 or EU15 as reference, and with the purchasing power standard (PPS) as numéraire[6]. In OECD tables the price and volume measures are presented at the average price levels of OECD34, with OECD34 as reference, and the OECD dollar as numéraire. (Both the PPS and the OECD dollar are artificial currency units as explained in the next section.) Although Eurostat tables have either EU27 or EU15 as reference, they include all 37 countries that participate in Eurostat comparisons (ECP37). Similarly, OECD tables include all 47 countries that participate in OECD comparisons (OECD47). The countries comprising EU15, EU27, ECP37, OECD34 and OECD47 are specified in Box 13.2.

13.6 All the tables refer to GDP broken down by *analytical categories*. The analytical categories used in Eurostat tables and OECD tables are listed in Box 13.3. The Eurostat breakdown with 60 categories is more detailed than the OECD breakdown with 49 categories (46 of which are the same as Eurostat). In both cases, the analytical categories reflect that the SNA 93[7] and the ESA 95[8] classify final consumption expenditure in two ways: one by reference to the *type of consumption* - that is, by whether the purchase is consumed by households individually or collectively (categories 02 to 34); the other by reference to the *purchaser* - that is, by whether the purchase is made by households, non-profit institutions serving households (NPISHs) or government (categories 45 to 49). The essential difference between these two classifications is how government final consumption expenditure is treated.

13.7 All final consumption expenditures of households and NPISHs[9] are considered to benefit individual households and to constitute individual consumption expenditure. But government final consumption expenditure can benefit households either collectively or individually and is divided between collective consumption expenditure, which is expenditure on collective services[10], and individual consumption expenditure, which is expenditure on individual services[11]. When final consumption expenditure is classified by purchaser, *government final consumption expenditure* is taken in its entirety (category 47). But when final consumption expenditure is classified by type of consumption, the individual consumption expenditure by government is removed from government final consumption expenditure and added to the individual consumption expenditures of households and NPISHs to obtain *actual individual consumption* (category 02).[12] The government final consumption expenditure that remains is the expenditure on collective services, otherwise known as *actual collective consumption* (category 34) or *collective consumption expenditure* (category 48).

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4 The OECD provides more coverage of nominal expenditures. This practice dates back to the early years of the PPP Programme when there was a need to educate users. To this end, the tables are ordered didactically allowing users to follow a progression from values through volumes to prices. They show first the nominal expenditures and the corresponding value indices, then the real final expenditures and the corresponding volume indices and, finally, the price level indices.

5 The two series do not have the same coverage of countries, years and variables.

6 The common currency in which the PPPs and the real expenditures are expressed.

7 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

8 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

9 Final consumption expenditure of NPISHs is not shown separately in Box 13.3 because it is not identified uniformly in the national accounts of participating countries. It is included in final consumption expenditure (category 45).

10 Principally general public services, defence, public order and safety, economic affairs, environment protection, and housing and community services

11 Most services provided by government relating to housing, health, recreation and culture, education and social protection.

12 Summing the individual consumption expenditures of households and NPISHs and the individual consumption expenditure of government to obtain actual individual consumption affects the following analytical categories: 19-Housing, water, electricity gas and other fuels; 24-Health; 29-Recreation and culture; 31-Education; and 33-Miscellaneous goods and services.

Box 13.1: Tables for presenting Eurostat and OECD comparison results

Eurostat	
Table 1:	Purchasing power parities (EU27 = 1.00)
Table 2:	Purchasing power parities (EU15 = 1.00)
Table 3:	Price level indices (EU27 = 100)
Table 4:	Price level indices (EU15 = 100)
Table 5:	Nominal expenditure in national currency
Table 6:	Nominal expenditure as a percentage of GDP (GDP = 100)
Table 7:	Real expenditure in purchasing power standards of EU27 (PPS_EU27)
Table 8:	Real expenditure in purchasing power standards of EU15 (PPS_EU15)
Table 9:	Real expenditure per capita in purchasing power standards of EU27 (PPS_EU27)
Table 10:	Real expenditure per capita in purchasing power standards of EU15 (PPS_EU15)
Table 11:	Volume indices of real expenditure per capita (EU27 = 100)
Table 12:	Volume indices of real expenditure per capita (EU15 = 100)

OECD	
Table 1:	Expenditure at national price levels in national currencies
Table 2:	Purchasing power parities in national currencies per OECD dollar (OECD = 1.00)
Table 3:	Nominal expenditure at national price levels in US dollars
Table 4:	Nominal expenditures per capita at national price levels in US dollars
Table 5:	Indices of nominal expenditure at national price levels (OECD =100)
Table 6:	Indices of nominal expenditure per capita on GDP at national price levels (OECD = 100)
Table 7:	Real expenditure at average OECD price levels in OECD dollars
Table 8:	Real expenditure per head at average OECD price levels in OECD dollars
Table 9:	Indices of real expenditure on GDP at average OECD price levels (OECD = 100)
Table 10:	Indices of real expenditure per capita at average OECD price levels (OECD = 100)
Table 11:	Price level indices for expenditure at average OECD price levels (OECD = 100)
Table 12:	Purchasing power parities in national currencies per US dollar (United States = 1.00)

13.8 The division of government expenditure between individually-consumed services and collectively-consumed services is necessary because of the various ways the former are financed in different countries. Under the classification by purchaser, households in countries where government directly provides individually-consumed services will appear to consume a smaller volume of goods and services than households in countries where households themselves pay directly for these services.[13] Hence, while household final consumption expenditure is a better measure of the total volume of goods and services purchased by households in different countries, actual individual consumption is a better measure of the actual volume of goods and services consumed by these households. Since one of the principal purposes of international volume comparisons of GDP is to facilitate comparisons of material well-being across countries, the classification by type of consumption is given pre-eminence.

[13] This is illustrated in Chapter 4, Box 4.2.

Box 13.2: Composition of country groups

Country group	Countries included in the group	Eurostat	OECD
EU15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain. Sweden and United Kingdom	X	
EU27	EU15 plus Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia	X	X
ECP37	EU27 plus Iceland, Norway, Switzerland, Albania, Bosnia and Herzegovina, Croatia, FYR Macedonia, Montenegro, Serbia and Turkey	X	
EA11	Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain	X	
EA12	EA11 plus Greece	X	
EA13	EA12 plus Slovenia	X	
EA15	EA13 plus Cyprus and Malta	X	
EA16	EA15 plus Slovakia	X	
EA17	EA16 plus Estonia	X	X
OECD34	EU15 plus Czech Republic, Estonia, Hungary, Poland, Slovakia, Slovenia, Iceland, Norway, Switzerland, Turkey, Australia, Canada, Chile, Israel, Japan, Korea, Mexico, New Zealand and United States		X
OECD47	ECP37 plus Australia, Canada, Chile, Israel, Japan, Korea, Mexico, New Zealand, United States and Russian Federation		X

Box 13.3: Analytical categories

Eurostat	Analytical category	OECD	Note
01	**Gross domestic product**	01	
02	**Actual individual consumption**	02	
03	Food and non-alcoholic beverages	03	
04	Food	04	
05	Bread and cereals	05	
06	Meat	06	
07	Fish	07	
08	Milk, cheese and eggs	08	
09	Oils and fats	09	
10	Fruits, vegetables and potatoes	10	
11	Other food	11	
12	Non-alcoholic beverages	12	
13	Alcoholic beverages, tobacco and narcotics	13	
14	Alcoholic beverages	14	
15	Tobacco	15	
16	Clothing and footwear	16	
17	Clothing		PPPs and PLIs only
18	Footwear		PPPs and PLIs only
19	Housing, water, electricity, gas and other fuels	17	
20	Electricity, gas and other fuels		PPPs and PLIs only
21	Household furnishings, equipment and maintenance	18	
22	Furniture		PPPs and PLIs only
23	Household appliances		PPPs and PLIs only
24	Health	19	

Eurostat	Analytical category	OECD	Note
25	Transport	20	
26	Personal transport equipment	21	
27	Transport services		PPPs and PLIs only
28	Communication	22	
29	Recreation and culture	23	
30	Audio-visual, photographic and information processing equipment		PPPs and PLIs only
31	Education	24	
32	Restaurants and hotels	25	
33	Miscellaneous goods and services	26	
	Net purchases abroad	27	Nominal data only
34	**Actual collective consumption**	28	
35	**Gross fixed capital formation**	29	
36	Machinery and equipment	30	
37	Metal products and equipment		PPPs and PLIs only
38	Electrical and optical equipment		PPPs and PLIs only
39	Transport equipment		PPPs and PLIs only
40	Construction	31	
41	Residential buildings		PPPs and PLIs only
42	Non-residential buildings		PPPs and PLIs only
43	Civil engineering works		PPPs and PLIs only
44	Software		PPPs and PLIs only
	Changes in inventories and valuables	32	Nominal data only
	Balance of exports and imports	33	Nominal data only
45	**Final consumption expenditure**	34	
46	Household final consumption expenditure	35	
47	Government final consumption expenditure:	36	
48	Collective consumption expenditure	37	
49	Individual consumption expenditure	38	
50	**Total goods**	39	
51	Consumer goods:	40	
52	Non-durable goods	41	
53	Semi-durable goods	42	
54	Durable goods	43	
55	Capital goods	44	
56	**Total services**	45	
57	Consumer services	46	
58	Government services:	47	
59	Collective services	48	
60	Individual services	49	

13.9 Box 13.3 also includes analytical categories which classify final expenditures by type of product (categories 50 to 60). The classification first distinguishes between final expenditure on goods and final expenditure on services. Final expenditure on goods is divided between consumer goods and capital goods with expenditure on consumer goods being broken down into expenditure on non-durable goods, expenditure on semi-durable goods and expenditure on durable goods.[14] Final expenditure on services is divided between consumer services and government services with expenditure on government services being broken into expenditure on collective services and expenditure on individual services.

[14] The distinction between non-durable goods and durable goods is based on whether the goods can be used only once or whether they can be used repeatedly or continuously over a period of considerably more than one year. Durables also have a relatively high purchasers' price. Semi-durable goods differ from durable goods in that their expected lifetime of use, though more than one year, is often significantly shorter and that their purchasers' price is substantially less.

13.2.2 Purchasing power standards and OECD dollars

13.10 The PPS and the OECD dollar are the artificial currencies used respectively by Eurostat and OECD to express PPPs and real expenditures for analytical categories. Eurostat PPPs can be interpreted as the exchange rates of the PPS and OECD PPPs can be seen as the exchange rates of the OECD dollar. Since PPPs are different for different categories, the values of the PPS and the OECD dollar depend on the category in question. The values of the PPS and the OECD dollar for food, for example, will not be the same as their values for clothing.

13.11 The PPS is defined so that it has the same purchasing power as the weighted average of one euro's purchasing power for an analytical category over all EU Member States. The weights are the expenditures of participating countries on the analytical category. Hence, one PPS buys as many goods and services covered by the analytical category as one euro does for the average consumer in the European Union. The OECD dollar is defined in a completely analogous way with reference to the weighted average purchasing power of the US dollar for an analytical category across all OECD Member Countries.

13.12 In practice, real expenditures in PPS are derived by scaling the PPPs for an analytical category so that the total expenditure of the European Union on the category in PPS equals the corresponding expenditure in euro:

$$\sum (EXP_i/PPP_i) = \sum (EXP_i/XR_i)$$

Where EXPi is the expenditure of country *i* and *XRi* is the exchange rate of country *i* to the euro. For OECD, the exchange rate to the US dollar is used. The values of PPS and OECD dollar change with each reference year, as they are defined with reference to the purchasing power of the euro and US dollar in the reference year. This implies that values of real expenditure in PPS or OECD dollar cannot be compared between reference years.

13.13 As noted in the previous section, Eurostat publishes two sets of data: one with reference to EU27 and one with reference to EU15. The first data set uses a PPS defined on the basis of the average purchasing power of the EU27 countries, whereas the second data set uses a PPS defined on the basis of the average purchasing power of the EU15 countries. In the remainder of the chapter, these are referred to as PPS_EU27 and PPS_EU15 respectively.

13.2.3 PPPs for country groups

13.14 Besides presenting results for the individual countries participating in the comparison, the tables also present results for groups of countries. Eurostat tables include the country groups EU27 and EU15 and the euro areas EA11, EA12, EA13, EA15, EA16 and EA17. OECD tables include EA17, EU27 and OECD34. The composition of the country groups and the euro areas is given in Box 13.2.

Box 13.4: Deriving PPPs for a country group

Column	(1)	(2)	(3)	(4)	(5)	(6)
Countries in the group	**National expenditure** *(national currency)*	**Exchange rates** *(national currency per euro)*	**PPPs** *(national currency per PPS_EU27)*	**Nominal expenditure** *(euros)*	**Real expenditure** *(PPS_EU27)*	**Group PPP** *("Group euro" per PPS_EU27)*
Germany	1970	1	1.05	1970	1876	
France	1350	1	0.99	1350	1364	
Italy	1100	1	0.84	1100	1310	
Spain	565	1	0.79	565	715	
Sweden	2000	8.2	10.19	244	196	
United Kingdom	900	0.6	0.68	1500	1324	
GROUP				6729	6784	0.95

1. The hypothetical country group consists of six countries. The euro is the national currency of Germany, France, Italy and Spain. The krona and pound are the national currencies of Sweden and the United Kingdom respectively.

2. The basic data required to calculate the PPP for the group are the national expenditures in national currencies in column (1), the exchange rates between national currencies and the euro in column (2) and the PPPs between national currencies and the PPS in column (3). The latter are expressed at the average price levels of the EU27.

3. The nominal expenditures for the countries in column (4) are expressed in euros. They are obtained by dividing their national expenditures in column (1) by their exchange rates in column (2). The nominal expenditure for the group is the sum of these nominal expenditures.

4. The real expenditures for the countries in column (5) are expressed in PPS. They are obtained by dividing their national expenditures in column (1) by their PPPs in column (3). The real expenditure for the group is the sum of these real expenditures.

5. PPPs can be derived by dividing national expenditures by their corresponding real expenditures. The Group PPP in column (6) has been calculated by dividing the group's nominal expenditure in column (4) by its real expenditure in column (5). The Group PPP is based on the PPS_EU27. It reflects the average price level for the group as a whole vis-à-vis the price level for the EU27.

13.15 The PPPs and the real and nominal expenditures for EU27, EU15, the euro areas and OECD34 are derived using the PPPs and the national expenditures in national currencies of their constituent countries. A simple example of how PPPs and real and nominal expenditures are obtained for a country group is given in Box 13.4. Because EKS real expenditures are not additive, the process has to be repeated for each basic heading, aggregation level and analytical category.[15]

13.2.4 Selected Geary Khamis results

13.16 Annex VIII explains that EKS real expenditures are free of the Gerschenkron effect but not additive and that Geary Khamis (GK) real expenditures are additive but subject to the Gerschenkron effect. Because of this, EKS PPPs and real expenditures are considered to be better suited for comparisons across countries of the price and volume levels of individual analytical categories and GK PPPs and real expenditures are considered to be better suited for comparisons of price and volume structures between countries. Accordingly, the OECD database includes a selection of GK results to complement the official EKS results. However, unlike the EKS results, the selected GK

[15] With an additive aggregation method, such as the Geary Khamis method, the procedure has only to be done once, at the level of GDP.

results have no official status and do not respect fixity. They are made available for analytical purposes only.

13.17 The OECD selection is limited to those GK indices that are useful for the analysis of price and volume structures. They comprise two tables, namely:

- *Real expenditures on the component expenditures of GDP at average OECD prices as a percentage of GDP:* These show the relative importance of the final expenditures on the analytical categories vis-à-vis the final expenditure on their corresponding GDP after the expenditures have been valued at a uniform set of average prices. They enable the real shares of the component expenditures of GDP – the volume structure - to be compared across countries.
- *Relative price levels of the component expenditures of GDP at average OECD prices*: These are defined as the ratios of the specific PPPs for the analytical categories to the overall PPP for their corresponding GDP. They indicate whether the price level for a given analytical category is higher or lower relative to the overall or general price level in the country thereby facilitating the comparison of price structures between countries.

The two tables cover the same analytical categories, the same countries and the same country groups as the tables the OECD uses to present EKS results.

13.3 Eurostat annual publication schedule

13.3.1 Preliminary to final estimates

13.18 Eurostat makes comparisons covering the countries of EU27 and ECP37 every year. The detailed results of these annual comparisons are disseminated through Eurostat's public database, while selected summary results are published in Eurostat's *Statistics in Focus* series and in *Statistics Explained* on the Eurostat website, as well as in press releases that accompany the release of new data. The publication and dissemination calendar is synchronised with the timetable for the delivery of national accounts data set out in the ESA 95 regulation[16]. The first delivery of annual national accounts data for t is in spring t+1. Countries provide expenditures on the seven main aggregates. This is when Eurostat makes its preliminary estimates of PPPs for t.

13.19 For the preliminary estimates, the most recent price data from consumer and capital goods surveys are used as input. For housing and compensation of government employees, input data for t do not become available until the autumn of t+1. For housing, preliminary estimates for t are calculated by extrapolating the PPPs for t-1 with the HICP[17] indices for actual rents. PPPs for compensation of government employees for year t-1 are extrapolated to t with the overall HICP indices. As expenditure data are available only for the seven main aggregates, weights for the basic headings are derived using the structure of the year t-1 or t-2. The data are released in the public database in t+6 months. At the same time, a press release presenting the preliminary estimates of per capita volume indices for GDP is distributed.

13.20 In t+9 months, countries report for the first time the expenditures at basic heading level for t. The PPPs calculated with these expenditures are considered to be first or provisional estimates. They are released in t+12 months. Countries are expected to report the best estimates for the various levels of aggregation - as defined in the Eurostat-OECD expenditure classification - that are available for t at the time. Being provisional, the extent to which the breakdowns, particularly at the lower levels of aggregation, will reflect that of a previous year rather than t will vary from country to country. As a minimum, GDP, the main aggregates and the expenditure categories should be current estimates for t, but the structure of expenditure below these levels - that is, at the level of expenditure groups, classes and basic headings - may be that of a previous year.

16 Commission regulation (EC) 2223/1996 of 25th June 1996.

17 Harmonised index of consumer prices. See the glossary in Annex IX for more details.

13.21 The PPPs for t will be calculated in t+12 months just prior to their dissemination. The detailed expenditures that were reported in t+9 months provide the weights for the calculation. But they do not provide the levels of either GDP or its components. Levels for GDP and the main aggregates are taken from the national accounts databases maintained by Eurostat and the OECD just before the calculation is made. The expenditure extracted for each of the main aggregates is then distributed proportionally across the aggregate's basic headings in line with each basic heading's share in the expenditure on the aggregate reported in t+9 months.

13.22 At the same time as the first or provisional estimates of PPPs are calculated for t, the second or intermediate estimates of PPPs are calculated for the year t-1, and the third or final estimates of PPPs for the year t-2 are also calculated. After calculation, these three sets of PPPs are added to the database (replacing the earlier PPP estimates in the database for t, t-1 and t-2), a *Statistics in Focus* is published and a press release is distributed. Both the *Statistics in Focus* and the press release presents the newly calculated per capita volume indices and PLIs for GDP and for actual individual consumption (AIC) for the years t, t-1 and t-2.

13.23 In addition, to the *Statistics in Focus* just mentioned and published in t+12 months, Eurostat also publishes other PPP related issues of *Statistics in Focus*. Every year in July, it publishes an issue on the price levels of a selection of analytical categories comprising household expenditure[18]. Every two years following the December calculation, it publishes an issue on the price levels of the analytical categories for gross fixed capital formation[19]. And every three years, in the year immediately following the price collection, it publishes an issue on the price levels of the analytical categories for food, beverages and tobacco[20]. This publication of this issue is accompanied by a press release. Most issues of *Statistics in Focus* are also published in *Statistics Explained*.

13.3.2 Revision of PPPs

13.24 The final calculation that Eurostat makes for the reference year t in t+3 is final in as much as the calculation will not be repeated to obtain new PPPs when countries subsequently revise their GDP estimates for the reference year. Such revisions occur frequently and regularly and continue long after the reference year has passed. The t+3 closure was chosen in the expectation that countries will have introduced most of the major revisions to their national accounts estimates for t by then, but experience shows that this is not always the case. The approach adopted by Eurostat when countries revised their GDP estimates for a reference year after the final calculation has been made is as follows. The revisions are incorporated in the original results without recalculating the PPPs. The revised national expenditures are converted to new real expenditures using the original PPPs. This means that the relativities between countries' volume measures will change, and that the relativities between countries' price measures – the PPPs and PLIs – will remain as they were. Volume measure relativities between countries and their country group will also change, but so too will the price measure relativities as PPPs for country groups are weighted averages which change when their expenditure weights change. To avoid the changes in price measure relativities, Eurostat rescales the original PPS_EU27.[21] The revised national expenditures converted with exchange rates and the original PPPs generate new nominal expenditures and new real expenditures for EU27 and these are used to compute the required rescaling factor. Rescaling is carried out separately for each analytical category.

13.25 Final calculations will be repeated under certain circumstances. During the second half of 1990s, there was a significant change in national accounting methodology as participating countries moved from the SNA 68 and the ESA 79 to the SNA 93 and the ESA 95. Countries introduced the new accounting systems by degrees, at varying speeds and at different points in time. As a result,

[18] 03-Food and non-alcoholic beverages; 13-Alcoholic beverages and tobacco; 17-Clothing; 18-Footwear; 20-Energy; 22-Furniture; 23-Household appliances; 26-Personal transport equipment; 27-Transport services; 28-Communication; 30-Audio-visual, photographic and information processing equipment; 32-Restaurants and hotels.

[19] 35-Gross fixed capital formation; 36-Machinery and equipment; 37-Metal products and equipment; 38-Electronic and optical equipment; 39-Transport equipment; 40-Construction; 41-Residential buildings; 42-Non-residential buildings; 43-Civil engineering works; 44-Software.

[20] 03-Food and non-alcoholic beverages; 04-Food; 05-Bread and cereals; 06-Meat; 07-Fish; 08-Milk, cheese and eggs; 09-oils and fats; 10-Fruits, vegetables and potatoes; 11-Other food; 12-Non-alcoholic beverages; 13-Alcoholic beverages and tobacco; 14-Alcoholic beverages; 15-Tobacco.

[21] Rescaling is not necessary if a country and not a country group is used as reference.

many breaks existed in their national accounts data that affected both the comparability of the volume measures between countries within a given year and the comparability of the volume measures over time – a fact that was widely criticised by users. Between April 2002 and December 2003, Eurostat and the countries participating in its comparison programme undertook a thorough revision of the PPPs for the years 1995 to 2000. Such a comprehensive and systematic revision was unprecedented in the history of PPPs. It was successfully completed with Eurostat publishing the final results in August 2004.[22] No similar exercise was conducted by the OECD. It is likely that Eurostat will repeat the exercise to accommodate forthcoming major changes in the national accounts compilation system due to the introduction of the ESA 2010[23].

13.26 The PPP Regulation allows for final calculations to be repeated if there has been a mistake made by either a participating country, Eurostat or the OECD.[24] A mistake is defined as "a use of incorrect basic information or an inappropriate application of a calculation procedure". For the recalculation to take place, the mistake must be discovered within three months of publication of the final results. For the results of the recalculation to be published and to replace the results initially disseminated, the mistake must cause at least a change of 0.5 per cent in the real GDP per capita of at least one participating country.

13.4 OECD estimation of PPPs outside benchmark years

13.4.1 Annual PPPs

13.27 By using the rolling survey approach, Eurostat is able to make annual comparisons that provide PPPs and real expenditures for each level of aggregation up to GDP. The OECD makes such detailed calculations only once every three years. PPPs for GDP, AIC and household final consumption expenditure for the years between these three-yearly benchmark calculations are obtained by extrapolation. For example, the PPPs for GDP for the latest benchmark year are extrapolated by the relative rates of inflation in different countries as measured by the implicit price deflators for GDP. More specifically, a country's PPP for the year t+1 is obtained by multiplying its PPP for the benchmark year t by its GDP implicit price deflator for the year t+1 and then dividing by the GDP implicit price deflator for the year t+1 for the reference country[25] when both implicit price deflators are relative to the year t. As changes in PPPs depend directly on relative rates of inflation in different countries, this method produces robust estimates for intermediate years provided they are not too distant from the benchmark year and there have been no significant changes in price or expenditure structures within countries. For AIC and household final consumption expenditure, the extrapolation is carried out with the national accounts deflators for these aggregates.

13.28 The summary data required for extrapolation are extracted from the national accounts series compiled quarterly by OECD Member Countries and the projections of GDP underlying the *OECD Economic Outlook*. The PPPs for the year t+1 that the OECD estimates for its Member Countries are available in the first quarter of the year t+2. They and the price and volume measures they give rise to are disseminated through the OECD's public database.

13.29 When PPPs for GDP, AIC and household final consumption expenditure are available for two benchmark years, t and t+3, the OECD estimates their PPPs for the intervening years, t+1 and t+2, in the following way. First, the aggregate's PPP for the benchmark year t is extrapolated to t+1 and t+2 by multiplying it by the aggregate's implicit price deflators for the years t+1 and t+2 and dividing by the aggregate's implicit price deflators for the reference country for the same years. Next, the aggregate's PPP for the benchmark year t+3 is retropolated to t+2 and t+1 by dividing it by the

22 "Purchasing power parities and related economic indicators for EU, Candidate Countries and EFTA - Data 1991 to 2003, including final results of the revision 1995 to 2000", S. Stapel, J. Pasanen and S. Reinecke, *Statistics in Focus*, 37/2004, Eurostat, Luxembourg, August 2004.

23 European System of Accounts 2010, Eurostat, Luxembourg, 2011.

24 Annex 1, Section 10, Corrections, of Regulation (EC) No 1445/2007 of the European Parliament and of the Council of 11 December 2007 establishing common rules for the provision of basic information on Purchasing Power Parities and their calculation and dissemination.

25 The choice of reference country does not influence the final results. In practice the OECD uses the United States.

aggregate's implicit price deflators for t+2 and t+1 and multiplying by the aggregate's implicit price deflator for the reference country for the same years. Lastly, the geometric mean is taken of the two PPPs that result for t+1 and t+2.

13.4.2 Monthly PLIs

13.30 In addition to estimating PPPs for non-benchmark years for GDP, AIC and household final consumption expenditure, the OECD also estimates monthly PLIs for household final consumption expenditure for its Member Countries. The procedure is the same as that described above for GDP except that the PPPs on which the PLIs are based are the PPPs for household consumption final expenditure from the latest benchmark year and the price deflators are the overall consumer price indices of Member Countries. The PLIs become available two months after the close of the month to which they refer. They are disseminated through the OECD's public database. The PLIs are not presented as a time series, only the PLIs for the latest month are available in the database. PLIs are the ratio between PPPs and the exchange rates and a monthly time series would primarily reflect movements in exchange rates rather than changes in the underlying PPPs which generally evolve slowly.

13.5 Data access policy

13.31 Box 13.5 gives the access rights of users of PPP data by type of user and by type of data. The comparison results that Eurostat and the OECD disseminate through their public databases are shown in the first column. All users have access to these data, namely: PPPs, real and nominal expenditures, PLIs and volume indices by the analytical categories listed in Box 13.3.

13.32 Underlying the comparison results are other information and data that users would like to access. Data such as the price observations from which the average prices used to compute PPPs are derived, the average prices themselves, and the PPPs, price and volume measures and product lists for basic headings. Eurostat, the OECD and the national statistical institutes (NSIs) of participating countries all have access to basic heading data and to average prices. It would be difficult to organise a comparison if this was not so. Only Eurostat and its contractors have access to individual price observations of all countries of ECP37.

13.33 As can be seen from Box 13.5, users in Commission services other than Eurostat, in OECD directorates other than the Statistics Directorate, in government departments of participating countries and in research institutes have special access rights to basic heading data and to average prices under certain conditions. They have no special access rights to price observations. Special access rights have to be applied for. This involves providing a project description that specifies the data requested and how they will be used and then, if the project is considered worthwhile, a signed declaration stating that the data will not be made public in any form and that the results of the research will not be published in more detail than the analytical category level.

13.34 The responsibility for granting special access rights is shared as follows.

- If the data requested concerns only one country, the NSI of the country decides;
- If the data requested concerns several countries, Eurostat decides after consultation with the countries involved;
- If the data requested concerns all countries, Eurostat decides;
- If the OECD receives requests for data that involve countries coordinated by Eurostat, the request is referred to Eurostat.

13.35 One user requiring particular mention is the ICP Global Office in the World Bank. The Global Office is responsible for carrying out a global comparison every six years. The comparison is to cover all regions of the world and to include those countries that participate in Eurostat and OECD comparisons. The Eurostat-OECD PPP Programme is organised independently of the ICP requiring

Eurostat and the OECD to work closely with the Global Office to ensure that a world comparison that includes their countries can be made.

Box 13.5: Access rights by type of user

Type of user	Public data	Non-public data		
	PPPs, PLIs, volume indices and expenditure weights for analytical categories	PPPs, PLIs, volume indices, expenditure weights and product lists for basic headings	Average prices	Individual price observations
Eurostat	yes	yes	yes	yes
OECD (Statistics Directorate)	yes	yes	yes	no
NSIs of participating countries	yes	yes	yes	no
Commission services other than Eurostat	yes	special access rights, cannot publish them	special access rights, cannot publish them*	no
OECD directorates other than Statistics Directorate	yes	special access rights, cannot publish them	special access rights, cannot publish them*	no
Government departments of participating countries	yes	special access rights, cannot publish them	special access rights, cannot publish them*	no
Research institutions and researchers	yes	special access rights, cannot publish them	special access rights, cannot publish them*	no
Journalists and other members of the public	yes	no	No	no
ICP Global Office at the World Bank	yes	for the purpose of linking Eurostat-OECD comparison into the worldwide comparison, cannot publish them	average prices of products priced specifically for the ICP so as to facilitate inter-country validation across regions and the linking of regions in the worldwide comparison, cannot publish them	no

*Only for Eurostat results

13.36 One condition for Eurostat-OECD participation in the ICP is that in ICP benchmark years Eurostat and the OECD provide the Global Office with basic heading PPPs and expenditure weights so that countries co-ordinated by Eurostat and the OECD can be combined at the basic heading level with countries co-ordinated by the Global Office. The second condition is that Eurostat and OECD countries price a selection of products from the ICP product list in order that their prices may be compared with those of ICP countries and links established between them. The Global Office needs the average prices of these products: first, to validate them across all countries participating in the global comparison and, second, to use them in the calculation of the world comparison.

13.37 To provide the Global Office with special access rights to basic heading PPPs and expenditure data for Eurostat and OECD countries and to the average prices of ICP products priced by Eurostat and OECD countries, a memorandum of understanding has been signed by Eurostat, the OECD and the Global Office. In the memorandum, the Global Office is granted the access it requires. On its part, it undertakes to treat the data as non-public and not to publish comparison results for Eurostat and OECD countries with more detail than that already published by Eurostat and the OECD.

13.6 Consistency between Eurostat, OECD and ICP results

13.38 Eurostat makes comparisons annually, the OECD makes comparisons every three years and the ICP makes comparisons every six years. So, every third year there is a reference year common to Eurostat and the OECD and every sixth year there is a reference year common to Eurostat, the OECD and the ICP. Countries participating in Eurostat comparisons are covered in OECD comparisons and ICP comparisons. To avoid confusing users, it is important that the results for Eurostat countries in OECD comparisons are consistent with those in Eurostat comparisons (ECP37). Similarly it is important that the results for Eurostat and OECD countries in ICP comparisons are consistent with those in OECD comparisons (OECD47). Consistency here means that the relativities between countries do not change from one comparison to another.

13.39 In the years between its comparisons, the OECD extrapolates the PPPs for GDP, for AIC and for household final consumption expenditure so as to keep the price and volume measures for the three aggregates in its database up to date. The World Bank and the IMF do the same, but with the ICP PPPs for the aggregates. Extrapolation is done at the level of the aggregates themselves (as described in Section 13.4.1).

13.40 Eurostat makes its first preliminary estimates of the PPPs for year t in June t+5 (as required by the annual publication schedule in Section 13.3.1). The OECD does not follow the same calculation and dissemination schedule as Eurostat and its extrapolated PPPs for GDP, AIC and household final consumption expenditure for t are usually in the public domain before those of Eurostat. To maintain consistency, it replaces the PPPs for Eurostat countries that it obtained by extrapolation with the corresponding PPPs calculated by Eurostat as soon as they become available. To ensure consistency at the world level, the IMF and the World Bank take the PPPs for Eurostat and OECD countries from the OECD after the substitution has been made.

Annexes

ANNEX I. BRIEF HISTORY OF THE PROGRAMME

I.1 Introduction

I.1 The origins of international price and volume comparisons of GDP can be traced back to the experimental comparisons carried out by the Organisation for European Economic Cooperation (OEEC) in the 1950s. Two approaches were adopted. The first was a comparison made from the expenditure side using mainly price data. Initially, it covered France, Germany, Italy, the United Kingdom and the United States.[1] Subsequently, it was expanded to include Belgium, Denmark, the Netherlands and Norway.[2] The second was a comparison between the United Kingdom and the United States made from the production side using mainly quantity data.[3]

I.2 In both studies, *purchasing power equivalents* rather than exchange rates were used to express the GDPs and their components in a common currency and at uniform price levels. The reasons given for using purchasing power equivalents - or purchasing power parities (PPPs) to use current terminology - can be paraphrased as follows:

> *Exchange rates are not indicators of the internal purchasing power of currencies. At best they could only be so for goods and services that are internationally traded. For them to be so, it would be necessary for a long-term free-market equilibrium in exchange rates to exist which, even without the exchange controls, multiple exchange rates and prevailing quantitative restrictions on trade, would be difficult to establish. Moreover, if established, the equilibrium exchange rates would not, even for internationally traded goods, reflect the final prices at which these goods are sold to domestic buyers because of tariffs and other indirect taxes, costs of transportation - both to the country and within the country - and costs of domestic processing and distribution. Given also that a significant proportion of goods and services are not traded internationally, exchange rates should not be used for international price and volume comparisons of GDP.*

I.3 An important practical lesson learnt from the OEEC studies was that PPP-based GDP comparisons made from the expenditure side demand less data than those made from the production side. Comparisons from the expenditure side only require prices for final goods and services, but comparisons from the production side require prices of both outputs and intermediate inputs. Consequently, when, in the late 1960s, research was continued under the auspices of the International Comparison Project (ICP), it was decided that it would focus on comparisons made from the expenditure side. Comparisons are still made from the production side, but usually they cover a small number of countries, focus on a limited number of economic activities and are based generally on unit values rather than prices.[4] Almost all of these comparisons have been organised under the programme for International Comparisons of Output and Productivity (ICOP) initiated by Professor Angus Maddison at Groningen University in the Netherlands in collaboration with his associate Bart van Ark.

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1 An International Comparison of National Products and the Purchasing Power of Currencies: A Study of the United States, the United Kingdom, France, Germany and Italy, M. Gilbert and I. Kravis, OEEC, Paris, 1954.

2 Comparative National Products and Price Levels: A Study of Western Europe and the United States, M. Gilbert and Associates, OEEC, Paris, 1958.

3 A Comparison of National Output and Productivity of the United Kingdom and the United States, D. Paige and G. Bombach, OEEC, Paris, 1959.

4 See, for example, "International comparisons of purchasing power, real output and labour productivity: a case study of Brazilian, Mexican, and U.S. manufacturing, 1975", A. Maddison and B. van Ark, *The Review of Income and Wealth*, March 1989; or "Prices, quantities and productivity in industry: a study of transition economies in a comparative perspective", B. van Ark, E. Monnikhof and M. Timmer, *International and Interarea Comparisons of Income, Output and Prices,* edited by A. Heston and R. Lipsey, *National Bureau of Economic Research, Studies in Income and Wealth*, Volume 61, Chicago University Press, 1999; or "Output, Input and Productivity Measures at the Industry Level: the EU KLEMS Database", M. O'Mahony and M. Timmer (2009), *Economic Journal*, 119(538).

I.2 International Comparison Project[5]

I.2.1 Research phases

I.4 The ICP started in 1968 as a research project, but its ultimate goal was to set up worldwide PPP-based comparisons of GDP on a regular basis. Responsibility for the project was shared by the United Nations Statistics Division (UNSD)[6] and the University of Pennsylvania, with the University of Pennsylvania taking the leading role. The research was a cooperative effort involving many institutions and persons in the countries participating in the project. Both the Ford Foundation and the World Bank made major financial contributions. The first director of the project was Professor Irving Kravis of the University of Pennsylvania. Together with his colleagues Alan Heston and Robert Summers, he organised the first three rounds of the project and co-authored three seminal reports[7] on international comparisons of real product and purchasing power. A chronology of the ICP and its offshoot, the European Comparison Programme (ECP), is provided in Annex Table A.

I.5 The project's initial task was to develop a methodology which would serve for a comprehensive system of international comparisons based on PPPs. In this it was assisted by the experiences gained from the two OEEC comparisons of market economies mentioned above, the comparisons of centrally planned economies coordinated by the Council for Mutual Economic Assistance since 1959[8], the comparisons carried out in the early and late 1960s in Latin America[9] and the comparisons between centrally planned and market economies started by Statistics Austria[10] during the 1960s[11].

I.6 The next task was to test the methodology by making actual comparisons using PPPs. Thus, the first three rounds or phases of the ICP – 1970, 1973 and 1975 - were essentially experimental in character. Comparisons were set up for a small group of countries representative of different income levels, social systems and geographical regions. During Phase I, comparisons of GDP were made for ten countries for 1970. Six of the ten countries also supplied data for 1967 and for these six countries comparisons were made for 1967 as well.[12] In Phase II, the ten Phase I countries were joined by six others. Comparisons covering all sixteen countries were made for 1970 and for 1973.[13] Phase III comparisons covered 34 countries and had 1975 as the reference year.[14] The results of these and subsequent ICP comparisons were published with the United States as reference country and the international dollar as numéraire.

I.2.2 Going operational and regionalisation

I.7 After Phase III, there were three major developments. First, the ICP became a regular part of the work programme of the UNSD with the University of Pennsylvania advising on methodological issues. Second, Eurostat started to play an increasingly important role, organising the comparisons

5 It was renamed International Comparison Programme in 1989.

6 At that time it was *United Nations Statistical Office* but its present title, *United Nations Statistics Division*, is used throughout this Annex.

7 See footnotes 12, 13 and 14.

8 For a description of these comparisons, see “An intercountry comparison of national income of planned economies”, G. Szilagyi, *The Review of Income and Wealth*, June 1962.

9 See “The measurement of Latin American real income in US dollars”, *Economic Bulletin for Latin America*, October 1967, and “Latin American real product comparisons”, J. Salazar-Carrillo, *Economic Journal*, December 1977.

10 At the time it was *Austrian Central Statistics Office*, but its present title, *Statistics Austria*, is used throughout this Annex.

11 *Comparisons of Levels of Consumption in Austria and Poland*, Conference of European Statisticians, United Nations, New York, 1968.

12 *A System of International Comparisons of Gross Product and Purchasing Power*, I. Kravis, Z. Kenessey, A. Heston and R. Summers, The John Hopkins University Press, Baltimore, 1975.

13 *International Comparisons of Real Product and Purchasing Power*, I. Kravis, A. Heston and R. Summers, The John Hopkins University Press, Baltimore, 1978.

14 *World Product and Income, International Comparisons of Real Product and Purchasing Power*, I. Kravis, A. Heston and R. Summers, The John Hopkins University Press, Baltimore, 1982.

for the European Union[15], providing technical and financial assistance to regional comparisons in Africa and encouraging the OECD to become involved in the work. The third and most significant development was the regionalisation of the ICP.

I.8 The need for regionalisation became evident in several respects during Phase III. It was clear that, as the number of participating countries increased, a highly centralised scheme of organisation was no longer feasible, especially as there was no one international body in a position to manage it. Early results from Phase III had indicated that countries within regions tended to form more or less homogeneous subsets and it was recognised that there were operational advantages in grouping countries according to their geographical proximity. The Phase III comparison for the European Union had demonstrated that a comparison tailored to meet the specific requirements of a region need not jeopardise the larger comparison of which it is a part. Eurostat had made the comparison using a different list of representative items and different methods to calculate and aggregate PPPs. At the same time, the basic methodological rules and classification system of the ICP had been retained and the price and expenditure data could still be used for the world comparison.

I.9 Regionalisation placed a greater share of the work on the regional organisations of the United Nations, namely: the Economic Commission for Europe (ECE), the Economic Commission for Latin America and the Caribbean (ECLAC), the Economic and Social Commission for Asia and the Pacific (ESCAP) and the Economic and Social Commission for Western Asia (ESCWA). This left UNSD at the centre to coordinate the regional comparisons and to ensure that they could be linked in a global comparison. Two rounds of the ICP were completed after regionalisation: Phase IV which covered 60 countries and had 1980 as the reference year[16]; and Phase V which covered 64 countries and had 1985 as the reference year[17]. A third round, Phase VI, covering 83 countries and having 1993 as the reference year, was started but not completed.

Box I.1: ICP comparisons 1970 to 2011 (countries by region)

Region	Research phases			Operational phases				
	Phase I 1970	Phase II 1973	Phase III 1975	Phase IV 1980	Phase V 1985	Phase VI 1993	ICP 2005	ICP 2011
Africa	1	1	3	15	22	22	48	52
Middle East	-	-	1	1	-	9	11	13
Asia & Pacific	2	6	9	8	13	16	27	43[a]
N. America	1	1	1	2	2	2	2	2
C. & S. America	1	1	5	16	7	-	11	41[b]
Europe & C. Asia	5	7	15	18	20	34	48	49
Total	**10**	**16**	**34**	**60**	**64**	**83**	**147**	**200**
Published	1975	1978	1982	1986/7	1994	---	2007/8	2013

[a] Includes 15 Pacific islands
[b] Includes 21 Caribbean islands.

[15] At this time it was *European Community*. It became *European Union* with the signing of the Maastricht Treaty in November 1993. European Union is used throughout this Annex.

[16] World Comparisons of Purchasing Power and Real Product for 1980: Part One, Summary Results for 60 Countries, United Nations and Eurostat, New York, 1986; and World Comparisons of Purchasing Power and Real Product for 1980: Part Two, Detailed, Summary Results for 60 Countries, United Nations and Eurostat, New York, 1987.

[17] World Comparisons of Purchasing Power and Real Product, 1985: Phase V of the International Comparison Programme, United Nations and Eurostat, New York, 1994.

I.10 Box I.1 summarises the regional distribution of countries that participated in the first six rounds of the ICP. It also gives the years when the global results were published. Until Phase VI, there was on average a six year gap between the reference year and the year of publication. This delay was tolerated while the project was primarily engaged in research, but was considered unacceptable once the project became operational. The project was also heavily criticised for its limited and uneven coverage of the regions. Its nadir was Phase VI when there was no regional comparison in Central and South America and only results for the regional comparisons carried out in Africa[18], the Middle East[19], Asia[20] and Europe[21] were published. As these regional results could not be combined, there were no global results and no global report.

I.2.3 Ryten report[22]

I.11 After Phase VI failed to produce a world comparison, the United Nations Statistical Commission (UNSC) decided at its twenty-ninth session (New York, February 1997) that the ICP should be thoroughly reviewed before any further round was attempted. A consultant (Jacob Ryten) was recruited to establish whether or not the ICP should continue and, if it should, what improvements were required and how these improvements should be brought about. The consultant's report was presented to the UNSC at its thirtieth session (New York, March 1999). It concluded that PPPs and PPP-related statistics are needed, but that the ICP was not producing these data on a timely and regular basis for a sufficient number of countries as required by important potential users such as the World Bank.

I.12 Poor management and insufficient resources at all levels – central, regional and national - were identified as the principal reasons for this. Other important contributory factors included inadequate documentation, heavy data requirements that did not take account of the circumstances of individual countries, lack of uniformity in the execution of activities across regions, lack of confidence among countries that others were following guidelines and standards consistently, and failure to involve countries in the editing and calculation stages of the exercise. The report recommended that the UNSC should not sanction a new round until at least the management and resource issues had been addressed.

I.13 The UNSC response to the report was to ask the World Bank – the de facto global coordinator of the ICP since 1993 - to a propose a strategy for a comprehensive solution to the deficiencies identified by the consultant. The World Bank, in consultation with other interested agencies, drew up an implementation plan for a new round of the ICP. The plan involved mobilising funds from a variety of sources and establishing a governance infrastructure to provide effective management and coordination – both at and between - the central, regional and national levels. It also involved providing complete clearly-written documentation on technical and procedural guidelines and standards, allowing countries to participate in a full comparison covering GDP or a partial comparison covering final consumption expenditure, using, as far as possible, regular national statistical programmes to obtain price and national accounts data for the ICP, and linking participation in the ICP with national statistical capacity building.

I.14 The UNSC considered the implementation plan at its thirty-first session (New York, March 2000) and again at its thirty-second session (New York, March 2001). It was particularly concerned about securing adequate funding before starting another round. The World Bank, in the meantime, had embarked on a successful major fund raising exercise and, at its thirty-third session (New York, March 2002), the UNSC agreed to a new round.

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18 Comparisons of Price Levels and Economic Aggregates: The Results of 22 African Countries, M. Mouyelo-Katoula and K. Munnsad, Eurostat, Luxembourg, 1996.

19 Purchasing Power Parities; Volume and Price Level Comparisons for the Middle East, 1993, Economic Commission for Western Asia (ESCWA) and the World Bank, Amman, 1997.

20 ESCAP Comparisons of Real Gross Domestic Product and Purchasing Power Parities, 1993, United Nations, Bangkok, 1999.

21 "International Comparison of Gross Domestic Product in Europe 1993", *Conference of European Statisticians Statistical Standards and* Studies, No. 47, United Nations, New York and Geneva, 1997.

22 Evaluation of the International Comparison Programme, Jacob Ryten, E/CN.3/19999/8, November 1998.

I.2.4 ICP 2005

I.15 The new round started in 2003 and finished in 2008. Its reference year was 2005. Regional comparisons were organised by the ICP regional coordinating agencies – namely: the African Development Bank, the Asian Development Bank, ESCWA, ECLAC and Statistics Canada, and the Statistical Office of the Commonwealth of Independent States (CISSTAT) and the Federal State Statistical Services of the Russian Federation on Statistics (Rosstat) – and by Eurostat and the OECD[23]. The ICP Global Office was established at the World Bank to provide overall coordination and to ensure technical and procedural uniformity across the regions. The Global Office was also responsible for organising the *ring comparison* which, by comparing a small number of countries from each region across regions, provided the means to link the regional comparisons with each other in one global or worldwide comparison.[24] The regional distribution of countries that took part in ICP 2005 is given in Box I.1. Final results of the regional and global comparisons were published at the end of 2007 and the beginning of 2008.[25]

I.16 ICP 2005 was a success. It covered 147 countries, including major emerging economies such as Brazil, China, India, Indonesia, the Russian Federation and South Africa, and results were published on a timely basis. An important contributory factor was the governance structure that the World Bank put in place prior to the start of the exercise to ensure that the ICP regional coordinating agencies would deliver within a common time frame regional results that would be consistent across regions and which could be combined in a world comparison. Working through the Global Office to attain these objectives were the Executive Board and the Technical Advisory Group. The Executive Board was made up of eminent economists and statisticians and experienced statistical managers. Its role was to provide strategic leadership and make decisions about priorities, standards, overall work programme and budget. It also oversaw the activities of the Global Office which reported to the Board on a regular basis. The Technical Advisory Group was made up of internationally known experts in price statistics or national accounts appointed by the Executive Board. It was responsible for providing technical advice and for resolving conceptual and methodological issues. The governance structure was retained after ICP 2005 to commence preparations for the next round of the ICP.

I.2.5 ICP 2011

I.17 The round will have 2011 as its reference year and is expected to cover some 200 countries. Their distribution by region is shown in Box I.1. Among the 200 expected participants are 15 Pacific islands and 21 Caribbean islands. Price collection in these two groups of islands will take place in 2012 and not 2011. Moreover, the Pacific islands will only collect prices for a limited number of consumer items. There will not be a ring comparison with which to combine regional comparisons in a global comparison. Instead, regional comparisons will be linked through participating countries pricing a selection of products chosen from a global list of core products that has been integrated with their regional product list. The list of core products has been compiled by the Global Office in consultation with regional organisers and covers all component expenditures of GDP for which prices are collected. Publication of the results of the global comparison is planned for the end of 2013. Regional results will be published beforehand.

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[23] Strictly speaking, the comparisons organised by Eurostat and the OECD are not regional. They cover countries in North, South and Central America, Asia and the Pacific, Middle East, Central Asia and Europe. These countries are treated as a "region" for ICP management and organisation. Similarly, neither Eurostat nor the OECD are ICP regional coordinating agencies, though they are often referred to as such for ICP purposes.

[24] The ring comparison covered eighteen countries spread over five regions: Cameroon, Egypt, Kenya, Senegal, South Africa and Zambia from Africa; Hong Kong China, Malaysia, Philippines and Sri Lanka from Asia; Brazil and Chile from South America; Jordan and Oman from Western Asia; and Estonia, Japan, Slovenia and United Kingdom from Eurostat-OECD. There were no countries from the CIS region. Instead, CIS regional results were first linked to Eurostat-OECD results using the Russian Federation as a bridge country (the Russian Federation had participated in both the CIS comparison and the Eurostat-OECD comparison) and then to the global comparison through the Eurostat-OECD ring countries.

[25] *Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Program*, World Bank, Washington DC, 2008 at http://go.worldbank.org/U6HXIPKWA0. For reports on the regional comparisons in Africa, Asia and the Pacific, South America and Western Asia, refer to http://go.worldbank.org/YBYRDMZT80. The combined results of the 2005 Eurostat-OECD comparison and the 2005 CIS comparison are published in *PPPs and Real Expenditures, 2005 Benchmark year*, OECD, Paris, 2007.

I.3 European Comparison Programme

I.18 One of the regional comparison programmes that resulted from the regionalisation of the ICP was the European Comparison Programme (ECP). It was launched at the twenty-seventh plenary session of the Conference of European Statisticians (Geneva, June 1979). The ECE became responsible for the ECP and published the results of its comparisons, but the actual comparisons were organised by other agencies. This was because the ECP was an amalgam of independent comparisons involving different groups of countries. The Eurostat-OECD PPP Programme was central to the ECP and brought with it coverage beyond Europe through the inclusion of non-European OECD Member Countries.

Box I.2: ECP comparisons 1980 to 1996 (countries by group)

ECP	1980	1985	1990	1993	1996
Group I	18	22	24	24	30
Group II	3	3	6	15	13
Group III	-	-	-	-	9
Total	**21**	**25**	**30**	**39**	**52**

I.19 Box I.2 summarises country participation and organisation during the five rounds of the ECP that were conducted between 1980 and 1996.[26] Before 1996, the ECP covered two groups of countries. Group I consisted of the countries that were participating in the comparisons organised by Eurostat and the OECD for their joint programme. These countries are listed in Annex Table B and Annex Table C. Group II consisted of countries from central and eastern Europe that were participating in the comparisons coordinated by Statistics Austria specifically for the ECP at the request of the ECE. These countries are listed in Annex Table D.

I.20 Group I comparisons were multilateral comparisons, based on a common basket of goods and services, with each country being compared directly with each of the other participating countries. Group II comparisons were bilateral comparisons with each country compared directly with Austria. Each bilateral comparison was based on a different basket of goods and services. Quality adjustments were made when it proved impossible to find strictly comparable goods and services. Adjustments were also made for differences in the productivity of producers of non-market services such as general public administration, health and education. (Neither quality adjustments nor productivity adjustments were a feature of Group I comparisons.) Comparisons between Group II countries were made through Austria. Comparisons between countries in Group I and countries in Group II were also made through Austria. Austria participated in the comparisons of both groups for this purpose.[27]

I.21 The 1996 comparison was a turning point for the ECP. It had three important features. The first was that a third group of countries, Group III, was included in the ECP. The group was made up of the member countries of the Commonwealth of Independent States (CIS) - except Ukraine - plus Mongolia and Turkey. These countries are listed in Annex Table E. The Group III comparison was a

[26] "International Comparison of Gross Domestic Product in Europe 1980", *Conference of European Statisticians Statistical Standards and Studies*, No. 37, United Nations, New York, 1985; "International Comparison of Gross Domestic Product in Europe 1985", *Conference of European Statisticians Statistical Standards and Studies*, No. 41, United Nations, New York, 1988; "International Comparison of Gross Domestic Product in Europe 1990", *Conference of European Statisticians Statistical Standards and Studies*, No. 45, United Nations, New York and Geneva, 1994; "International Comparison of Gross Domestic Product in Europe 1993", *Conference of European Statisticians Statistical Standards and Studies*, No. 47, United Nations, New York and Geneva, 1997; "International Comparison of Gross Domestic Product in Europe 1996", *Conference of European Statisticians Statistical Standards and Studies*, No.50, United Nations, Geneva, 1999.

[27] See "Comparisons for countries of central and eastern Europe: an informal report", Alfred Franz, *International and Interarea Comparisons of Income, Output and Prices,* edited by A. Heston and R. Lipsey, *National Bureau of Economic Research, Studies in Income and Wealth,* Volume 61, Chicago University Press, 1999

multilateral comparison. It was managed by the OECD with the assistance of CISSTAT, Rosstat and the State Institute of Statistics of Turkey. Countries in Group III were compared with countries in Group I and Group II through Austria. The link between Group III and Austria was established through the four countries in Group III that had participated with Austria in one of the other groups – the Russian Federation, Belarus and Moldova in Group II and Turkey in Group I.

I.22 The second feature of ECP 1996 was that the comparisons in Group II were organised as a single multilateral comparison and not as a set of bilateral comparisons with Austria. Quality adjustments were discontinued because, with the adoption of a multilateral approach and the opening up of markets in the transition economies of Group II, it became easier for countries to price comparable products. Productivity adjustments were also stopped. This was to ensure that the treatment of non-market services was the same for the EU Candidate Countries in Group II as it was for the EU Member States and the EU Candidate Countries in Group I.[28] These changes aligned the methodology of Group II with that used in the other two groups.

I.23 The third feature was the start of the break-up of Group II. The Czech Republic, Hungary, Poland and Slovakia – countries which originally had participated in Group II comparisons - moved to Group I as OECD accession countries. The Russian Federation and Slovenia, while remaining in Group II, also participated in the Group I comparisons on an experimental basis. After ECP 1996, Group II no longer existed. EU Candidate Countries from Group II moved to Group I to work with Eurostat. Croatia, FYR of Macedonia and Ukraine also joined Group I, but to work with the OECD. Belarus and Moldova, as CIS countries, joined Group III which since 2000 has been an independent comparison programme organised by CISSTAT and Rosstat. The results of all ECP comparisons carried out between 1980 and 1996 were published with Austria as the reference country and the Austrian schilling as numéraire.

I.24 Although the ECP formally ceased to exist after 1996, the term is still in use as shorthand for the Eurostat PPP Programme.

I.4 Eurostat-OECD PPP Programme

I.25 Annex Table B traces the evolution of the Eurostat PPP Programme. Although EU Member States were involved in a comparison for 1970[29], the first official comparison conducted by Eurostat was for 1975. It covered the nine countries that were EU Member States at that time.[30] Subsequently, until 1990, Eurostat carried out comparisons every five years, in 1980[31], 1985[32] and 1990[33]. These comparisons were principally for EU Member States and countries like Greece, Portugal and Spain that were in line for EU membership. But countries falling into neither of these two categories - such as Israel in 1980[34], Austria in 1980[35], 1985 and 1990, and Switzerland in 1990 - also participated. Austria's participation was occasioned by the need to provide a "bridge" between the EU Member States and other countries in ECP Group I and the eastern and central European countries in ECP Group II. Throughout these first twenty years, the Programme was under the direction of Hugo Krijnse Locker.

I.26 After 1990, Eurostat adopted the rolling benchmark or rolling survey approach[36] and started making annual comparisons.[37] At the same time, the number of countries covered rose from 14 in

[28] The other option – that is, Group I adopting productivity adjustments – was not considered because, as explained in Chapter 9, Section 9.5, EU Member States and others in Group I considered the productivity adjustments of Group II to be too subjective and not sufficiently rigorous.

[29] See "Comparaison réelle du produit intérieur brut des pays de la Communauté européenne", V. Paretti, H. Krijnse Locker and P. Goybet, *Analyse et Prévision*, June 1974, Number 6.

[30] Comparison in Real Values of the Aggregates of ESA, 1975, Eurostat, Luxembourg, 1977.

[31] Comparison in Real Values of the Aggregates of ESA, 1980, Eurostat, Luxembourg, 1983.

[32] Purchasing Power Parities and Gross Domestic Product in Real Terms, Results 1985, Eurostat, 1987.

[33] Comparison in Real Values of the Aggregates of ESA, Results for 1990 and 1991, Eurostat, Luxembourg, 1993.

[34] Comparison of National Accounts Aggregates between Israel and the European Community, Eurostat, Luxembourg, 1985

[35] Comparison of National Accounts Aggregates between Austria and the European Community, Eurostat, Luxembourg, 1984.

[36] Originally called the *rolling benchmark approach*. It is now referred to as the *rolling survey approach*.

1991 to 19 in 1994 after which it stayed stable until 1999. The increase was due to the continuing enlargement of the European Union and to countries of the European Free Trade Association (EFTA)[38] harmonising their statistics and statistical programmes with those of EU Member States. In 1999, the number of countries covered by Eurostat comparisons rose to 31 with the inclusion of the 13 countries that were candidates for EU membership. To accommodate this increase, Eurostat had to rethink the whole modus operandi of its comparisons. This led to the so called *ECP Reform* described in Section I.4.4.

I.27 Encouraged and assisted by Eurostat, the OECD began organising comparisons for those OECD Member Countries that were not already included in Eurostat comparisons in the early 1980s. The first comparison had 1980 as the reference year, but data collection did not start until 1983 and, as can be seen from Annex Table C, was limited to four countries. Two of these - Japan and the United States – were major non-European economies of particular interest to the European Commission because of their trade and investment links with the European Union. The results of this retrospective exercise were combined with those from the Eurostat comparison, thereby covering 18[39] of the OECD's 24 Member Countries.[40]

I.28 Thereafter the OECD worked closely with Eurostat to effect comparisons for 1985 and 1990. When put together, the Eurostat and OECD comparisons covered 22 OECD Member Countries in 1985[41] and all 24 OECD Member Countries in 1990[42]. It was during this time that formal agreements between the two organisations were made to establish the Eurostat-OECD PPP Programme. Eurostat and the OECD agreed to coordinate the data collections in two different groups of countries with the object of combining the data sets of the two groups in a single comparison. Coverage of the combined Eurostat-OECD comparisons is shown in Box I.3.

Box I.3: Eurostat-OECD Comparisons 1980 to 2011

Countries coordinated by:	1980	1985	1990	1993	1996	1999	2002	2005	2008	2011
Eurostat	**13**	**13**	**14**	**16**	**19**	**31**	**31**	**37**	**37**	**37**
- EU Member States	10	10	12	12	15	15	15	25	27	27
- Non-EU OECD countries	3	3	2	4	4	8	8	4	4	4
- Other countries	-	-	-	-	-	8	8	8	6	6
OECD	**5**	**9**	**10**	**8**	**13**	**12**	**11**	**9**	**9**	**10**
- Non-EU OECD countries	5	9	10	8	9	7	7	7	7	9
- Other countries	-	-	-	-	4	5	4	2	2	1
Total	**18**	**22**	**24**	**24**	**32**	**43**	**42**	**46**	**46**	**47**

I.29 When Eurostat adopted the rolling survey approach after the 1990 comparison, the OECD followed suit, but only with respect to the three-year survey schedule for consumer goods and services. It did not adopt the schedule of yearly price surveys for equipment goods and construction projects that the annual comparisons required. Instead, because of the cost involved in pricing

37 Comparison in Real Values of the Aggregates of ESA, Results for 1990 and 1991, Eurostat, Luxembourg, 1993; Comparison in Real Values of the Aggregates of ESA, Results for 1992 and 1993, Eurostat, Luxembourg, 1995; Comparison in Real Values of the Aggregates of ESA, Results for 1994, Eurostat, Luxembourg, 1996; Purchasing Power Parities and Related Economic Indicators, Results for 1995 and 1996, Eurostat, Luxembourg, 1999; Purchasing Power Parities and Related Economic Indicators, Results for 1997, Eurostat, Luxembourg, 1999; Purchasing Power Parities and Related Economic Indicators, Results for 1998, Eurostat, Luxembourg, 2000.

38 Iceland, Norway and Switzerland, but not Liechtenstein.

39 Twelve EU Member States plus Austria, Canada, Japan, Norway, the United States. In 1980 Finland participated in ECP Group II. It was included in the combined Eurostat-OECD comparison through Austria.

40 Purchasing Power Parities and Real Expenditures in the OECD, M. Ward, OECD, Paris. 1985.

41 Purchasing Power Parities and Real Expenditures, 1985, OECD, Paris, 1987.

42 Purchasing Power Parities and Real Expenditures, 1990, Volume 1, EKS Results, OECD, Paris, 1992; Purchasing Power Parities and Real Expenditures, 1990, Volume 2, GK Results, OECD, Paris, 1993; Purchasing Power Parities and Real Expenditures for Nordic Countries, 1990, OECD, Paris, 1992; Purchasing Power Parities and Real Expenditures for Canada and the United States, 1990, OECD, Paris, 1993.

capital goods and the resource constraints of countries participating in OECD comparisons, it was decided they would only price capital goods every third year.[43] Since 1990, OECD comparisons have been three yearly – 1993[44], 1996[45], 1999[46], 2002[47], 2005[48] and 2008[49].

I.30 From Box I.3, it can be seen that the number of countries being managed by the OECD has fluctuated from comparison to comparison. Prior to 1993, this was due the increased coverage of non-EU OECD Member Countries. After 1993, it can be explained partly by an expansion in OECD membership, partly by OECD Member Countries moving over to participate in Eurostat comparisons, usually as candidates for EU membership, and partly because countries that are neither OECD Member Countries nor EU Member States have joined the comparison as a result of the ECP Reform and the breakup of ECP Group II.

I.31 From the beginning, Eurostat has published the results of comparisons with the European Union as reference and an artificial currency unit – the *purchasing power standard* (PPS) - as numéraire. (The PPS is, in effect, the average of the currencies of all EU Member States.) The OECD published the results of the 1980 and 1985 comparisons with the United States as reference country and the international dollar as numéraire because coverage of OECD Member Countries was incomplete. From 1990, when all Member Countries started to participate in the Programme, the OECD has published results of comparisons with the OECD as reference and *OECD dollars* as numéraire. (The OECD dollar, like the PPS, is an artificial currency unit. It is the average of the currencies of all OECD Member Countries.)

I.4.1 EKS-GK controversy

I.32 Prior to 1980, the ICP employed the Country-Product-Dummy (CPD) method to calculate PPPs at the basic heading level and the Geary-Khamis (GK) method to aggregate the basic heading PPPs up to the level of GDP. These methods were not generally accepted at the time and their advantages and disadvantages relative to other methods are still a subject of debate among experts. Regionalisation allowed the use of alternative methods. Eurostat and OECD comparisons have always used the Èltetö-Köves-Szulc (EKS) method to calculate PPPs at the basic heading level. Eurostat would also have liked to move away from the GK method of aggregation – for the 1975 comparison it had employed the Gerardi method – but it did not do so. Instead, in consultation with the UNSD and the ECE, it commissioned a study to investigate the relative merits of the GK method and the Gerardi method.[50] The study favoured the GK method and it was used by Eurostat and the OECD for their 1980 and 1985 comparisons.

I.33 Subsequently, Eurostat proposed that the EKS method be used to aggregate basic heading PPPs because it provided volume indices that were free of the Gerschenkron effect and that these indices were better suited to the requirements of users within the European Commission. The OECD, on the other hand, wanted to retain the GK method, because, while its volume indices were not free of the Gerschenkron effect, the real expenditures on which the indices were based were additive - which EKS real expenditures are not - and, as such, more relevant to the type of analysis carried out by OECD economists. Consequently, in 1988 and again in 1989, the UNSD, the OECD and Eurostat jointly convened a meeting of experts to discuss aggregation methods. The experts recognised that comparison results serve many different purposes and that there was no one method of aggregation

[43] An important difference between Eurostat and the OECD is that Eurostat funds a major part the data collection in most of its countries. OECD countries pay for the data collections themselves. This places an additional burden on their already limited statistical resources. The pricing of capital goods, particularly the pricing of construction projects which usually has to be contracted out to consultants, is especially onerous.

[44] Purchasing Power Parities and Real Expenditures, 1993, Volume 1, EKS Results, OECD, Paris, 1995; Purchasing Power Parities and Real Expenditures, 1993, Volume 2, GK Results, OECD, Paris, 1996; Purchasing Power Parities and Real Expenditures for Nordic Countries, 1993, OECD, Paris, 1995.

[45] Purchasing Power Parities and Real Expenditures, 1996 Results, OECD, Paris, 1999.

[46] Purchasing Power Parities and Real Expenditures, 1999 Results, OECD, Paris, 2002.

[47] Purchasing Power Parities and Real Expenditures, 2002 Results, OECD, Paris, 2004.

[48] Purchasing Power Parities and Real Expenditures, 2005 Results, Eurostat and OECD, Paris, 2007.

[49] http://stats.oecd.org/Index.aspx?DataSetCode=PPP2008

[50] Multilateral Measurements of Purchasing Power and Real GDP, P. Hill, Eurostat, 1982.

which can be considered satisfactory for all these purposes. They recommended the calculation and dissemination of two sets of results: one set to be aggregated using the EKS method, the other to be aggregated using the GK method.[51]

I.34 Both Eurostat and the OECD accepted the experts' recommendations in principle, but there was a practical difficulty to it being adopted. The results for EU Member States were used for administrative purposes – the allocation of structural funds - as well as for economic analysis. For this reason, Eurostat required that only one set of results be recognised as the official results for the European Union and that only these official results be disseminated initially. Eurostat selected the EKS results as the official results for the European Union.[52] The OECD agreed to publish these first and to publish the GK results a year later. This allowed time for the EKS results to be accepted as official and avoided any confusion that could arise from the simultaneous dissemination of two sets of results. This solution was adopted for the 1990 and 1993 comparisons.[53] Since the 1996 comparison, the OECD has published a complete set of EKS results together with a selected set of GK results. The GK results published are those relevant to the comparative analysis of price and volume structures of countries. As such they complement the EKS results which are better suited to comparing the prices and volumes of individual aggregates across countries.

I.4.2 Fixity

I.35 The EKS-GK controversy was not the first time that the need to have only one set of official results for EU Member States had been faced by Eurostat and the OECD. Because the relative position of countries can change as the compositions of the group of countries being compared changes, the inclusion of the EU Member States in the comparison covering all OECD Member Countries could change the relativities established between them when they were compared just among themselves. To avoid this, Eurostat and the OECD adopted the *fixity convention*. This convention ensures that the price and volume relativities established by Eurostat between EU Member States remain unchanged, or fixed, when the EU Member States are included in the OECD or other comparisons that encompass a wider group of countries. It has been observed since the 1980 comparison.

I.36 Fixity has now a more general application than just Eurostat and OECD comparisons. Most countries participating in a comparison that is subsequently to be combined with another comparison expect fixity. It ensures that they have only one set of results to explain to users. Hence, in ICP 2005, the relativities established between countries in their regional comparison remained unchanged when they were included with other regions in the world comparison. This will also be the case when the global results of ICP 2011 are published.

I.4.3 Castles report[54]

I.37 After the publication of the results of the 1993 round, the usefulness and reliability of the Eurostat-OECD PPP Programme were questioned by a number of non-European OECD countries which felt that the resources they allocated to participation would be better employed on their own statistical priorities. The OECD response was to anticipate the reassessment that the United Nations was proposing to make of the ICP by recruiting a consultant (Ian Castles) in 1996 to review the Eurostat-OECD PPP Programme. The consultant was to focus on the uses to which PPPs and PPP-related statistics were put by different users, the extent to which the PPPs produced by Eurostat and the OECD met the needs of these users, the alternative ways of comparing comparison resistant goods and services - such as the non-market services produced by government, equipment goods and construction - and the difference that would be made to the existing burden on the statistical resources of participating countries if the alternative ways of comparing comparison resistant goods and services were to be adopted.

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51 This recommendation was subsequently included in the SNA 93. See paragraph 16.103.

52 This is the approach adopted in the ESA 95. See paragraphs 10.73 and 10.74.

53 See footnotes 38 and 40.

54 *Review of the OECD-Eurostat PPP Programme*, I. Castles, unpublished OECD document, STD/PPP(97)5, September 1997.

I.38 The consultant's report was considered by all countries participating in the Programme at the meeting convened by Eurostat and the OECD to examine the preliminary results of the 1996 round (Paris, November 1997). It was also discussed, mainly by non-European OECD countries, at a meeting that the OECD held in New York during the UNSC of February 1998. The report commenced by affirming the need for PPPs and the international volume and price comparisons they facilitate. It made two main proposals:

- Because the Programme approached the calculation of real GDP from the expenditure side rather than the production side, its results were of limited value for analysts concerned with the measurement of the output or productivity of particular industries. They were of much greater usefulness for those concerned with the measurement of real incomes and the command over goods and services enjoyed by the recipients of income in their capacity as consumers. Expenditures on government consumption and capital formation could be viewed as household consumption expenditure forgone and treated accordingly - that is, by converting both aggregates to real expenditures using the PPPs for private consumption.
- Alternatively, consideration could be given to abandoning the input-price approach for non-market services and derive government consumption in real terms either directly using physical measures of output or indirectly using PPPs based on output prices collected for market services. (Real expenditure on capital formation would still be obtained using the PPPs for private consumption.)

Adoption of either of these proposals would reduce the response burden on participating countries which would no longer be required to carry out the difficult and expensive task of pricing equipment goods and construction projects.

I.39 Participating countries agreed that the consultant was correct to identify the PPPs for government consumption and capital formation as among the least reliable of the PPPs estimated by the Programme. They did not accept that providing comparative measures of welfare as defined by the report was the only use of PPPs estimated from the expenditure side. The main objective of the Programme was to make volume comparisons of GDP and its component expenditures. Using the PPPs for private consumption as reference PPPs for government consumption and capital formation was not compatible with this objective. Most countries were of the opinion that there was a considerable analytical interest among users, such as economists and researchers, in PPPs for capital formation and that rather than abandon them Eurostat and the OECD should work on improving their accuracy. Countries supported the consultant's recommendation that physical output indicators be developed for deriving real expenditure on government consumption, but recognised that this was a long-term goal dependent on the research that they themselves were undertaking to improve the quality of their national accounts estimates of non-market services. In the short term, Eurostat and the OECD should be working to improve the representativeness of the input prices collected.

I.40 The consultant also proposed that responsibility for the results of the Programme should be accepted by Eurostat and the OECD and that it should not be shared with the statistical agencies of participating countries. Almost all countries disagreed with the proposal. They preferred that responsibility for the results of the Programme should continue to be shared by Eurostat, the OECD and participating countries. This was of particular relevance to EU Member States because, within the European Union, PPPs are used for administrative purposes as well as for statistical purposes. Shared responsibility required Eurostat and the OECD to improve the transparency of their editing and calculation procedures.

I.41 Castles' review of the Eurostat-OECD PPP Programme was an important milestone in its history. Most significantly, it confirmed the usefulness of PPPs and fostered a better understanding of their respective responsibilities and roles between Eurostat, the OECD and participating countries. In addition, it identified areas of weakness such as the poor quality of PPPs for non-market services and capital goods, the need for better checks on pricing inconsistencies between benchmarks, the need to investigate the use of alternative data sources available to Eurostat and the OECD, and the lack of transparency of the methodology employed.

I.4.4 ECP reform

I.42 Thirteen EU Candidate Countries were included in Eurostat comparisons in 1999. At the time, three of the countries - Poland since 1994, Cyprus since 1997 and Malta since 1998 – were already participating in Eurostat comparisons, five of them – the Czech Republic, Hungary, Slovakia, Slovenia and Turkey – were participating in OECD comparisons, while the remaining five – Bulgaria, Estonia, Latvia, Lithuania and Romania – were still participating in ECP Group II comparisons. The reorganisation completed the break-up of ECP Group II referred to earlier. It also increased the number of countries working with Eurostat from 20 to 31.

I.43 Eurostat was already experiencing difficulties coordinating the activities of the 20 countries. With the arrival of eleven more countries pending, it became imperative to find a new way operating. The surveys that were proving particularly hard to organise centrally were - with the exception of the rent survey and the survey of medical goods and services[55] - the consumer price surveys. The product lists for these surveys were becoming unmanageable making countries increasingly reluctant to conduct the pre-surveys essential to their updating. The pre-survey work that was done usually resulted in more products being added to the list than were removed from the list. Each new country introduced into the comparison inevitably lengthened the lists further as its products were added to them. Countries complained that the longer the product lists the more laborious and inefficient became their selection of the subset of products to price. In short, the product lists were not user friendly and this was detrimental to the quality of the prices collected.

I.44 It was decided to decentralise the management of these consumer surveys. Countries would be broken down into three groups. Each group would be comprised of countries that were relatively homogeneous thereby making it easier to draw up representative product lists. Each group would consist of a balanced mix of experienced EU Member States and inexperienced EU Candidate Countries thereby facilitating the integration of the candidate countries into the comparison. Each group would also have a group leader selected from among the countries in the group. The group leader would be responsible for: drawing up the product lists for the surveys in consultation with the other members of the group; visiting group members to ensure uniformity of product selection and pricing procedures; and editing the price data provided by group members. The group leaders together with Eurostat would also be responsible for ensuring that the product lists for the three groups had a sufficient number of overlap products at each basic heading so the comparisons could be effected across groups. The overall result of the reform would be smaller more manageable lists, more rigorous pre-surveys, easier selection of products for pricing and improved quality of price data.

I.45 The reform did not touch organisation of other surveys. The surveys dealing with rents, medical goods and services, consumer price indices, compensation of employees in general government, public education and public hospitals, equipment goods, construction projects and expenditure weights would continue to be managed centrally by Eurostat.

I.46 The three groups that were introduced in 1999, together with their constituent countries and their leaders, are shown in Annex Table F. In 2004, a new group leader was appointed for the Southern Group, otherwise, as can be seen from Annex Table G, group leaders and the composition of their groups remained unchanged until 2010. A further development in 2004 was the creation of a fourth group covering six countries in the Western Balkans. Slovenia was the group leader and, as it was a member of the Central Group headed by Austria, acted as the bridge country between the two groups. The Western Balkan Group was in effect a semi-detached subgroup of the Central Group. It was not until 2010 when the four groups were reconstituted and renamed that the six Western Balkan Countries were fully integrated. The composition of the four groups is given in Annex Table H.

I.4.5 Recent developments

I.47 The Eurostat-OECD PPP Programme evolves continually and there have been a number of developments since the ECP Reform. Of these, the two most significant from a historical perspective

[55] At the time, a special, centrally coordinated survey on medical goods and services was part of the Programme.

were the publication of a methodological manual[56] in 2006 and the adoption by the European Parliament and Council of the PPP Regulation[57] in 2007.

I.48 Prior to 2006, the methods and procedures employed by the Eurostat-OECD PPP Programme were described in an assortment of reports and papers. But these reports and papers tended to be either too general in their description of the approach followed or too focused on specific methodological issues. There was no single document covering the Programme in detail from start to finish. Practitioners involved directly in the implementation of the Programme found the absence of such a document particularly irksome. To rectify this omission and in anticipation of the PPP Regulation which, when approved, would require the provision of a methodological manual, Eurostat and the OECD prepared the manual published in 2006. It explained the methods and procedures that were employed by the Programme at the time of publication. Although intended primarily for those engaged in the Programme, it was also to serve as a source of information for researchers and other users interested in knowing how PPPs are produced.

I.49 The PPP Regulation established within the European Union the rules governing the collection and validation of data for PPPs as well as the rules governing the calculation and dissemination of PPPs. It provided the legal infrastructure for Eurostat comparisons by clearly defining the roles and responsibilities of Eurostat and the EU Member States as well as the methods and procedures to be followed. As mentioned already, the Regulation required Eurostat to provide a methodological manual describing the methods applied at various stages of PPP compilation. It also required Eurostat to revise the manual whenever a significant change to the methodology is made.

[56] Eurostat-OECD Methodological Manual on Purchasing Power Parities, 2005 edition, European Communities/OECD, 2006

[57] Regulation (EC) No 1445/2007 of the European Parliament and of the Council of 11 December 2007 establishing common rules for the provision of basic information on Purchasing Power Parities and their calculation and dissemination.

ANNEX TABLES

Table A: Chronology of the International Comparison Programme (ICP) and the European Comparison Programme (ECP)

1950-1960	1954 and 1958: Experimental comparisons with 9 European countries and United States carried out by the Organisation for European Economic Cooperation (OEEC).		
1960-1970	1968: International Comparison Project launched under the University of Pennsylvania and the United Nations Statistical Division (UNSD).		
1970-1975	Establishing a methodology to allow worldwide comparisons on a regular basis. Three research phases: - 1970 ICP Phase I: 10 countries; - 1973 ICP Phase II: 16 countries; - 1975 ICP Phase III: 34 countries; first official EU comparison organised by Eurostat covering all 9 Member States.		
1975-1980	ICP going operational under UNSD. Regionalisation of the ICP. European Comparison Programme (ECP) launched in 1979 under the European Commission of Europe (ECE). The ECP consisted of two groups: Group I covering Western Europe and non-European OECD countries and organised by Eurostat and the OECD; Group II covering Central and Eastern European Countries organised for the ECE by Statistics Austria. In 1996, Group III covering member countries of the Commonwealth of Independent States (CIS) joined the ECP.		
	ECP		**ICP**
	Group I	**Group II and Group III**	
1980	ECP 1980: 18 countries; EKS method applied below the basic heading, GK method applied above.	ECP 1980: 5 countries; Bilateral comparisons with Austria; Quality and productivity adjustments made.	ICP Phase IV: 60 countries; CPD method applied below the basic heading, GK method applied above.
1985	ECP 1985: 22 countries	ECP 1985: 4 countries	ICP Phase V: 64 countries
1990	ECP 1990: 24 countries; Adoption of the EKS method above the basic heading for official results; First time all OECD member countries included.	ECP 1990: 7 countries	International Comparison *Project* renamed International Comparison *Programme*
1991	Adoption by Eurostat of the rolling survey approach and annual comparisons of GDP; OECD follows the survey cycle for consumer products but retains a three year cycle for comparisons covering all GDP aggregates.		
1993	ECP 1993: 24 countries.	ECP 1993: 16 countries.	ICP Phase VI: 83 countries; regional comparisons but no world comparison.
1996-1998	ECP 1996: 32 countries; Inclusion of some former Group II countries in Group I (OECD accession countries); Castles Report 1997.	ECP 1996 Group II: 14 countries; Multi-lateral comparison with no quality or productivity adjustments; EKS method applied below and above the basic heading; ECP 1996 Group III: 9 countries; EKS method applied below and above the basic heading; Break up of Group II.	Ryten Report 1998: Main conclusion being that ICP should be relaunched with better management and more resources at global, regional and national levels.

	Eurostat-OECD PPP Programme	CIS Comparison Programme	ICP
1999-2000	Eurostat-OECD 1999: 43 countries; ECP Reform: Inclusion of all EU candidate countries in Group I and Division of participating countries into groups; Work on EU PPP Regulation started.	CIS 2000: 12 countries.	
2002-2003	Eurostat-OECD 2002: 42 countries.		Relaunch of the ICP: Establishment of the Global Office at the World Bank in 2003; 2005 to be reference year.
2005	Eurostat-OECD 2005: 46 countries	CIS 2005: 10 countries.	ICP 2005: 147 countries; CPD method applied below the basic heading. EKS method applied above; Regions linked through a comparison of 18 ring or bridge countries.
2006-2007	Eurostat-OECD PPP Manual published in 2006; EU PPP Regulation passed in 2007.		
2008	Eurostat-OECD 2008: 43 countries	CIS 2008 – 5 countries.	Results of ICP 2005 published.
2011	Eurostat-OECD 2011: 47 countries.	CIS 2011 – 9 countries.	ICP 2011: 200 countries; Regions linked through all countries pricing a selection of products from a core list of products.

Note: Since the 2005 comparison, OECD publishes combined results for Eurostat-OECD and CIS countries with Russia as the bridge country.

Table B: Eurostat comparisons 1975 to 2011

Country	Five-year comparisons				Annual comparisons							
	1975	1980	1985	1990	1991	1992	1993	1994 to 1996	1997	1998	1999 to 2004	2005 to 2011
Belgium[1]	x	x	x	x	x	x	x	x	x	x	x	x
France[1]	x	x	x	x	x	x	x	x	x	x	x	x
Germany[1,10]	x	x	x	x	x	x	x	x	x	x	x	x
Italy[1]	x	x	x	x	x	x	x	x	x	x	x	x
Luxembourg[1]	x	x	x	x	x	x	x	x	x	x	x	x
Netherlands[1]	x	x	x	x	x	x	x	x	x	x	x	x
Denmark[2]	x	x	x	x	x	x	x	x	x	x	x	x
Ireland[2]	x	x	x	x	x	x	x	x	x	x	x	x
United Kingdom[2]	x	x	x	x	x	x	x	x	x	x	x	x
Greece[3]		x	x	x	x	x	x	x	x	x	x	x
Portugal[4]		x	x	x	x	x	x	x	x	x	x	x
Spain[4,11]		x	x	x	x	x	x	x	x	x	x	x
Austria[5]		x	x	x	x	x	x	x	x	x	x	x
Switzerland[6]				x	x	x	x	x	x	x	x	x
Finland[5]						x	x	x	x	x	x	x
Sweden[5]							x	x	x	x	x	x
Iceland[6,9]								x	x	x	x	x
Norway[6]								x	x	x	x	x
Poland[7]								x	x	x	x	x
Cyprus[7]									x	x	x	x
Malta[7]										x	x	x
Czech Republic[7]											x	x
Estonia[7]											x	x
Hungary[7]											x	x
Latvia[7]											x	x
Lithuania[7]											x	x
Slovakia[7]											x	x
Slovenia[7]											x	x
Bulgaria[8]											x	x
Romania[8]											x	x
Turkey[9]											x	x
Albania												x
Bosnia-Croatia[9]												x
FYR of Montenegro[9]												x
Serbia												x
Total	**9**	**13**	**13**	**14**	**14**	**15**	**16**	**19**	**20**	**21**	**31**	**37**

[1] Member State since 1958
[2] Member State since 1973
[3] Member State since 1981
[4] Member State since 1986
[5] Member State since 1995
[6] Member of the European Free Trade Association (EFTA)
[7] Member State since 2004
[8] Member State since 2007
[9] Candidate country
[10] West Germany only before 1992
[11] Participated in the 1975 ICP Phase III, but not as part of the Eurostat comparison.

Table C: OECD comparisons 1980 to 2011

Country	Five-year comparisons			Three-year comparisons						
	1980	1985	1990	1993	1996	1999	2002	2005	2008	2011
Canada	x	x	x	x	x	x	x	x	x	x
Japan	x	x	x	x	x	x	x	x	x	x
Norway[3]	x	x	x	x						
United States	x	x	x	x	x	x	x	x	x	x
Australia		x	x	x	x	x	x	x	x	x
Finland[1]		x	x							
New Zealand		x	x	x	x	x	x	x	x	x
Sweden[2]		x	x							
Turkey[4]		x	x	x	x					
Iceland[3]			x	x						
Mexico					x	x	x	x	x	x
Israel					x	x	x	x	x	x
Russian Federation					x	x	x	x	x	x
Czech Republic[4]					x					
Hungary[4]					x					
Slovakia[4]					x					
Slovenia[4]					x					
Korea						x	x	x	x	x
Croatia						x	x			
FYR of Macedonia						x	x			
Ukraine						x				
Chile										x
Total	4	9	10	8	13	12	11	9	9	10

Moved to Eurostat comparisons in [1] 1992; [2] 1993; [3] 1994; [4] 1999.

Table D: Group II comparisons 1980 to 1996

Country	1980	1985	1990	1993	1996
Austria	x	x	x	x	x
Finland[1]	x				
Hungary[2]	x	x	x	x	
Poland[3]	x	x	x	x	
Yugoslavia	x	x	x		
Czechoslovakia			x		
Romania			x	x	x
USSR			x		
Belarus				x	x
Bulgaria				x	x
Croatia				x	x
Czech Republic[2]				x	
Estonia				x	x
Latvia				x	x
Lithuania				x	x
Moldova				x	x
Russian Federation				x	x
Slovakia[(2)]				x	
Slovenia				x	x
Ukraine				x	x
Albania					x
FYR of Macedonia					x
Total	5	4	7	16	14

Moved to OECD comparisons in [1] 1985; [2] 1996. Moved to Eurostat comparisons in [3] 1994.

Table E: Group III/CIS comparisons 1996 to 2011

Country	Group III	CIS comparisons				
	1996	2000	2004	2005	2008	2011
Armenia	x	x	x	x	x	x
Azerbaijan	x	x	x	x		x
Belarus	x	x	x	x	x	x
Georgia	x	x	x	x		
Kazakhstan	x	x	x	x	x	x
Kyrgyz Republic	x	x	x	x	x	x
Moldova	x	x	x	x		x
Russian Federation	x	x	x	x	x	x
Tajikistan	x	x	x	x		x
Turkmenistan	x	x				
Turkey	x					
Ukraine	x		x	x		x
Uzbekistan	x	x				
Mongolia	x	x				
Total	**13**	**12**	**10**	**10**	**5**	**9**

Table F: Eurostat country groups and group leaders, 1999 to 2003

Northern group	Central group	Southern group
Denmark	Austria	Bulgaria
Estonia	Belgium	Cyprus
Finland	Czech Republic	France
Iceland	Germany	Greece
Ireland	Hungary	Italy
Latvia	Luxembourg	Malta
Lithuania	Netherlands	Portugal
Norway	Poland	Romania
Sweden	Slovakia	Spain
United Kingdom	Slovenia	Turkey
	Switzerland	
Group leader	Group leader	Group leader
Finland	Austria	Italy

Table G: Eurostat country groups and group leaders, 2004 to 2009

Northern group	Central group	Southern group	Western Balkan group
Denmark	Austria	Bulgaria	Albania
Estonia	Belgium	Cyprus	Bosnia-Herzegovina
Finland	Czech Republic	France	Croatia
Iceland	Germany	Greece	FYR of Macedonia
Ireland	Hungary	Italy	Montenegro
Latvia	Luxembourg	Malta	Serbia
Lithuania	Netherlands	Portugal	
Norway	Poland	Romania	
Sweden	Slovakia	Spain	
United Kingdom	Slovenia	Turkey	
	Switzerland		
Group leader	Group leader	Group leader	Group leader
Finland	Austria	Portugal	Slovenia

Table H: Eurostat country groups and group leaders as from 2010

Northern group	Western group	Eastern group	Southern group
Denmark	Belgium	Austria	Albania
Estonia	Czech Republic	Bosnia-Herzegovina	Cyprus
Finland	France	Bulgaria	FYR of Macedonia
Iceland	Germany	Croatia	Greece
Latvia	Ireland	Hungary	Italy
Lithuania	Luxembourg	Montenegro	Malta
Norway	Netherlands	Romania	Portugal
Poland	Switzerland	Serbia	Spain
Sweden	United Kingdom	Slovakia	Turkey
		Slovenia	
Group leader	Group leader	Group leader	Group leader
Finland	Netherlands	Austria	Portugal

ANNEX II. EUROSTAT LEGAL FRAMEWORK

II.1 The Annex presents the two regulations referred to in Chapter 3 that provide the legal basis for Eurostat comparisons, namely:

- Regulation (EC) No 1445/2007 of the European Parliament and of the Council of 11 December 2007 establishing common rules for the provision of basic information on Purchasing Power Parities and their calculation and dissemination.

- Commission Regulation (EU) No 193/2011 of 28 February 2011 implementing Regulation (EC) No 1445/2007 of the European Parliament and of the Council as regards the system of quality control used for Purchasing Power Parities.

The two regulations are reproduced as published in the *Official Journal of the European Union*.

II.2 The first regulation, which is referred to as *the PPP Regulation* throughout the manual, sets out rules for the collection and validation of data required for PPPs and for the calculation and dissemination of PPPs and their related price and volume measures. It comprises fifteen articles and two annexes. The second annex lists the basic headings for which PPPs are to be calculated. It is not included in this Annex to avoid duplication with Annex III where the basic headings are not only listed but defined as well.

II.3 The PPP Regulation requires EU Member States to provide Eurostat with all the detail necessary to evaluate the quality of the basic information supplied for a comparison. It also requires EU Member States to provide quality reports on the price and other surveys for which they are responsible. Although the PPP Regulation sets out the minimum quality standards for the basic information and for the validation of price survey results, it has proved necessary to define further the quality criteria and the structures of the quality reports. This is done in the second regulation.

II.4 The second regulation consists of two articles and an annex. The annex specifies the structure and content of the inventory of sources and methods that EU Member States are required to prepare for Eurostat and the structure and content of the reports that EU Member States have to submit to Eurostat after each survey of consumer prices.

ANNEX III. CLASSIFICATION OF GDP EXPENDITURES

III.1 The annex presents the classification of expenditure used for Eurostat and OECD comparisons of GDP. It differs from the classification in Annex II of the PPP Regulation because it has been updated to accommodate the methodological developments that have been introduced into the PPP Programme since 2007 and which will be in place by the end of 2011. The updating has reduced the number of basic headings for construction and education.

III.2 The classification adheres to the definitions, concepts, classifications and accounting rules of the SNA 93[1] and the ESA 95[2]. It is structured by type of expenditure - individual consumption expenditure, collective consumption expenditure and capital expenditure - and, in the case of individual consumption expenditure, by purchaser - households, non-profit institutions serving households (or NPISHs) and general government (or government).

III.3 GDP is broken down into seven main aggregates:

- individual consumption expenditure by households,
- individual consumption expenditure by NPISHs,
- individual consumption expenditure by government,
- collective consumption expenditure by government,
- gross fixed capital formation,
- change in inventories and acquisitions less disposals of valuables,
- balance of exports and imports.

III.4 These seven main aggregates are broken down into 31 expenditure categories, 66 expenditure groups, 143 expenditure classes and 206 basic headings[3] as shown in Box III.1. Of these aggregation levels, the basic heading level is particularly important because it is at this level that expenditures are defined, products selected, prices collected, prices edited and PPPs first calculated and averaged.

III.5 GDP, main aggregates, expenditure categories and expenditure groups are identified in the classification by capital letters and by having one-, two-, four- and five-digit codes respectively. Expenditure classes are underlined and have six-digit codes. Basic headings have seven-digit codes. These distinctions are illustrated in Box III.2. The abbreviations used in the classification are listed in Box III.3.

III.6 Individual consumption expenditures by households, NPISHs and government are classified by purpose following COICOP[4], COPNI[5] and COFOG 98[6]. Gross fixed capital formation is classified by type of product according to CPA 96[7]. The correspondence with COICOP, COPNI and CPA 96 is given at the level of the expenditure class. The correspondence with COFOG 98 is given at the expenditure category level.

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1 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

2 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

3 The version of the classification used for OECD comparisons has 196 basic headings to which the 206 basic headings in the Eurostat version sum exactly. The principal difference between the two versions is that the OECD version has just one basic heading for furniture and one basic heading for NPISHs, whereas the Eurostat version has four basic headings for furniture and six basic headings for NPISHs.

4 "Classification of Individual Consumption According to Purpose (COICOP)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

5 "Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

6 "Classification of the Functions of Government (COFOG)", *Classification of Expenditure According to Purpose*, United Nations, New York, 2000.

7 Statistical Classification of Products by Activity in the European Economic Community (CPA 1996), Eurostat, Luxembourg, 1998.

III.7 ***Individual consumption expenditure by households*** is broken down by purpose in line with COICOP into 143 basic headings. Expenditures at the basic heading level are defined according to the domestic concept - that is, irrespective of whether the household making the purchase in the country is resident or not. But total individual consumption expenditure by households is required by the national concept - that is, it should refer to expenditures by resident households only. A global adjustment – *net purchases abroad* - is made to achieve this. It is defined as total expenditure in the rest of the world by resident households *less* total expenditure in the economic territory of the country by non-resident households.

III.8 The individual consumption expenditures of households are also classified by type of product. Basic headings containing consumer goods are denoted by either (ND), (SD) or (D) indicating *non-durable*, *semi-durable* or *durable* respectively.[8] Basic headings containing consumer services are denoted by (S). Most basic headings comprise either goods or services, but, for practical reasons, some basic headings contain both goods and services. Similarly, there are basic headings which contain either both non-durable and semi-durable goods or both semi-durable and durable goods. Such basic headings are assigned a (ND), (SD), (D) or (S) according to which type of product is considered to be predominant.

III.9 ***Individual consumption expenditure by NPISHs*** is broken down by purpose in line with COPNI into six basic headings: housing, health, recreation and culture, education, social protection and other services (such as religion, political parties, labour and professional organisations and environment protection). By convention all consumption expenditures of NPISHs are treated as individual consumption expenditure and all six basic headings are classified as containing individual services (IS).

III.10 Government final consumption expenditure is broken down by purpose and by type of service in line with COFOG 98 into *individual consumption expenditure by government* and *collective consumption expenditure by government*. Individual consumption expenditure by government is government expenditure on services which households consume individually (housing, health, recreation and culture, education and social protection). Collective consumption expenditure of government is government expenditure on services which benefit households collectively (general public services, defence, public order and safety, economic affairs, environment protection, and housing and community services).

III.11 ***Individual consumption expenditure by government*** is broken down into 21 basic headings. First by purpose - housing, health, recreation and culture, education and social protection - and then, in the case of health, by whether the expenditure is for the purchase of health services from the private sector (in the form of benefits and reimbursements) or the production of health services by government itself. The expenditure on government produced health services is broken down further by cost components as required by the input-price approach[9]. All 21 basic headings are classified as containing individual services (IS).

III.12 ***Collective consumption expenditure by government*** is broken down into seven basic headings by cost components as required by the input-price approach. A distinction is made between *defence services* and *collective services other than defence services*. All seven basic headings are classified as containing collective services (CS).

[8] The distinction between non-durable goods and durable goods is based on whether the goods can be used only once or whether they can be used repeatedly or continuously over a period of considerably more than one year (paragraph 9.38, SNA 93). Durables also have a relatively high purchasers' price. Semi-durable goods differ from durable goods in that their expected lifetime of use, though more than one year, is often significantly shorter and that their purchasers' price is substantially less (paragraph 6.93, SNA 68).

[9] This is the approach used to obtain PPPs for non-market services. There are no economically-significant prices with which to value the outputs of non-market services. Instead national accountants estimate expenditures on non-market services by summing the costs of the inputs required to produce them. PPPs for non-market services are calculated with purchasers' prices for inputs. These are the prices that are consistent with the prices underlying the estimated expenditures.

Box III.1: Number of categories, groups, classes and basic headings by main aggregates

Main aggregates Categories	Categories	Groups	Classes	Basic headings
11.00 Individual consumption expenditure by households	**13**	**44**	**105**	**143**
- .01 Food and non-alcoholic beverages		2	11	34
- .02 Alcoholic beverages, tobacco and narcotics		3	5	5
- .03 Clothing and footwear		2	6	10
- .04 Housing, water, electricity, gas and other fuels		5	11	11
- .05 Furnishings, household equipment and maintenance		6	12	16
- .06 Health		3	7	7
- .07 Transport		3	14	18
- .08 Communication		3	3	3
- .09 Recreation and culture		6	20	22
- .10 Education		1	1	1
- .11 Restaurants and hotels		2	3	4
- .12 Miscellaneous goods and services		7	11	11
- .13 Net purchases abroad		1	1	1
12.00 Individual consumption expenditure by NPISHs	**6**	**6**	**6**	**6**
- .01 Housing		1	1	1
- .02 Health		1	1	1
- .03 Recreation and culture		1	1	1
- .04 Education		1	1	1
- .05 Social protection		1	1	1
- .06 Other services		1	1	1
13.00 Individual consumption expenditure by government	**5**	**6**	**11**	**21**
- .01 Housing		1	1	1
- .02 Health		2	7	17
- .03 Recreation and culture		1	1	1
- .04 Education		1	1	1
- .05 Social protection		1	1	1
14.00 Collective consumption expenditure by government	**1**	**1**	**5**	**7**
15.00 Gross fixed capital formation	**3**	**6**	**13**	**26**
- .01 Machinery and equipment		2	7	20
- .02 Construction		3	3	3
- .03 Other products		1	3	3
16.00 Change in inventories and acquisitions less disposals of valuables	**2**	**2**	**2**	**2**
-.01 Change of inventories		1	1	1
-.02 Acquisitions less disposals of valuables		1	1	1
17.00 Balance of exports and imports	**1**	**1**	**1**	**1**
GDP	**31**	**66**	**143**	**206**

III.13 ***Gross fixed capital formation*** is broken down by type of product in line with CPA 96 into 26 basic headings: twenty for machinery and equipment, three for construction and three for other products. Other products comprise products of agriculture, forestry, fisheries and aquaculture; computer software; land improvement, mineral exploration and other intangible fixed assets. All 26 basic headings are classified as containing investment goods (IG).

III.14 ***Change in inventories and acquisitions less disposals of valuables*** is broken into two basic headings: *change in inventories* and *acquisitions less disposals of valuables*.

III.15 ***Balance of exports and imports*** comprises one basic heading and is defined as exports of goods and services *less* imports of goods and services.

Box III.2: Levels of aggregation

10.00.00.0 GROSS DOMESTIC PRODUCT	
11.00.00.0 INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS	= main aggregate
11.01.00.0 FOOD AND NON-ALCOHOLIC BEVERAGES	= expenditure category
11.01.10.0 FOOD	= expenditure group
11.01.11.0 Bread and cereals [COICOP 01.1.1]*	= expenditure class
11.01.11.1 Rice (ND)**	= basic heading
11.01.11.2 Other cereals (ND)**	= basic heading
11.01.11.3 Bread (ND)**	= basic heading
11.01.11.4 Other bakery products (ND)**	= basic heading
11.01.11.5 Pasta products (ND)**	= basic heading
11.01.12.0 Meat [COICOP 01.1.2]*	= expenditure class
11.01.12.1 Beef and veal (ND)**	= basic heading
11.01.12.2 Pork (ND)**	= basic heading

* classification correspondence
** classification by type of product

Box III.3: Abbreviations used in the classification

c.i.f. – cost, insurance and freight
COFOG – classification of the functions of government
COICOP – classification of individual consumption according to purpose
COPNI – classification of the purposes of non-profit institutions serving households
CPA – classification of products by activity
CS – collective services
D – durable goods
f.o.b. – free on board
IG – investment goods
IS – individual services
ND – non-durable goods
n.e.c. – not elsewhere classified
NPISHs – non-profit institutions serving households
S – consumer services
SD – semi-durable goods

10.00.00.0 GROSS DOMESTIC PRODUCT

11.00.00.0 INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS

11.01.00.0 FOOD AND NON-ALCOHOLIC BEVERAGES

11.01.10.0 FOOD

The food products classified here are those purchased for consumption at home; *excludes* food products sold for immediate consumption away from the home by hotels, restaurants, cafés, bars, kiosks, street vendors, automatic vending machines, etc. (11.11.11.1); cooked dishes prepared by restaurants for consumption off their premises (11.11.11.1); cooked dishes prepared by catering contractors whether collected by the customer or delivered to the customer's home (11.11.11.1); and products sold specifically as pet foods (11.09.34.1).

11.01.11.0 Bread and cereals [COICOP 01.1.1]

Includes farinaceous-based products prepared with meat, fish, seafood, cheese, vegetables or fruit.

11.01.11.1 Rice (ND)

Rice in all forms except flour (11.01.11.2).

11.01.11.2 Other cereals, flour and other cereal products (ND)

Maize, wheat, barley, oats, rye and other cereals in the form of grain, meal or flour; cereal preparations (cornflakes, oat flakes, etc.) and other cereal products (malt, malt flour, malt extract, potato starch, tapioca, sago and other starches); *includes* couscous; rice flour; *excludes* sweetcorn (11.01.17.1).

11.01.11.3 Bread (ND)

Fresh bread and special bread.

11.01.11.4 Other bakery products (ND)

Bakery products such as crispbread, rusks, toasted bread, biscuits, gingerbread, wafers, waffles, crumpets, muffins, croissants, cakes, tarts, pies, quiches and pizzas; *includes* mixes and doughs for the preparation of bakery products; *excludes* meat pies (11.01.12.6); fish pies (11.01.13.2).

11.01.11.5 Pasta products (ND)

Pasta products in all forms.

11.01.12.0 Meat [COICOP 01.1.2]

Includes animals and poultry purchased live for consumption as food.

11.01.12.1 Beef and veal (ND)

Fresh, chilled or frozen meat of bovine animals, *excludes* edible offal (11.01.12.5).

11.01.12.2 Pork (ND)

Fresh, chilled or frozen meat of swine; *excludes* edible offal (11.01.12.5).

11.01.12.3 Lamb, mutton and goat (ND)

Fresh, chilled or frozen meat of sheep and goat; *excludes* edible offal (11.01.12.5).

11.01.12.4 Poultry (ND)

Fresh, chilled or frozen meat of poultry (chicken, duck, goose, turkey, guinea fowl); *includes* edible poultry offal.

11.01.12.5 Other meats and edible offal (ND)

Fresh, chilled or frozen meat of hare, rabbit, game (antelope, deer, boar, pheasant, grouse, pigeon, quail, etc.), marine mammals (seal, walrus, whale, etc.), horse, mule, donkey, camel, ostrich, kangaroo, alligator, etc.; fresh, chilled or frozen edible offal; *excludes* edible poultry offal (11.01.12.4).

11.01.12.6 Delicatessen and other meat preparations (ND)

Dried, salted or smoked meat and edible offal (sausages, salami, bacon, ham, pâté, etc.); other preserved or processed meat and meat-based preparations (canned meat, meat extracts, meat juices, meat pies, etc.); *excludes* frogs, land and sea snails (11.01.13.1); lard and other edible animal fats (11.01.15.3); soups, broths and stocks containing meat (11.01.19.1).

11.01.13.0 Fish and seafood [COICOP 01.1.3]

11.01.13.1 Fresh, chilled or frozen fish and seafood (ND)

Fresh, chilled or frozen fish and seafood (crustaceans, molluscs and other shellfish, sea snails); *includes* land crabs, land snails and frogs; fish and seafood purchased live for consumption as food.

11.01.13.2 Preserved or processed fish and seafood (ND)

Dried, smoked or salted fish and seafood; other preserved or processed fish and seafood and fish and seafood based preparations (canned fish and seafood, caviar and other hard roes, fish pies, etc.); *excludes* soups, broths and stocks containing fish or seafood (11.01.19.1).

11.01.14.0 Milk, cheese and eggs [COICOP 01.1.4]

Includes non-dairy milk substitutes such as soya milk; *excludes* butter and butter products (11.01.15.1).

11.01.14.1 Fresh milk (ND)

Raw milk; pasteurised or sterilised milk; *includes* whole and low fat milk; recombined or reconstituted milk; soya milk.

11.01.14.2 Preserved milk and other milk products (ND)

Condensed, evaporated or powdered milk; yoghurt, cream, milk-based desserts, milk-based beverages and other similar milk-based products; *includes* milk, cream and yoghurt containing sugar, cocoa, fruit or flavourings.

11.01.14.3 Cheese (ND)

Cheese and curd.

11.01.14.4 Eggs and egg-based products (ND)

Eggs and egg products made wholly from eggs.

11.01.15.0 Oils and fats [COICOP 01.1.5]

11.01.15.1 Butter (ND)

Butter and butter products (butter oil, ghee, etc.).

11.01.15.2 Margarine (ND)

Margarine; *includes* "diet" margarine

11.01.15.3 Other edible oils and fats (ND)

Edible oils (olive oil, corn oil, sunflower-seed oil, cotton-seed oil, soybean oil, groundnut oil, walnut oil, etc.); edible animal fats (lard, etc.); edible vegetable fats (peanut butter, etc.); *excludes* cod or halibut liver oil (11.06.11.1).

11.01.16.0 Fruit [COICOP 01.1.6]

11.01.16.1 Fresh or chilled fruit (ND)

Fresh or chilled fruit; *includes* melons and water melons; *excludes* vegetables grown for their fruit such as aubergines, cucumbers and tomatoes (11.01.17.1).

11.01.16.2 Frozen, preserved or processed fruit and fruit-based products (ND)

Frozen fruit; dried fruit, fruit peel, fruit kernels, nuts and edible seeds; other preserved fruit; processed fruit; fruit-based products; *excludes* jams, marmalades, compotes, jellies, fruit purees and pastes (11.01.18.2); parts of plants preserved in sugar (11.01.18.2); fruit juices (11.01.22.3).

11.01.17.0 Vegetables [COICOP 01.1.7]

11.01.17.1 Fresh or chilled vegetables other than potatoes (ND)

Fresh or chilled vegetables cultivated for their leaves or stalks (asparagus, broccoli, cauliflower, endives, fennel, spinach, etc.), for their fruit (aubergines, cucumbers, courgettes, green peppers, pumpkins, tomatoes, etc.), and for their roots (beetroot, carrots, onions, parsnips, radishes, turnips, etc.); *includes* olives; garlic; pulses; sweetcorn; sea fennel and other edible seaweed; mushrooms and other edible fungi; *excludes* lentils (11.01.17.3); culinary herbs (parsley, rosemary, thyme, etc.) and spices (pepper, pimento, ginger, etc.) (11.01.19.1).

11.01.17.2 Fresh or chilled potatoes (ND)

Fresh or chilled potatoes; *includes* other tuber vegetables (manioc, arrowroot, cassava, sweet potatoes, etc.).

11.01.17.3 Frozen, preserved or processed vegetables and vegetable-based products (ND)

Frozen vegetables; dried vegetables; other preserved vegetables; processed vegetables; vegetable-based products; *includes* frozen preparations such as chipped potatoes; lentils; products of potatoes and other tuber vegetables such as flours, meals, flakes, purees, chips, crisps, etc.; *excludes* potato starch, tapioca, sago and other starches (11.01.11.2); soups, broths and stocks containing vegetables (11.01.19.1); vegetable juices (11.01.22.3).

11.01.18.0 Sugar, jam, honey, chocolate and confectionery [COICOP 01.1.8]

11.01.18.1 Sugar (ND)

Cane or beet sugar, unrefined or refined, powdered, crystallised or in lumps; *includes* artificial sugar substitutes.

11.01.18.2 Jams, marmalades and honey (ND)

Jams, marmalades, compotes, jellies, fruit purees and pastes, natural and artificial honey, maple syrup, molasses and parts of plants preserved in sugar.

11.01.18.3 Confectionery, chocolate and other cocoa preparations (ND)

Chocolate in bars and slabs, chewing gum, sweets, toffees, pastilles and other confectionery products; cocoa-based foods and cocoa-based dessert preparations; *excludes* cocoa and chocolate-based powder (11.01.21.1).

11.01.18.4 Edible ice, ice cream and sorbet (ND)

Edible ice, ice cream and sorbet.

11.01.19.0 Food products n.e.c. [COICOP 01.1.9]

11.01.19.1 Food products n.e.c. (ND)

Salt, spices (pepper, pimento, ginger, etc.), culinary herbs (parsley, rosemary, thyme, etc.), sauces, condiments, seasonings (mustard, mayonnaise, ketchup, soy sauce, etc.), vinegar; prepared baking powders, baker's yeast, dessert preparations, soups, broths, stocks, culinary ingredients, etc.; homogenised babyfood and dietary preparations irrespective of the composition; *excludes* soya milk (11.01.14.1); milk-based desserts (11.01.14.2); artificial sugar substitutes (11.01.18.1); cocoa-based dessert preparations (11.01.18.3).

11.01.20.0 NON-ALCOHOLIC BEVERAGES

The non-alcoholic beverages classified here are those purchased for consumption at home; *excludes* non-alcoholic beverages sold for immediate consumption away from the home by hotels, restaurants, cafés, bars, kiosks, street vendors, automatic vending machines, etc. (11.11.11.2).

11.01.21.0 Coffee, tea and cocoa [COICOP 01.2.1]

11.01.21.1 Coffee, tea and cocoa (ND)

Coffee, whether or not decaffeinated, roasted or ground; tea, maté and other plant products for infusions; cocoa, whether or not sweetened, and chocolate-based powder; *includes* instant coffee; coffee substitutes; extracts and essences of coffee; tea substitutes; extracts and essences of tea; cocoa-based beverage preparations; *excludes* chocolate in bars or slabs (11.01.18.3); cocoa-based foods and cocoa-based dessert preparations (11.01.18.3).

11.01.22.0 Mineral waters, soft drinks, fruit and vegetable juices [COICOP 01.2.2]

11.01.22.1 Mineral waters (ND)

Mineral or spring waters; all drinking water sold in containers.

11.01.22.2 Soft drinks and concentrates (ND)

Soft drinks such as sodas, lemonades and colas; syrups and concentrates for the preparation of beverages; *excludes* non-alcoholic beverages which are generally alcoholic such as non-alcoholic beer (11.02.13.1).

11.01.22.3 Fruit and vegetable juices (ND)

Fruit and vegetable juices.

11.02.00.0 ALCOHOLIC BEVERAGES, TOBACCO AND NARCOTICS

11.02.10.0 ALCOHOLIC BEVERAGES

The alcoholic beverages classified here are those purchased for consumption at home; *includes* low or non-alcoholic beverages which are generally alcoholic such as

non-alcoholic beer; *excludes* alcoholic beverages sold for immediate consumption away from the home by hotels, restaurants, cafés, bars, kiosks, street vendors, automatic vending machines, etc. (11.11.11.2).

11.02.11.0 Spirits [COICOP 02.1.1]

11.02.11.1 Spirits (ND)

Eaux-de-vie, liqueurs and other spirits; *includes* mead; aperitifs other than wine-based aperitifs (11.02.12.1).

11.02 12.0 Wine [COICOP 02.1.2]

11.02.12.1 Wine (ND)

Wine, cider and perry, including sake; champagne and other sparkling wines; fortified wines and wine-based aperitifs.

11.02.13.0 Beer [COICOP 02.1.3]

11.02.13.1 Beer (ND)

All kinds of beer, such as ale, lager and porter; *includes* non-alcoholic beer; shandy.

11.02.20.0 TOBACCO

Covers all purchases of tobacco by households, including purchases of tobacco in cafés, bars, restaurants, service stations, etc.

11.02.21.0 Tobacco [COICOP 02.2.0]

11.02.21.1 Tobacco (ND)

Cigarettes, cigarette tobacco and cigarette papers; cigars, pipe tobacco, chewing tobacco or snuff; *excludes* other smokers' articles (11.12.32.1).

11.02.30.0 NARCOTICS

11.02.31.0 Narcotics [COICOP 02.3.0]

11.02.31.1 Narcotics (ND)

Marijuana, opium, cocaine and their derivatives; other vegetable-based narcotics such as cola nuts, betel leaves and betel nuts; other narcotics including chemicals and man-made drugs.

11.03.00.0 CLOTHING AND FOOTWEAR

11.03.10.0 CLOTHING

11.03.11.0 Clothing materials [COICOP 03.1.1]

11.03.11.1 Clothing materials (SD)

Clothing materials of natural fibres, of man-made fibres and of their mixtures; *excludes* furnishing fabrics (11.05.21.1).

11.03.12.0 Garments [COICOP 03.1.2]

Garments for men, women, children (3 to 13 years) and infants (0 to 2 year), either ready-to-wear or made-to-measure, in all materials (including leather, furs, plastics and rubber), for everyday wear, for sport or for work; *includes* capes, overcoats, raincoats, anoraks, parkas, blousons, jackets, trousers, waistcoats, suits, costumes, dresses, skirts, etc.; shirts, blouses, pullovers, sweaters, cardigans, shorts, swimsuits,

tracksuits, jogging suits, sweatshirts, T-shirts, leotards, etc.; vests, underpants, socks, stockings, tights, petticoats, brassières, knickers, slips, girdles, corsets, body stockings, etc.; pyjamas, night-shirts, night dresses, housecoats, dressing gowns, bathrobes, etc.; *excludes* articles of medical hosiery such as elasticated stockings (11.06.12.1).

11.03.12.1 Men's clothing (SD)

Men's clothing as defined above.

11.03.12.2 Women's clothing (SD)

Women's clothing as defined above.

11.03.12.3 Children's and infant's clothing (SD)

Children's and infant's clothing as defined above; *includes* babyclothes and babies' booties made of fabric; *excludes* babies' napkins (11.12.13.1).

11.03.13.0 Other articles of clothing and clothing accessories [COICOP 03.1.3]

11.03.13.1 Other articles of clothing and clothing accessories (SD)

Ties, handkerchiefs, scarves, squares, gloves, mittens, muffs, belts, braces, aprons, smocks, bibs, sleeve protectors, hats, caps, berets, bonnets, etc.; sewing threads, knitting yarns and accessories for making clothing such as buckles, buttons, press-studs, zip-fasteners, ribbons, laces, trimmings, etc.; *includes* gardening gloves and working gloves; crash helmets for motor cycles and bicycles; *excludes* gloves and other articles made of rubber (11.05.61.1); pins, safety pins, sewing needles, knitting needles, thimbles (11.05.61.1); protective headgear for sports (11.09.32.1); other protective gear for sports such as life jackets, boxing gloves, body padding, belts, supports, etc. (11.09.32.1); paper handkerchiefs (11.12.13.1); watches, jewellery, cuff-links, tie-pins (11.12.31.1); walking sticks and canes, umbrellas and parasols, fans, key rings (11.12.32.1).

11.03.14.0 Cleaning, repair and hire of clothing [COICOP 03.1.4]

11.03.14.1 Cleaning, repair and hire of clothing (S)

Dry-cleaning, laundering and dyeing of garments; darning, mending, repair and altering of garments; hire of garments; *includes* total value of the repair service (that is, both the cost of labour and the cost of materials are covered); *excludes* materials, threads, accessories, etc. purchased by households with the intention of undertaking the repairs themselves (11.03.11.1) or (11.03.13.1); repair of household linen and other household textiles (11.05.21.1); dry-cleaning, laundering, dyeing of household linen and household textiles (11.05.62.2); hire of household linen (11.05.62.2).

11.03.20.0 FOOTWEAR

11.03.21.0 Shoes and other footwear [COICOP 03.2.1]

All footwear for men, women, children (3 to 13 years) and infants (0 to 2 years) including sports footwear suitable for everyday or leisure wear (shoes for jogging, cross-training, tennis, basket ball, boating, etc.); *includes* gaiters, leggings and similar articles; shoelaces; parts of footwear, such as heels, soles, etc., purchased by households with the intention of repairing footwear themselves; *excludes* shoe-trees, shoehorns and polishes, creams and other shoe-cleaning articles (11.05.61.1); orthopaedic footwear (11.06.13.1); game-specific footwear (ski boots, football boots, golfing shoes and other such footwear fitted with ice skates, rollers, spikes, studs, etc.) (11.09.32.1); shin-guards, cricket pads and other protective apparel for sport (11.09.32.1).

11.03.21.1 Men's footwear (SD)

Men's footwear as defined above.

11.03.21.2 Women's footwear (SD)

Women's footwear as defined above.

11.03.21.3 Children's and infant's footwear (SD)

Children's and infant's footwear as defined above; *excludes* babies booties made of fabric (11.03.12.3).

11.03.22.0 Repair and hire of footwear [COICOP 03.2.2]

11.03.22.1 Repair and hire of footwear (S)

Repair of footwear; shoe cleaning services; hire of footwear; *includes* total value of the repair service (that is, both the cost of labour and the cost of materials are covered); *excludes* parts of footwear, such as heels, soles, etc., purchased by households with the intention of undertaking the repairs themselves (11.03.21.1), (11.03.21.2) or (11.03.21.3); polishes, creams and other shoe-cleaning articles (11.05.61.1); repair (11.09.32.1) and hire (11.09.41.1) of game-specific footwear (ski boots, football boots, golfing shoes and other such footwear fitted with ice skates, rollers, spikes, studs, etc.).

11.04.00.0 HOUSING, WATER, ELECTRICITY, GAS AND OTHER FUELS

11.04.10.0 ACTUAL RENTALS FOR HOUSING

Rentals normally include payment for the use of the land on which the property stands, the dwelling occupied, the fixtures and fittings for heating, plumbing, lighting, etc., and, in the case of a dwelling let furnished, the furniture. They also include payment for the use of a garage to provide parking in connection with the dwelling. The garage does not have to be physically contiguous to the dwelling; nor does it have to be leased from the same landlord.

Rentals do not include payment for the use of garages or parking spaces not providing parking in connection with the dwelling (11.07.24.1). Nor do they include charges for water supply (11.04.41.1), refuse collection (11.04.42.1) and sewerage collection (11.04.42.1); co-proprietor charges for caretaking, gardening, stairwell cleaning, heating and lighting, maintenance of lifts and refuse disposal chutes, etc. in multi-occupied buildings (11.04.42.1); charges for electricity (11.04.51.1) and gas (11.04.52.1); charges for heating and hot water supplied by district heating plants (11.04.55.1).

11.04.11.0 Actual rentals for housing [COICOP 04.1.1 and 04.1.2]

11.04.11.1 Actual rentals for housing (S)

Rentals actually paid by tenants or subtenants occupying unfurnished or furnished apartments or one-family houses as their main residence; rentals actually paid for secondary residences; *includes* payments by households occupying a room in a hotel or boarding house as their main residence; *excludes* accommodation services of educational establishments and hostels (11.11.21.1), of holiday villages and holiday centres (11.11.21.1) or of retirement homes for elderly people (11.12.41.1).

11.04.20.0 IMPUTED RENTALS FOR HOUSING

The coverage is the same as that defined for actual rents – see note to (11.04.10.0) above - with one exception. Imputed rentals for housing do not include an imputation for furniture. They refer to owner-occupied dwellings without their furniture.

11.04.21.0 Imputed rentals for housing [COICOP 04.2.1 and 04.2.2]

11.04.21.1 Imputed rentals for housing (S)

Imputed rentals of owners occupying apartments or one-family houses as their main residence; imputed rentals for secondary residences; imputed rentals of households paying a reduced rental or housed free.

11.04.30.0 MAINTENANCE AND REPAIR OF THE DWELLING

Maintenance and repair of dwellings are distinguished by two features: first, they are activities that have to be undertake regularly in order to maintain the dwelling in good working order; second, they do not change the dwelling's performance, capacity or expected service life. There are two types of maintenance and repair of dwellings: those which are minor, such as interior decoration and repairs to fittings, and which are commonly carried out by both tenants and owners; and those which are major, such as replastering walls or repairing roofs, and which are carried out by owners only. Only expenditures which tenants and owner-occupiers incur on materials and services for minor maintenance and repair are part of individual consumption expenditure of households. Expenditures which owner-occupiers incur on materials and services for major maintenance and repair are not part of individual consumption expenditure of households. Purchases of materials made by tenants or owner-occupiers with the intention of undertaking the maintenance or repair themselves should be shown under (11.04.31.1). If tenants or owner-occupiers pay an enterprise to carry out the maintenance or repair, then the total value of the service, including the costs of the materials used, should be shown under (11.04.32.1).

11.04.31.0 Materials for the maintenance and repair of the dwelling [COICOP 04.3.1]

11.04.31.1 Materials for the maintenance and repair of the dwelling (ND)

Products and materials, such as paints and varnishes, renderings, wallpapers, fabric wall coverings, window panes, plaster, cement, putty, wallpaper pastes, etc., purchased for minor maintenance and repair of the dwelling; *includes* small plumbing items (pipes, taps, joints, etc.), surfacing materials (floor boards, ceramic tiles, etc.) and brushes and scrapers for paint, varnish and wallpaper; *excludes* fitted carpets and linoleum (11.05.12.1); hand tools, door fittings, power sockets, wiring flex and lamp bulbs (11.05.52.1); brooms, scrubbing brushes, dusting brushes and cleaning products (11.05.61.1); products, materials and fixtures used for major maintenance and repair (intermediate consumption) or for extension and conversion of the dwelling (capital formation).

11.04.32.0 Services for the maintenance and repair of the dwelling [COICOP 04.3.2]

11.04.32.1 Services for the maintenance and repair of the dwelling (S)

Services of plumbers, electricians, carpenters, glaziers, painters, decorators, floor polishers, etc. engaged for minor maintenance and repair of the dwelling; *includes* total value of the service (that is, both the cost of labour and the cost of materials are covered); *excludes* separate purchases of materials made by households with the intention of undertaking the maintenance or repair themselves (11.04.31.1); services engaged for major maintenance and repair (intermediate consumption) or for extension and conversion of the dwelling (capital formation).

11.04.40.0 WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING

11.04.41.0 Water supply [COICOP 04.4.1]

11.04.41.1 Water supply (ND)

Water supply; *includes* associated expenditure such as hire of meters, reading of meters, standing charges, etc.; *excludes* drinking water sold in bottles or containers (11.01.22.1); hot water or steam supplied by district heating plants (11.04.55.1).

11.04.42.0 Miscellaneous services relating to the dwelling [COICOP 04.4.2, 04.4.3 and 04.4.4]

11.04.42.1 Miscellaneous services relating to the dwelling (S)

Refuse collection and disposal; sewerage collection and disposal; co-proprietor charges for caretaking, gardening, stairwell cleaning and lighting, maintenance of lifts and refuse disposal chutes, etc. in multi-occupied buildings; security services; snow removal and chimney sweeping; *excludes* household services such as window cleaning, disinfecting, fumigation and pest extermination (11.05.62.2); bodyguards (11.12.71.1).

11.04.50.0 ELECTRICITY, GAS AND OTHER FUELS

11.04.51.0 Electricity [COICOP 04.5.1]

11.04.51.1 Electricity (ND)

Electricity; *includes* associated expenditure such as hire of meters, reading of meters, standing charges, etc.

11.04.52.0 Gas [COICOP 04.5.2]

11.04.52.1 Gas (ND)

Town gas and natural gas; liquefied hydrocarbons (butane, propane, etc.); *includes* associated expenditure such as hire of meters, reading of meters, standing charges, etc.

11.04.53.0 Liquid fuels [COICOP 04.5.3]

11.04.53.1 Liquid fuels (ND)

Domestic heating and lighting oils.

11.04.54.0 Solid fuels [COICOP 04.5.4]

11.04.54.1 Solid fuels (ND)

Coal, coke, briquettes, firewood, charcoal, peat and the like.

11.04.55.0 Heat energy [COICOP 04.5.5]

11.04.55.1 Heat energy (ND)

Hot water and steam purchased from district heating plants; *includes* associated expenditure such as hire of meters, reading of meters, standing charges, etc.; ice used for cooling and refrigeration purposes.

11.05.00.0 FURNISHINGS, HOUSEHOLD EQUIPMENT AND ROUTINE HOUSEHOLD MAINTENANCE

11.05.10.0 FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS

11.05.11.0 Furniture and furnishings [COICOP 05.1.1]

Includes the delivery and installation of furniture and furnishings when applicable; *excludes* works of art and antique furniture acquired primarily as stores of value (capital formation).

11.05.11.1 Kitchen furniture (D)

Tables, chairs, cupboards, etc. for kitchens.

11.05.11.2 Bedroom furniture (D)

Beds, tables, chairs, wardrobes, chests of drawers, etc. for bedrooms; *includes* base-mattresses, mattresses, tatamis; *excludes* sofa beds (11.05.11.3).

11.05.11.3 Living-room and dining-room furniture (D)

Sofas, sofa beds, couches, tables, chairs, cupboards, dressers, wall systems, book shelves for living rooms and dining rooms.

11.05.11.4 Other furniture and furnishings (D)

Baby furniture such as cradles, high-chairs and play-pens; camping and garden furniture; lighting equipment such as ceiling lights, standard lamps, globe lights and bedside lamps; pictures, sculptures, engravings, tapestries and other art objects including reproductions of works of art and other ornaments; screens, folding partitions and other furniture and fixtures; *includes* bathroom cabinets; blinds with the exception of fabric blinds (11.05.21.1); mirrors, candle-holders and candlesticks; *excludes* sunshades (11.05.21.1); safes (11.05.31.1); glassware and ceramic ware for households, offices and decoration (11.05.41.1); clocks (11.12.31.1); baby carriages and push-chairs (11.12.32.1); wall thermometers and barometers (11.12.32.1).

1.05.12.0 Carpets and other floor coverings [COICOP 05.1.2]

11.05.12.1 Carpets and other floor coverings (D)

Loose carpets, rugs, mats and other such movable floor coverings; fitted carpets, linoleum and other such fixed floor coverings; *includes* laying of floor covers; *excludes* floor boards and ceramic floor tiles (11.04.31.1); bathroom mats, rush mats and door mats (11.05.21.1); antique floor coverings acquired primarily as stores of value (capital formation).

11.05.13.0 Repair of furniture, furnishings and floor coverings [COICOP 05.1.3]

11.05.13.1 Repair of furniture, furnishings and floor coverings (S)

Repair of furniture, furnishings and floor coverings; *includes* total value of the service (that is, both the cost of labour and the cost of materials are covered); restoration of works of art, antique furniture and antique floor coverings other than those acquired primarily as stores of value (capital formation); *excludes* separate purchases of materials made by households with the intention of undertaking the repairs themselves (11.05.11.1), (11.05.11.2), (11.05.11.3), (11.05.11.4) or (11.05.12.1); dry cleaning of carpets (11.05.62.2).

11.05.20.0 HOUSEHOLD TEXTILES

11.05.21.0 Household textiles [COICOP 05.2.0]

11.05.21.1 Household textiles (SD)

Furnishing fabrics, curtain material, curtains, double curtains, awnings, door curtains and fabric blinds; bedding such as futons, pillows, bolsters and hammocks; bedlinen such as sheets, pillowcases, blankets, travelling rugs, plaids, eiderdowns,

counterpanes and mosquito nets; table linen and bathroom linen such as tablecloths, table napkins, towels and face-cloths; other textile household articles such as shopping bags, laundry bags, shoe bags, covers for clothes and furniture, flags, sunshades, etc.; repair of such articles; *includes* cloth bought by the piece; oilcloth; bathroom mats, rush mats and door mats; *excludes* fabric wall coverings (11.04.31.1); tapestries (11.05.11.4); floor coverings such as unfitted and fitted carpets (11.05.12.1); electric blankets (11.05.32.1); covers for motor cars, motor cycles, etc. (11.07.21.1); air mattresses and sleeping bags (11.09.32.1).

11.05.30.0 HOUSEHOLD APPLIANCES

11.05.31.0 Major household appliances whether electric or not [COICOP 05.3.1]

Includes the delivery and installation of the appliances when applicable; *excludes* such appliances that are built into the structure of the building (capital formation).

11.05.31.1 Major household appliances whether electric or not (D)

Refrigerators, freezers and fridge-freezers; washing-machines, dryers, drying cabinets, dishwashers, ironing and pressing machines; cookers, spit roasters, hobs, ranges, ovens and micro-wave ovens; air conditioners, humidifiers, space heaters, water heaters, ventilators and extractor hoods; vacuum cleaners, steam-cleaning machines, carpet shampooing machines and machines for scrubbing, waxing and polishing floors; safes, sewing machines, knitting machines, water softeners, etc.

11.05.32.0 Small electric household appliances [COICOP 05.3.2]

11.05.32.1 Small electric household appliances (SD)

Coffee mills, coffee-makers, juice extractors, can openers, food mixers, deep fryers, meat grills, knives, toasters, ice cream makers, sorbet makers, yoghurt makers, hotplates, irons, kettles, fans, electric blankets, etc.; *excludes* small non-electric kitchen household appliances and utensils (11.05.41.1); household scales (11.05.41.1); personal weighing machines and baby scales (11.12.13.1).

11.05.33.0 Repair of household appliances [COICOP 05.3.3]

11.05.33.1 Repair of household appliances (S)

Repair of household appliances; *includes* total value of the service (that is, both the cost of labour and the cost of are covered); *excludes* separate purchase of materials made by households with the intention of undertaking the repair themselves (11.05.31.1) or (11.05.32.1).

11.05.40.0 GLASSWARE, TABLEWARE AND HOUSEHOLD UTENSILS

11.05.41.0 Glassware, tableware and household utensils [COICOP 05.4.0]

11.05.41.1 Glassware, tableware and household utensils (SD)

Glassware, crystal-ware and ceramic ware of a kind used for table, kitchen, bathroom, toilet, office and indoor decoration; cutlery, flatware and silverware; non-electric kitchen utensils of all materials such as saucepans, stew pots, pressure cookers, frying pans, coffee mills, purée-makers, mincers, hotplates, household scales and other such mechanical devices; non-electric household articles of all materials such as containers for bread, coffee, spices, etc., waste bins, waste-paper baskets, laundry baskets, portable money-boxes and strong-boxes, towel rails, bottle racks, irons and ironing boards, letter boxes, feeding bottles, thermos flasks and ice boxes; repair of glassware, tableware and household utensils; *excludes* lighting equipment (11.05.11.4); electric household appliances (11.05.31.1) or (11.05.32.1); cardboard tableware (11.05.61.1); personal weighing machines and baby scales (11.12.13.1); ashtrays (11.12.32.1).

11.05.50.0 TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN

11.05.51.0 Major tools and equipment [COICOP 05.5.1]

11.05.51.1 Major tools and equipment (D)

Motorised tools and equipment such as electric drills, saws, sanders and hedge cutters, garden tractors, lawn mowers, cultivators, chain saws and water pumps; repair of such articles; *includes* charges for leasing or rental of do-it-yourself machinery and equipment.

11.05.52.0 Small tools and miscellaneous accessories [COICOP 05.5.2]

11.05.52.1 Small tools and miscellaneous accessories (SD)

Small electric accessories such as power sockets, switches, wiring flex, electric bulbs, fluorescent lighting tubes, torches, hand-lamps, electric batteries for general use, bells and alarms; hand tools such as saws, hammers, screwdrivers, wrenches, spanners, pliers, trimming knives, rasps and files; garden tools such as wheel barrows, watering cans, hoses, spades, shovels, rakes, forks, scythes, sickles and secateurs; ladders and steps; door fittings (hinges, handles and locks), fittings for radiators and fireplaces, other metal articles for the house (curtain rails, carpet rods, hooks, etc.) or for the garden (chains, grids, stakes and hoop segments for fencing and bordering); repair of such articles.

11.05.60.0 GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE

11.05.61.0 Non-durable household goods [COICOP 05.6.1]

11.05.61.1 Non-durable household goods (ND)

Cleaning and maintenance products such as soaps, washing powders, washing liquids, scouring powders, detergents, disinfectant bleaches, softeners, conditioners, window-cleaning products, waxes, polishes, dyes, unblocking agents, disinfectants, insecticides, pesticides; fungicides and distilled water; articles for cleaning such as brooms, scrubbing brushes, dust pans and dust brushes, dusters, tea towels, floor cloths, household sponges, scourers, steel wool and chamois leathers; paper products such as filters, tablecloths and table napkins, kitchen paper, vacuum cleaner bags and cardboard tableware; other non-durable household articles such as matches, candles, lamp wicks, methylated spirits, clothes pegs, clothes hangers, pins, safety pins, sewing needles, knitting needles, thimbles, nails, screws, nuts and bolts, tacks, washers, glues and adhesive tapes for household use, string, twine and rubber gloves; *includes* polishes, creams and other shoe-cleaning articles; aluminium foil, cellophane wrap and plastic bin liners; shoe-trees and shoehorns; fire extinguishers for households; *excludes* brushes and scrapers for paint, varnish and wallpaper (11.04.31.1); products specifically for the cleaning and maintenance of transport equipment such as paints, chrome cleaners, sealing compounds and bodywork polishes (11.07.21.1); fire extinguishers for transport equipment (11.07.21.1); horticultural products for the upkeep of ornamental gardens (11.09.33.1); paper handkerchiefs, toilet paper, toilet soaps, toilet sponges and other products for personal hygiene (11.12.13.1); cigarette, cigar and pipe lighters and lighter fuel (11.12.32.1).

11.05.62.0 Domestic services and household services [COICOP 05.6.2]

11.05.62.1 Domestic services (S)

Domestic services supplied by paid staff in private service such as butlers, cooks, maids, cleaners, drivers, gardeners, governesses, secretaries, tutors and au pairs; domestic services, including baby-sitting and housework, supplied by enterprises or

self-employed persons; *excludes* services of wet-nurses, crèches, day care centres and other child-minding facilities (11.12.41.1).

11.05.62.2 Household services (S)

Dry-cleaning, laundering and dyeing of household linen and household textiles; hire of furniture, furnishings, household equipment and household linen; household services such as window cleaning, disinfecting, fumigation and pest extermination; *excludes* dry-cleaning, laundering and dyeing of garments (11.03.14.1); refuse collection (11.04.42.1); sewerage collection (11.04.42.1); co-proprietor charges for caretaking, gardening, stairwell cleaning and lighting, maintenance of lifts and refuse disposal chutes, etc. in multi-occupied buildings (11.04.42.1); snow removal and chimney sweeping (11.04.42.1); removal and storage services (11.07.36.1).

11.06.00.0 HEALTH

Includes health services purchased from school and university health centres.

11.06.10.0 MEDICAL PRODUCTS, APPLIANCES AND EQUIPMENT

Medicaments, prostheses, medical appliances and equipment and other health-related products purchased by individuals, either with or without a prescription, usually from dispensing chemists, pharmacists or medical equipment suppliers. They are intended for consumption or use outside a health facility or institution. Such products supplied directly to out-patients by medical, dental and paramedical practitioners or to in-patients by hospitals and the like are classified in out-patient services (11.06.20.0) or hospital services (11.06.30.0).

11.06.11.0 Pharmaceutical products [COICOIP 06.1.1]

11.06.11.1 Pharmaceutical products (ND)

Medicinal preparations, medicinal drugs, patent medicines, serums and vaccines, vitamins and minerals, cod liver oil and halibut liver oil, oral contraceptives; *excludes* veterinary products (11.09.34.1); articles for personal hygiene such as medicinal soaps (11.12.13.1).

11.06.12.0 Other medical products [COICOP 06.1.2]

11.06.12.1 Other medical products (ND)

Clinical thermometers, adhesive and non-adhesive bandages, hypodermic syringes, first-aid kits, hot-water bottles and ice bags, medical hosiery items such as elasticated stockings and knee-supports, pregnancy tests, condoms and other mechanical contraceptive devices.

11.06.13.0 Therapeutic appliances and equipment [COICOP 06.1.3]

11.06.13.1 Therapeutic appliances and equipment (D)

Corrective eye-glasses and contact lenses, hearing aids, glass eyes, artificial limbs and other prosthetic devices, orthopaedic braces and supports, orthopaedic footwear, surgical belts, trusses and supports, neck braces, medical massage equipment and health lamps, powered and unpowered wheelchairs and invalid carriages, special beds, crutches, electronic and other devices for monitoring blood pressure, etc.; repair of such articles; *includes* dentures but not fitting costs; *excludes* hire of therapeutic equipment (11.06.23.1); protective goggles, belts and supports for sport (11.09.32.1); sun-glasses not fitted with corrective lenses (11.12.32 1).

11.06.20.0 OUT-PATIENT SERVICES

Medical, dental and paramedical services delivered to out-patients by medical, dental and paramedical practitioners and auxiliaries. The services may be delivered at home, in individual or group consulting facilities, dispensaries or the out-patient clinics of hospitals and the like. Out-patient services include the medicaments, prostheses, medical appliances and equipment and other health-related products supplied directly to out-patients by medical, dental and paramedical practitioners and auxiliaries. Medical, dental and paramedical services provided to in-patients by hospitals and the like are included in hospital services (11.06.30.0).

11.06.21.0 Medical Services [COICOP 06.2.1]

11.06.21.1 Medical services (S)

Services of physicians in general or specialist practice; *includes* orthodontic specialists; *exclude*s services of medical analysis laboratories and X-ray centres (11.06.23.1) and services of practitioners of traditional medicine (11.06.23.1).

11.06.22.0 Dental services [COICOP 06.2.2]

11.06.22.1 Dental services (S)

Services of dentists, oral-hygienists and other dental auxiliaries; *includes* fitting costs of dentures but not the dentures themselves; *excludes* dentures (11.06.13.1); orthodontic specialists (11.06.21.1); services of medical analysis laboratories and X-ray centres (11.06.23.1).

11.06.23.0 Paramedical services [COICOP 06.2.3]

11.06.23.1 Paramedical services (S)

Services of medical analysis laboratories and X-ray centres; services of freelance nurses and midwives; services of freelance acupuncturists, chiropractors, optometrists, physiotherapists, speech therapists, etc.; medically-prescribed corrective-gymnastic therapy; out-patient thermal bath or seawater treatments; ambulance services other than hospital ambulance services; hire of therapeutic equipment; *includes* services of practitioners of traditional medicine.

11.06.30.0 HOSPITAL SERVICES

Covers the services of general and specialist hospitals, the services of medical centres, maternity centres and nursing and convalescence homes which chiefly provide in-patient health care, the services of institutions serving old people in which medical monitoring is an essential component and the services of rehabilitation centres providing in-patient health care and rehabilitative therapy where the objective is to treat the patient rather than to provide long-term support; *includes* hospital day care, home-based hospital treatment and hospices for terminally-ill persons; *excludes* the services of facilities, such as medical cabinets, clinics and dispensaries, devoted exclusively to out-patient care (11.06.20.0); the services of retirement homes for elderly persons, institutions for disabled persons and rehabilitation centres providing primarily long-term support (11.12.40.0).

11.06.31.0 Hospital services [COICOP 06.3.0]

11.06.31.1 Hospital services (S)

Comprises both the provision of medical services: services of physicians in general or specialist practice, of surgeons and of dentists; medical analysis and X-rays; paramedical services such as those of nurses, midwives, chiropractors, optometrists, physiotherapists, speech therapists, etc.; and the provision of basic services: administration; accommodation; food and drink; supervision and care by non-specialist staff (nursing auxiliaries); first-aid and resuscitation; ambulance transport;

provision of medicines and other pharmaceutical products; provision of therapeutic appliances and equipment.

11.07.00.0 TRANSPORT

11.07.10.0 PURCHASE OF VEHICLES

Purchases of recreational vehicles such as camper vans, caravans, trailers, aeroplanes and boats are covered by (11.09.21.1).

11.07.11.0 Motor cars [COICOP 07.1.1]

Motor cars, passenger vans, station wagons, estate car and the like with either two-wheel drive or four-wheel drive; *excludes* invalid carriages (11.06.13.1); camper vans (11.09.21.1); golf carts (11.09.21.1).

11.07.11.1 Motor cars with diesel engine (D)

Motor cars, etc. with a diesel engine.

11.07.11.2 Motor cars with petrol engine of cubic capacity of less than 1200 cc (D)

Motor cars, etc. with a petrol engine of cubic capacity of less than 1200 cc.

11.07.11.3 Motor cars with petrol engine of cubic capacity of 1200 cc to 1699 cc (D)

Motor cars, etc. with a petrol engine of cubic capacity of 1200 cc to 1699 cc.

11.07.11.4 Motor cars with petrol engine of cubic capacity of 1700 cc to 2999 cc (D)

Motor cars, etc. with a petrol engine of cubic capacity over 1700 cc to 2999 cc.

11.07.11.5 Motor cars with petrol engine with cubic capacity of 3000 cc and over (D)

Motor cars, etc. with a petrol engine of cubic capacity of 3000 cc and over.

11.07.12.0 Motor cycles [COICOP 07.1.2]

11.07.12.1 Motor cycles (D)

Motor cycles of all types, scooters and powered bicycles; *includes* side cars; snowmobiles, rickshaws; *excludes* invalid carriages (11.06.13.1); golf carts (11.09.21.1).

11.07.13.0 Bicycles [COICOP 07.1.3]

11.07.13.1 Bicycles (D)

Bicycles and tricycles of all types; *includes* rickshaws; *excludes* toy bicycles and tricycles (11.09.31.1).

11.07.14.0 Animal drawn vehicles [COICOP 07.1.4]

11.07.14.1 Animal drawn vehicles (D)

Animal drawn vehicles; *includes* animals required to draw the vehicles and related equipment (yokes, collars, harnesses, bridles, reins, etc.); *excludes* horses and ponies, horse or pony drawn vehicles and related equipment purchased for recreational purposes (11.09.21.1).

11.07.20.0 OPERATION OF PERSONAL TRANSPORT EQUIPMENT

Purchases of spare parts, accessories or lubricants made by households with the intention of undertaking the maintenance, repair or intervention themselves should be shown under (11.07.21.1) or (11.07.22.1). If households pay an establishment to carry out the maintenance, repair or fitting then the total value of the service, including the costs of the materials used, should be shown under (11.07.23.1).

11.07.21.0 Spare parts and accessories for personal transport equipment [COICOP 07 2.1]

11.07.21.1 Spare parts and accessories for personal transport equipment (SD)

Tyres (new, used or retreaded), inner-tubes, spark plugs, batteries, shock absorbers, filters, pumps and other spare parts or accessories for personal transport equipment; *includes* fire extinguishers for transport equipment; products specifically for the cleaning and maintenance of transport equipment such as paints, chrome cleaners, sealing compounds and bodywork polishes; covers for motor cars, motor cycles, etc.; *excludes* crash helmets for motor cycles and bicycles (11.03.13.1); non-specific products for cleaning and maintenance such as distilled water, sponges, chamois leathers, detergents, etc. (11.05.61.1); charges for the fitting of spare parts and accessories and for the painting, washing and polishing of bodywork (11.07.23.1); radio-telephones (11.08.21.1); car radios (11.09.11.1); baby-seats for cars (11.12.32.1).

11.07.22.0 Fuels and lubricants for personal transport equipment [COICOP 07.2.2]

11.07.22.1 Fuels and lubricants for personal transport equipment (ND)

Petrol and other fuels such as diesel, liquid petroleum gas, alcohol and two-stroke mixtures; lubricants, brake and transmission fluids, coolants and additives; *includes* fuel for recreational vehicles covered under (11.09.21.1); *excludes* charges for oil changes and greasing (11.07.23.1).

11.07.23.0 Maintenance and repair of personal transport equipment [COICOP 07.2.3]

11.07.23.1 Maintenance and repair of personal transport equipment (S)

Services purchased for the maintenance and repair of personal transport equipment such as fitting of parts and accessories, wheel balancing, technical inspection, breakdown services, oil changes, greasing and washing; *includes* total value of the service (that is, both the cost of labour and the cost of materials are covered); *excludes* separate purchase of spare parts, accessories or lubricants made by households with the intention of undertaking the maintenance or repair themselves (11.07.21.1) or (11.07.22.1); road worthiness tests (11.07.24.1).

11.07.24.0 Other services in respect of personal transport equipment [COICOP 07.2.4]

11.07.24.1 Other services in respect of personal transport equipment (S)

Hire of garages or parking spaces not providing parking in connection with the dwelling; toll facilities (bridges, tunnels, shuttle-ferries, motorways, etc.) and parking meters; driving lessons, driving tests and driving licences; road worthiness tests; hire of personal transport equipment without drivers; *excludes* hire of a car with driver (11.07.32.1); service charges for insurance in respect of personal transport equipment (11.12.51.1).

11.07.30.0 TRANSPORT SERVICES

Purchases of transport services are classified by mode of transport. When a ticket covers two or modes of transport - for example, intra-urban bus and underground or inter-urban train and ferry - and the expenditure cannot be apportioned between them then such purchases should be classified in (11.07.35.1). Cost of meals, snacks,

drinks, refreshments or accommodation services have to be included if covered by the fare and not separately priced. If separately priced, these costs have to be classified in (11.11.00.0). *Includes* school transport; *excludes* ambulance services (11.06.23.1); package holidays (11.09.61.1).

11.07.31.0 Passenger transport by railway [COICOP 07.3.1]

11.07.31.1 Passenger transport by railway (S)

Urban and suburban transport of individuals and groups of persons and luggage by train, tram and underground; long-distance transport of individuals and groups of persons and luggage by train; *includes* transport of private vehicles; *excludes* funicular transport (11.07.36.1).

11.07.32.0 Passenger transport by road [COICOP 07.3.2]

11.07.32.1 Passenger transport by road (S)

Urban and suburban transport of individuals and groups of persons and luggage by bus, taxi and hired car with driver; long distance transport of individuals and groups of persons and luggage by coach, taxi and hired car with driver.

11.07.33.0 Passenger transport by air [COICOP 07.3.3]

11.07.33.1 Passenger transport by air (S)

Transport of individuals and groups of persons and luggage by aeroplane and helicopter.

11.07.34.0 Passenger transport by sea and inland waterway [COICOP 07.3.4]

11.07.34.1 Passenger transport by sea and inland waterway (S)

Transport of individuals and groups of persons and luggage by ship, boat, ferry, hovercraft and hydrofoil; *includes* transport of private vehicles.

11.07.35.0 Combined passenger transport [COICOP 07.3.5]

11.07.35.1 Combined passenger transport (S)

Transport of individuals and groups of persons and luggage by two or more modes of transport when the expenditure cannot be apportioned between them; *includes* transport of private vehicles; *excludes* package holidays (11.09.61.1).

11.07.36.0 Other purchased transport services [COICOP 07.3.6]

11.07.36.1 Other purchased transport services (S)

Funicular, cable-car and chair-lift transport; removal and storage services; services of porters and left-luggage and luggage-forwarding offices; travel agents' commissions, if separately priced; *excludes* cable car and chair-lift transport at ski resorts and holiday centres (11.09.41.1).

11.08.00.0 COMMUNICATION

11.08.10.0 POSTAL SERVICES

11.08.11.0 Postal services [COICOP 08.1.0]

11.08.11.1 Postal services (S)

Payments for the delivery of letters, postcards and parcels; private mail and parcel delivery; *includes* all purchases of new postage stamps, pre-franked postcards and

aerogrammes; *excludes* purchase of used or cancelled postage stamps (11.09.31.1); financial services of post offices (11.12.62.1).

11.08.20.0 TELEPHONE AND TELEFAX EQUIPMENT

11.08.21.0 Telephone and telefax equipment [COICOP 08.2.0]

11.08.21.1 Telephone and telefax equipment (D)

Purchases of telephones, radio-telephones, telefax machines, telephone-answering machines and telephone loudspeakers; repair of such articles; *excludes* telefax and telephone answering facilities provided by personal computers (11.09.13.1).

11.08.30.0 TELEPHONE AND TELEFAX SERVICES

11.08.31.0 Telephone and telefax services [COICOP 08.3.0]

11.08.31.1 Telephone and telefax services (S)

Installation and subscription costs of personal telephone equipment; telephone calls from a private line or from a public line (public telephone box, post office cabin, etc.); telephone calls from hotels, cafés, restaurants and the like; telegraphy, telex and telefax services; information transmission services; internet connection services; hire of telephones, telefax machines, telephone answering-machines and telephone loudspeakers; *includes* radiotelephony, radiotelegraphy and radio-telex services.

11.09.00.0 RECREATION AND CULTURE

11.09.10.0 AUDIO-VISUAL, PHOTOGRAPHIC AND INFORMATION PROCESSING EQUIPMENT

11.09.11.0 Equipment for the reception, recording and reproduction of sound and pictures [COICOP 09.1.1]

11.09.11.1 Equipment for the reception, recording and reproduction of sound and pictures (D)

Television sets, video-cassette players and recorders, television aerials of all types; radio sets, car radios, radio clocks, two-way radios, amateur radio receivers and transmitters; gramophones, tape players and recorders, cassette players and recorders, CD-players, personal stereos, stereo systems and their constituent units (turntables, tuners, amplifiers, speakers, etc.), microphones and earphones; *excludes* video cameras, camcorders and sound-recording cameras (11.09.12.1).

11.09.12.0 Photographic and cinematographic equipment and optical instruments [COICOP 09.1.2]

11.09.12.1 Photographic and cinematographic equipment and optical instruments (D)

Still cameras, movie cameras and sound-recording cameras, video cameras and camcorders, film and slide projectors, enlargers and film processing equipment, accessories (screens, viewers, lenses, flash attachments, filters, exposure meters, etc.); binoculars, microscopes, telescopes and compasses.

11.09.13.0 Information processing equipment [COICOP 09.1.3]

11.09.13.1 Information processing equipment (D)

Personal computers, visual display units, printers and miscellaneous accessories accompanying them; computer software packages such as operating systems,

applications, languages, etc.; calculators, including pocket calculators; typewriters and word processors; *includes* telefax and telephone answering facilities provided by personal computers; *excludes* pre-recorded diskettes and CD-ROMs containing books, dictionaries, encyclopaedias, foreign language trainers, multimedia presentations, etc. in the form of software (11.09.14.1); video-game software (11.09.31.1); video-game computers that plug into a television set (11.09.31.1); typewriter ribbons (11.09.53.1); toner and ink cartridges (11.09.53.1); slide rules (11.09.53.1).

11.09.14.0 Recording media [COICOP 09.1.4]

11.09.14.1 Pre-recorded recording media (SD)

Records and compact discs; pre-recorded tapes, cassettes, video cassettes, diskettes and CD-ROMs for tape recorders, cassette recorders, video recorders and personal computers; *includes* pre-recorded diskettes and CD-ROMs containing books, dictionaries, encyclopaedias, foreign language trainers, multimedia presentations, etc. in the form of software; *excludes* computer software packages such as operating systems, applications, languages, etc. (11.09.13.1); video-game software, video-game cassettes and video-game CD-ROMs (11.09.31.1).

11.09.14.2 Unrecorded recording media (SD)

Unrecorded tapes, cassettes, video cassettes, diskettes and CD-ROMs for tape recorders, cassette recorders, video recorders and personal computers; unexposed films, cartridges and discs for photographic and cinematographic use; *includes* photographic supplies such as paper and flash bulbs; unexposed film the price of which includes the cost of processing without identifying it; *excludes* batteries (11.05.52.1); the development of films and the printing of photographs (11.09.42.1).

11.09.15.0 Repair of audio-visual, photographic and information processing equipment [COICOP 09.1.5]

11.09.15.1 Repair of audio-visual, photographic and information processing equipment (S)

Repair of audio-visual equipment, photographic and information processing equipment; *includes* total value of the service (that is, both the cost of labour and the cost of materials are covered); *excludes* separate purchases of materials made by households with the intention of undertaking the repair themselves (11.09.11.1), (11.09.12.1) or (11.09.13.1).

11.09.20.0 OTHER MAJOR DURABLES FOR RECREATION AND CULTURE

11.09.21.0 Major durables for outdoor recreation [COICOP 09.2.1]

11.09.21.1 Major durables for outdoor recreation (D)

Camper vans, caravans and trailers; aeroplanes, microlight aircraft, gliders, hang-gliders and hot-air balloons; boats, outboard motors, sails, rigging and superstructures; horses and ponies, horse or pony drawn vehicles and related equipment (harnesses, bridles, reins, saddles, etc.); major items for games and sport such as canoes, kayaks, wind-surfing boards, sea-diving equipment, and golf carts; *includes* fitting out of boats, camper vans, caravans, etc.; *excludes* horses and ponies, horse or pony drawn vehicles and related equipment purchased for personal transport (11.07.14.1); inflatable boats, rafts and swimming pools for children and the beach (11.09.32.1).

11.09.22.0 Musical instruments and major durables for indoor recreation [COICOP 09.2.2]

11.09.22.1 Musical instruments and major durables for indoor recreation (D)

Musical instruments of all sizes, including electronic musical instruments, such as pianos, organs, violins, guitars, drums, trumpets, clarinets, flutes, recorders,

harmonicas, etc.; billiard tables, ping-pong tables, pin-ball machines, gaming machines, etc.; *excludes* toys (11.09.31.1).

11.09.23.0 Maintenance and repair of other major durables for recreation and culture [COICOP 09.2.3]

11.09.23.1 Maintenance and repair of other major durables for recreation and culture (S)

Maintenance and repair of other major durables for recreation and culture; *includes* total value of the service (that is, both the cost of labour and the cost of materials are covered); laying up for winter of boats, camper vans, caravans, etc.; hanger services for private planes; marina services for boats; veterinary and other services (stabling, feeding, farriery, etc.) for horses and ponies purchased for recreational purposes; *excludes* fuel for recreational vehicles (11.07.22.1); separate purchases of materials made by households with the intention of undertaking the repair themselves (11.09.21.1); veterinary and other services for pets (11.09.35.1).

11.09.30.0 OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS

11.09.31.0 Games, toys and hobbies [COICOP 09.3.1]

11.09.31.1 Games, toys and hobbies (SD)

Card games, parlour games, chess sets and the like; toys of all kinds including dolls, soft toys, toy cars and trains, toy bicycles and tricycles, toy construction sets, puzzles, plasticine, electronic games, masks, disguises, jokes, novelties, fireworks, festoons and Christmas tree decorations; stamp-collecting requisites (used or cancelled postage stamps, stamp albums, etc.), other items for collections (coins, minerals, zoological and botanical specimens, etc.) and other tools and articles n.e.c. for hobbies; *includes* video-game software; video-game computers that plug into a television set; video-game cassettes and video-game CD-ROMs; *excludes* collectors' items falling into the category of works of art or antiques (11.05.11.4); unused postage stamps (11.08.11.1); Christmas trees (11.09.33.1); children's scrapbooks (11.09.51.1).

11.09.32.0 Equipment for sport, camping and open-air recreation [COICOP 09.3.2]

11.09.32.1 Equipment for sport, camping and open-air recreation (SD)

Gymnastic, physical education and sport equipment such as balls, rackets, bats, skis, golf clubs, foils, sabres, poles, weights, discuses, javelins, dumb-bells, chest expanders and other body-building equipment; parachutes and other sky diving equipment; firearms and ammunition for hunting, sport and personal protection; fishing rods and other equipment for fishing; equipment for beach and open-air games such as bowls, croquet, frisbee, and inflatable boats, rafts and swimming pools; camping equipment such as tents and accessories, sleeping bags and back-packs, air mattresses and inflating pumps, camping stoves and barbecues; repair of such articles; *includes* game-specific footwear (ski boots, football boots, golfing shoes and other such footwear fitted with ice skates, rollers, spikes, studs, etc.); protective headgear for sports; other protective gear for sports such as life jackets, boxing gloves, body padding, shin-guards, goggles, belts, supports, etc.; *excludes* crash helmets for motor cycles and bicycles (11.03.13.1); camping and garden furniture (11.05.11.4).

11.09.33.0 Gardens, plants and flowers [COICOP 09.3.3]

11.09.33.1 Gardens, plants and flowers (ND)

Natural or artificial flowers and foliage, plants, shrubs, bulbs, tubers, seeds, fertilisers, composts, garden peat, turf for lawns, specially treated soils for ornamental gardens, horticultural preparations, pots and pot holders; *includes* natural and artificial Christmas trees; delivery charges for flowers and plants; *excludes* gardening gloves

(11.03.13.1); gardening services (11.04.42.1) or (11.05.62.1); gardening equipment (11.05.51.1); gardening tools (11.05.52.1); insecticides and pesticides for household use (11.05.61.1).

11.09.34.0 Pets and related products [COICOP 09.3.4]

11.09.34.1 Pets and related products (ND)

Pets, pet foods, veterinary and grooming products for pets, collars, leashes, kennels, birdcages, fish tanks, cat litters, etc.; *excludes* horses and ponies (11.07.14.1) or (11.09.21.1); veterinary services (11.09.35.1).

11.09.35.0 Veterinary and other services for pets [COICOP 09.3.5]

11.09.35.1 Veterinary and other services for pets (S)

Veterinary and other services for pets such as grooming and boarding; *excludes* veterinary and other services (stabling, feeding, farriery, etc.) for horses and ponies purchased for recreational purposes (11.09.21.1).

11.09.40.0 RECREATIONAL AND CULTURAL SERVICES

11.09.41.0 Recreational and sporting services [COICOP 09.4.1]

11.09.41.1 Recreational and sporting services (S)

Services provided by sports stadia, horse-racing courses, motor-racing circuits, velodromes, skating rinks, swimming pools, golf courses, gymnasia, fitness centres, tennis courts, squash courts, bowling alleys, fairs, amusement parks, roundabouts, see-saws and other playground facilities for children, pin-ball machines and other games for adults other than games of chance, ski slopes, ski lifts and the like; hire of equipment and accessories for sport and recreation, such as aeroplanes, boats, horses, skiing and camping equipment; out-of-school individual or group lessons in bridge, chess, aerobics, dancing, music, skating, skiing, swimming or other pastimes; services of mountain guides, tour guides, etc.; navigational aid services for boating; *includes* hire of game-specific footwear (ski boots, football boots, golfing shoes and other such footwear fitted with ice skates, rollers, spikes, studs, etc.); *excludes* cable car and chair-lift transport not at ski resorts or holiday centres (11.07.36.1).

11.09.42.0 Cultural services [COICOP 09.4.2]

11.09.42.1 Photographic services (S)

Services of photographers such as film developing, print processing, enlarging, portrait photography, wedding photography, etc.

11.09.42.2 Other cultural services (S)

Services provided by cinemas, theatres, opera houses, concert halls, music halls, circuses, sound and light shows, museums, libraries, art galleries, exhibitions, historic monuments, national parks, zoological and botanical gardens, aquaria; hire of equipment and accessories for culture, such as television sets, video cassettes, etc.; television and radio broadcasting, in particular licence fees for television equipment and subscriptions to television networks; *includes* services of musicians, clowns, performers for private entertainments.

11.09.43.0 Games of chance [COICOP 09.4.3]

11.09.43.1 Games of chance (S)

Service charges for lotteries, bookmakers, totalisators, casinos and other gambling establishments, gaming machines, bingo halls, scratch cards, sweepstakes, etc.

(Service charge is defined as the difference between the amounts paid for lottery tickets or placed in bets and the amounts paid out to winners.)

11.09.50.0 NEWSPAPERS, BOOKS AND STATIONERY

11.09.51.0 Books [COICOP 09.5.1]

11.09.51.1 Books (SD)

Books, including atlases, dictionaries, encyclopaedias, text books, guidebooks and musical scores; *includes* scrapbooks and albums for children; bookbinding; *excludes* pre-recorded tapes and compact discs of novels, plays, poetry, etc. (11.09.14.1); pre-recorded diskettes and CD-ROMs containing books, dictionaries, encyclopaedias, foreign language trainers, multimedia presentations, etc. in the form of software (11.09.14.1); stamp albums (11.09.31.1).

11.09.52.0 Newspapers and periodicals [COICOP 09.5.2]

11.09.52.1 Newspapers and periodicals (ND)

Newspapers, magazines and other periodicals.

11.09.53.0 Miscellaneous printed matter, stationery and drawing materials [COICOP 09 5.3 and 09.5.4]

11.09.53.1 Miscellaneous printed matter, stationery and drawing materials (ND)

Writings pads, envelopes, account books, notebooks, diaries, etc.; pens, pencils, fountain pens, ball-point pens, felt-tip pens, inks, ink erasers, rubbers, pencil sharpeners, etc.; stencils, carbon paper, typewriter ribbons, inking pads, correcting fluids, etc.; paper punches, paper cutters, paper scissors, office glues and adhesives, staplers and staples, paper clips, drawing pins, etc.; drawing and painting materials such as canvas, paper, card, paints, crayons, pastels and brushes; catalogues and advertising material; posters, plain or picture postcards, calendars; greeting cards and visiting cards, announcement and message cards; maps and globes; *includes* toner and ink cartridges; educational materials such as exercise books, slide rules, geometry instruments, slates, chalks and pencil boxes; *excludes* pre-franked postcards and aerogrammes (11.08.11.1); stamp albums (11.09.31.1). pocket calculators (11.09.13.1).

11.09.60.0 PACKAGE HOLIDAYS

11.09.61.0 Package holidays [COICOP 09.6.0]

11.09.61.1 Package holidays (S)

All inclusive holidays or tours which provide for travel, food, accommodation, guides, etc.; *includes* half-day and one-day excursion tours; pilgrimages.

11.10.00.0 EDUCATION

Covers educational services only; *excludes* expenditures on educational materials, such as books (11.09.51.1) and stationery (11.09.53.1), or education support services, such as health care services (11.06.00.0), transport services (11.07.30.0), catering services (11.11.12.1) and accommodation services (11.11.21.1).

The level categories are those of the 1997 International Standard Classification of Education (ISCED 97) of the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

11.10.10.0 EDUCATION

11.10.11.0 Education [COICOP 10.1.0, 10.2.0, 10.3.0, 10.4.0. 10.5.0]

11.10.11.1 Education (S)

Pre-primary and primary education (ISCED levels 0 and1); general, vocational or technical secondary education (ISCED levels 2 and 3); post-secondary non-tertiary education (ISCED level 4), tertiary education (ISCED levels 5 and 6); education not definable by level; *includes* literacy programmes for students too old for primary school, out-of-school secondary education for adults and young people; out-of-school post-secondary non-tertiary education for adults and young people; schools for disabled persons where the main aim is to provide students with a general education rather than to help them to overcome their disability; education by radio or television broadcasting; *excludes* driving lessons (11.07.24.1); recreational training courses such as sport or bridge lessons given by independent teachers (11.09.41.1), crèches, play schools and other child minding facilities (12.05.11.1); schools for disabled persons where the main aim is to help students overcome their disability rather than to provide a general education (12.05.11.1).

11.11.00.0 RESTAURANTS AND HOTELS

11.11.10.0 CATERING SERVICES

11.11.11.0 Restaurants, cafés and the like [COICOP 11.1.1]

Catering services (meals, snacks, drinks and refreshments) provided by restaurants, cafés, pubs, bars, buffets, tea-rooms, etc., including those provided: in places providing recreational, cultural, sporting or entertainment services (theatres, cinemas, sports stadia, swimming pools, sports complexes, museums, art galleries, night clubs, dancing establishments, etc.); or on public transport (coaches, trains, boats, aeroplanes, etc.) when priced separately; *includes* tips; *excludes* tobacco purchases (11.02.21.1); telephone calls (11.08.31.1).

11.11.11.1 Restaurant services whatever the type of establishment (S)

Expenditures primarily on food bought away from home; *includes* the sale of food products for immediate consumption by kiosks, street vendors and the like; food products dispensed ready for consumption by automatic vending machines; the sale of cooked dishes by restaurants for consumption off their premises; the sale of cooked dishes by catering contractors whether collected by the customer or delivered to the customers' home

11.11.11.2 Pubs, bars, cafés, tea rooms and the like (S)

Expenditures primarily on beverages bought away from home; *includes* the sale of beverages for immediate consumption by kiosks, street vendors and the like; beverages dispensed ready for consumption by automatic vending machines.

11.11.12.0 Canteens [COICOP 11.1.2]

11.11.12.1 Canteens (S)

Catering services of works canteens, office canteens and canteens in schools, universities and other educational establishments; *includes* university refectories, military messes and wardrooms; *excludes* food and drink provided to hospital in-patients (11.06.31.1).

11.11.20.0 ACCOMMODATION SERVICES

11.11.21.0 Accommodation services [COICOP 11.2.0]

11.11.21.1 Accommodation services (S)

Accommodation services provided by: hotels, boarding houses, motels, inns, holiday villages, holiday centres, camping sites, caravan sites, youth hostels, mountain chalets, boarding schools, universities and other educational establishments, public transport (trains, boats, etc.) when priced separately, hostels for young workers or immigrants; *includes* tips; porters; *excludes* rentals of households occupying a room in a hotel or boarding house as their main residence (11.04.11.1); rentals paid by households for a secondary residence for the duration of a holiday (11.04.11.1); catering services in such establishments except for breakfast or other meals included in the price of the accommodation (11.11.11.1) or (11.11.12.1); housing in orphanages, homes for disabled or maladjusted persons (11.12.41.1).

11.12.00.0 MISCELLANEOUS GOODS AND SERVICES

11.12.10.0 PERSONAL CARE

11.12.11.0 Hairdressing salons and personal grooming establishments [COICOP 12.1.1]

11.12.11.1 Hairdressing salons and personal grooming establishments (S)

Services of hairdressing saloons, barbers, beauty shops, manicures, pedicures, Turkish baths, saunas, solariums, non-medical massages, etc.; *includes* body care, depilation and the like; *excludes* spas (11.06.23.1) or (11.06.31.1); fitness centres (11.09.41.1).

11.12.12.0 Electric appliances for personal care [COICOP 12.1.2]

11.12.12.1 Electric appliances for personal care (SD)

Electric razors and hair trimmers, hand-held and hood hair dryers, curling tongs and styling combs, sun-lamps, vibrators, electric toothbrushes and other electric appliances for dental hygiene, etc.; repair of such articles.

11.12.13.0 Other appliances, articles and products for personal care [COICOP 12.1.3]

11.12.13.1 Other appliances, articles and products for personal care (ND)

Non-electric appliances: razors and hair trimmers and blades therefore, scissors, nail files, combs, shaving brushes, hairbrushes, toothbrushes, nail brushes, hairpins, curlers, personal weighing machines, baby scales, etc.; articles for personal hygiene: toilet soap, medicinal soap, cleansing oil and milk, shaving soap, shaving cream and foam, toothpaste, etc.; beauty products: lipstick, nail varnish, make-up and make-up removal products (including powder compacts, brushes and powder puffs), hair lacquers and lotions, pre-shave and after-shave products, sun-bathing products, hair removers, perfumes and toilet waters, personal deodorants, bath products, etc.; other products: toilet paper, paper handkerchiefs, paper towels, sanitary towels, cotton wool, cotton tops, babies' napkins, etc.; *excludes* handkerchiefs made of fabric (11.03.13.1).

11.12.20.0 PROSTITUTION

11.12.21.0 Prostitution [COICOP 12.2.0]

11.12.21.1 Prostitution (S)

Services provided by prostitutes and the like.

11.12.30.0 PERSONAL EFFECTS N.E.C.

11.12.31.0 Jewellery, clocks and watches [COICOP 12.3.1]

11.12.31.1 Jewellery, clocks and watches (D)

Precious stones and metals and jewellery fashioned out of such stones and metals; costume jewellery, cuff-links and tie-pins; clocks, watches, stop-watches, alarm clocks, travel clocks; repair of such articles; *excludes* ornaments (11.05.11.4) or (11.05.41.1); radio clocks (11.09.11.1); precious stones and metals and jewellery fashioned out of such stones and metals acquired primarily as stores of value (capital formation).

11.12.32.0 Other personal effects [COICOP 12.3.2]

11.12.32.1 Other personal effects (SD)

Suitcases, trunks, travel bags, attaché cases, satchels, hand-bags, wallets, purses, etc.; articles for babies: baby carriages, push-chairs, carry-cots, recliners, car beds and seats, back-carriers, front carriers, reins and harnesses, etc.; articles for smokers: pipes, lighters, cigarette cases, cigar cutters, ashtrays, etc.; miscellaneous personal articles: sun-glasses, walking sticks and canes, umbrellas and parasols, fans, key rings, etc.; funerary articles: urns, coffins, gravestones, etc.; repair of such articles; *includes* lighter fuel; wall thermometers and barometers; *excludes* baby furniture (11.05.11.4); shopping bags (11.05.21.1); feeding bottles (11.05.41.1).

11.12.40.0 SOCIAL PROTECTION

Social protection as defined here covers assistance and support services provided to persons who are: elderly, disabled, suffering from occupational injuries and diseases, survivors, unemployed, destitute, homeless, low-income earners, indigenous people, immigrants, refugees, alcohol and substance abusers, etc. It also covers assistance and support services provided to families and children. Such services include residential care, home help, day care and rehabilitation.

11.12.41.0 Social protection [COICOP 12.4.0]

11.12.41.1 Social protection (S)

Covers payments by households for: retirement homes for elderly persons, residences for disabled persons, rehabilitation centres providing long-term support for patients rather than health care and rehabilitative therapy, schools for disabled persons where the main aim is to help students overcome their disability; help to maintain elderly and disabled persons at home (home cleaning services, meal programmes, day-care centres, day-care services and holiday-care services); wet-nurses, crèches, play schools and other child-minding facilities; counselling, guidance, arbitration, fostering and adoption services for families.

11.12.50.0 INSURANCE

Services charges for insurance are defined as the differences between claims due and premiums earned and premium supplements.

11.12.51.0 Insurance [COICOP 12.5.1, 12.5.2, 12.5.3, 12.5.4 and 12.5.5]

11.12.51.1 Insurance (S)

Service charges for life assurance, death benefit assurance, education assurance, etc.; service charges paid by owner-occupiers and by tenants for the kinds of insurance typically taken out by tenants against fire, theft, water damage, etc.; service

charges for private sickness and accident insurance; service charges for insurance in respect of personal transport equipment; service charges for travel insurance and luggage insurance; service charges for other insurance such as civil liability for injury or damage to third parties or their property not arising from the operation of personal transport equipment; *excludes* service charges paid by owner-occupiers for the kinds of insurance typically taken out by landlords (intermediate consumption).

11.12.60.0 FINANCIAL SERVICES N.E.C.

11.12.61.0 FISIM [COICOP 12.6.1]

11.12.61.1 FISIM (S)

Financial intermediation services indirectly measured.

11.12.62.0 Other financial services n.e.c. [COICOP 12.6.2]

11.12.62.1 Other financial services n.e.c. (S)

Actual charges for the financial services of banks, post offices, saving banks, money changers and similar financial institutions; fees and service charges for brokers, investment counsellors, tax consultants and the like; administrative charges of private pension funds and the like.

11.12.70.0 OTHER SERVICES N.E.C.

11.12.71.0 Other services n.e.c. [COICOP 12.7.0]

11.12.71.1 Other services n.e.c. (S)

Fees for legal services, employment agencies, etc.; charges for undertaking and other funeral services; payment for the services of estate agents, housing agents, auctioneers, operators of salesrooms and other intermediaries; payment for photocopies and other reproductions of documents; fees for the issue of birth, marriage and death certificates and other administrative documents; payment for newspaper notices and advertisements; payment for the services of graphologists, astrologers, private detectives, bodyguards, matrimonial agencies and marriage guidance counsellors, public writers, miscellaneous concessions (seats, toilets, cloakrooms), etc.

11.13.00.0 NET PURCHASES ABROAD

11.13.10.0 NET PURCHASES ABROAD

11.13.11.0 Net purchases abroad

11.13.11.1 Net purchases abroad

Purchases by residential households in the rest of the world (as tourists, travelling businessmen and government officials, crews, border and seasonal workers, diplomatic and military personal stationed abroad) *less* purchases by non-residential households in the economic territory of the country (as tourists, travelling businessmen and government officials, crews, border and seasonal workers, diplomatic and military personal stationed abroad).

12.00.00.0 INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHs

12.01.00.0 HOUSING

12.01.10.0 HOUSING

12 01.11.0 Housing [COPNI 01.0.0]

12.01.11.1 Housing (IS)

Covers the following NPISHs: associations that undertake the development, construction, management, leasing, financing, renovation and rehabilitation of housing.

12.02.00.0 HEALTH

12.02.10.0 HEALTH

12.02.11.0 Health [COPNI 02.1.1 to 02.6.0]

12.02.11.1 Health (IS)

Covers the following NPISHs: general and specialised hospitals, nursing and convalescence homes, medical and maternity centres, hospices for terminally-ill persons; surgeries, clinics, vaccination centres and dispensaries; rehabilitation centres where the objective is to treat patients rather than to provide long-term support; volunteer organisations for ambulance crews and paramedical personnel that provide emergency medical services; organisations that promote public health and health education; organisations that provide medical services to persons who are victims of wars, famines and natural catastrophes whether in their own country or abroad; organisations that undertake research and scientific studies on medical and health matters and trust funds or charitable organisations that finance such activities; charitable foundations that provide financial support for hospitals, nursing homes, surgeries, etc. and charitable foundations that provide financial support for patients; *includes* hospitals, nursing homes, surgeries, etc. funded by religious organisations; *excludes* residential homes for elderly or disabled persons (12.05.11.1); shelters for homeless persons (12.05.11.1).

12.03.00.0 RECREATION AND CULTURE

12.03.10.0 RECREATION AND CULTURE

12.03.11.0 Recreation and culture [COPNI 03.1.0 and 03.2.0]

12.03.11.1 Recreation and culture (IS)

Covers the following NPISHs: clubs for playing indoor or outdoor sports, including fitness clubs, sailing, rowing and canoeing clubs; supporters' clubs for indoor or outdoor sports; clubs for games of skill or chance; youth clubs and organisations such as guides, scouts, young pioneers, YMCA and YWCA; clubs for outdoor activities such as rambling, hiking, caving and mountain-climbing, parachuting, scuba diving, hang gliding, etc.; social clubs such as veteran associations, Lions and Rotary Club; associations for bird-watchers, butterfly-hunters, model-builders, stamp-collectors, train spotters, vintage car enthusiasts, antique collectors, etc.; animal shelters, animal hospitals and veterinary services for pets; organisations that seek finance for, or otherwise support, participation of sportspersons and game-players in international competitions; libraries, museums and art galleries; historical, literary, humanistic and philosophical societies; theatre and dance groups, orchestras, choral and musical

ensembles, etc., that produce live performances of plays, operas, ballets and other spectacles; photography, cinema and art clubs; associations for the maintenance and visiting of historical monuments, war cemeteries, zoological and botanical gardens and aquaria; fan-clubs for actors, singers, film stars and other performing artists; television and radio broadcasting; *excludes* associations that promote alternative life-styles (12.06.11.1); organisations whose objective is to protect wild animals (12.06.11.1).

12.04.00.0 EDUCATION

12.04.10.0 EDUCATION

12.04.11.0 Education [COPNI 04.1.0 to 04.7.0]

12.04.11.1 Education (IS)

Covers the following NPISHs: pre-primary and primary schools; secondary schools providing general, vocational or technical education; institutions providing post-secondary non-tertiary education; universities, colleges and the like providing tertiary education; organisations providing educational programmes not definable by level; parent-teacher associations; organisations that undertake research or other scientific studies on educational matters and trust funds and charitable foundations set up to finance such activities; charitable foundations that provide support for schools, colleges, universities, etc. and charitable foundations that provide bursaries and financial support for students; *includes* schools for disabled persons where the main aim is to provide students with a general education rather than to help them to overcome their disability; night-schools and educational institutes managed by trade unions and labour federations; seminaries and colleges for training priests, clerics, rabbis and other offices of religious organisations; education by radio or television broadcasting; *excludes* crèches, play schools and other child minding facilities (12.05.11.1); schools for disabled persons where the main aim is to help students overcome their disability rather than to provide a general education (12.05.11.1).

12.05.00.0 SOCIAL PROTECTION

12.05.10.0 SOCIAL PROTECTION

Social protection as defined here covers assistance and support services provided to persons who are: elderly, disabled, suffering from occupational injuries and diseases, survivors, unemployed, destitute, homeless, low-income earners, indigenous people, immigrants, refugees, alcohol and substance abusers, etc. It also covers assistance and support services provided to families and children. Such services include residential care, home help, day care and rehabilitation.

12.05.11.0 Social protection [COPNI 05.1.0 and 05.2.0]

12.05.11.1 Social protection (IS)

Covers the following NPISHs: retirement homes for elderly persons, residences for disabled persons, rehabilitation centres providing long-term support for patients rather than health care and rehabilitative therapy, schools for disabled persons where the main aim is to help students overcome their disability; organisations that provide home-cleaning services, meal programmes, day-care centres, day-care services, holiday-care and transport services for elderly and disabled persons; orphanages, crèches, nurseries, play schools, day-care centres and other child-minding facilities; organisations that provide counselling, guidance, arbitration, fostering and adoption services for families; single parent agencies and services, family violence shelters; organisations that provide counselling to persons who are disaster victims, victims of assault and abuse and potential suicides; organisations that provide temporary

shelters or housing for homeless persons; organisations that provide long-term support for persons who are gamblers, alcohol abusers and substance abusers; organisations that provide cash assistance, food, clothing, shelter and other services to persons who are refugees, immigrants, destitute and low-income earners; organisations that seek to improve conditions in prisons, including prison visitors and social rehabilitation; organisations that seek to provide opportunities for economic or social development for deprived groups of persons, whether in their own country or abroad; organisations that undertake applied research and experimental development on subjects related to social protection and trust funds and charitable foundations that finance such activities.

12.06.00.0 OTHER SERVICES

12.06.10.0 OTHER SERVICES

Covers COPNI divisions 06 Religion, 07 Political parties, labour and professional organisations, 08 Environment protection and 09 Services n.e.c.

12.06.11.0 Other services [COPNI 06.0.0 to 09.2.0]

12.06.11.1 Other services (IS)

Covers the following NPISHs:

Organisations that promote religious beliefs, administer religious services and rituals, maintain places of worship, provide retreats for meditation or religious instruction; churches, convents, nunneries, monasteries, mosques, synagogues, temples, shrines, etc.; *includes* non-conventional cults and sects; *excludes* hospitals, nursing homes, surgeries, etc. funded by religious organisations (12.02.11.1); maintenance of war-cemeteries (12.03.11.1); schools, colleges, universities, etc. funded by religious organisations (12.04.11.1); seminaries and colleges for training priests, clerics, rabbis and other officers of religious organisations (12.04.11.1); orphanages and shelters for persons in distressed conditions funded by religious organisations (12.05.11.1).

Political parties; political action groups and organisations that seek to enhance respect for human rights, whether in their own country or abroad; political action groups and groups formed to promote equal employment or political rights or to oppose discrimination on grounds of race, gender, age or sexual preference; political parties and political action groups mainly concerned with single issues such as the environment, the abolition of blood-sports, gun control, capital punishment or right to life; research bodies directly linked to political parties and political action groups; trade unions, labour federations and similar groups whose purpose is to improve or maintain the living conditions of members; associations of members of particular professions which promote the interests of members, exchange information among members or issue regular publications on topics relevant to the professions; *exclude*s: night-schools and educational institutes managed by trade unions and labour federations (12.04.11.1).

Organisations set up to prevent or remedy damage to the environment; associations that seek to protect wild animals or preserve particular species of animals, birds, fish, insects etc.; organisations that seek to preserve forests, wet-lands and areas of natural beauty; organisations that undertake applied research and experimental development on subjects related to environment protection and trust funds and charitable organisations set up to finance such activities.

Community and neighbourhood organisations; organisations that seek to prevent cruel treatment of domesticated animals; organisations providing legal-aid services and related assistance; organisations carrying out economic forecasting and analysis; organisations that undertake basic research and applied research and experimental development on subjects not classified to 12.02.00.0, 12.04.00.0 or 12.05.00.0 and

trust funds and charitable organisations set up to finance such activities; organisations providing services that cannot be assigned to 12.01.00.00 to 12.05.00.0

13.00.00.0 INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT

Covers COFOG divisions 07 Health, 08 Recreation, culture and religion, 09 Education and 10 Social protection; *excluding* COFOG classes 07.5.0 R&D Health, 07.6.0 Health n.e.c., 08.3.0 Broadcasting and publishing services, 08.4.0 Religious and other community services, 08.5.0 R&D Recreation, culture and religion, 08.6.0 recreation, culture and religion n.e.c., 09.7.0 R&D Education, 09.8.0 Education n.e.c., 10.8.0 R&D Social protection and 10.9.0 Social protection n.e.c.

13.01.00.0 HOUSING

COFOG 10.6.0 covers government outlays on housing services provided to individual persons.

13.01.10.0 HOUSING

13.01.11.0 Housing

13.01.11.1 Housing (IS)

Provision of social protection in the form of benefits in kind to help households meet the cost of housing (recipients of these benefits are means tested); administration, operation or support of such social protection schemes; benefits in kind, such as payments made on a temporary or long-term basis to help tenants with rent costs, payments to alleviate the current housing costs of owner-occupiers (that is, to help with paying mortgages or interest), provision of low-cost or social housing.

13.02.00.0 HEALTH

COFOG 07 Health covers government outlays on health services provided to individual persons and health services provided on a collective basis. Only expenditures on individual services - COFOG 07.1.1 to 07.4.0 - are allocated here. Expenditures on collective services - COFOG 07.5.0 and 07.6.0 - are assigned to 14.01.10.0.

13.02.10.0 HEALTH BENEFITS AND REIMBURSEMENTS

General government expenditure on medical goods and services produced by the private sector.

13.02.11.0 Medical products, appliances and equipment

Medicaments, prostheses, medical appliances and equipment and other health-related products purchased by individuals, either with or without a prescription, usually from dispensing chemists, pharmacists or medical equipment suppliers. They are intended for consumption or use outside a health facility or institution. Such products supplied directly to out-patients by medical, dental and paramedical practitioners or to in-patients by hospitals and the like are included in health services (13.02.12.0).

13.02.11.1 Pharmaceutical products (IS)

Medicinal preparations, medicinal drugs, patent medicines, serums and vaccines, vitamins and minerals, cod liver oil and halibut liver oil, oral contraceptives.

13.02.11.2 Other medical products (IS)

Clinical thermometers, adhesive and non-adhesive bandages, hypodermic syringes, first-aid kits, hot-water bottles and ice bags, medical hosiery items such as elasticated stockings and knee-pads, pregnancy tests, condoms and other mechanical contraceptive devices.

13.02.11.3 Therapeutic appliances and equipment (IS)

Corrective eye-glasses and contact lenses, hearing aids, glass eyes, artificial limbs and other prosthetic devices, orthopaedic braces and supports, orthopaedic footwear, surgical belts, trusses and supports, neck braces, medical massage equipment and health lamps, powered and unpowered wheelchairs and invalid carriages, special beds, crutches, electronic and other devices for monitoring blood pressure, etc.; repair of such articles; *includes* dentures but not fitting costs; *excludes* hire of therapeutic equipment (13.02.12.3).

13.02.12.0 Health services

Medical, dental and paramedical services delivered to out-patients by medical, dental and paramedical practitioners and auxiliaries and to in-patients by hospitals and the like. *Includes* the medicaments, prostheses, medical appliances and equipment and other health-related products supplied directly to out-patients by medical, dental and paramedical practitioners and auxiliaries and to in-patients by hospitals and the like.

13.02.12.1 Out-patient medical services (IS)

Medical services delivered to out-patients by physicians in general or specialist practice; *includes* services of orthodontic specialists; *excludes* dental clinics and dentists (13.02.12.2); services of medical analysis laboratories and X-ray centres (13 02.12.3).

13.02.12.2 Out-patient dental services (IS)

Dental services delivered to out-patients by dentists, oral hygienists or other dental operating auxiliaries; *includes* fitting costs of dentures; *excludes* dentures (13.02.11.3); services of orthodontic specialists (13.02.12.1); services of medical analysis laboratories and X-ray centres (13.02.12.3).

13.02.12.3 Out-patient paramedical services (IS)

Paramedical health services delivered to out-patients; *includes* acupuncturists, chiropodists, chiropractors, optometrists, practitioners of traditional medicine, etc.; medical analysis laboratories and X-ray centres; hire of therapeutic equipment; medically-prescribed corrective-gymnastic therapy; out-patient thermal bath or seawater treatments; ambulance services other than ambulance services operated by hospitals.

13.02.12.4 Hospital services (IS)

Comprises both medical services: services of physicians in general or specialist practice, of surgeons and of dentists; medical analysis and X-rays; paramedical services such as those of nurses, midwives, chiropractors, optometrists, physiotherapists, speech therapists, etc.; and basic services: administration; accommodation; food and drink; supervision and care by non-specialist staff (nursing auxiliaries); first-aid and resuscitation; ambulance transport; provision of medicines and other pharmaceutical products; provision of therapeutic appliances and equipment.

13.02.20.0 PRODUCTION OF HEALTH SERVICES

General government expenditure on government-produced health services

13.02.21.0 Compensation of employees

13.02.21.1 Physicians (IS)

Total remuneration in cash and kind made by general government to physicians employed in government-produced health services; comprises gross salaries and wages (basic salary and wages plus other payments such as allowances, overtime and payments in kind), employers' actual social contributions and employers' imputed social contributions.

13.02.21.2 Nurses and other medical staff (IS)

Total remuneration in cash and kind made by general government to nurses and other medical staff employed in government-produced health services; comprises gross salaries and wages (basic salary and wages plus other payments such as allowances, overtime and payments in kind), employers' actual social contributions and employers' imputed social contributions.

13.02.21.3 Non-medical staff (IS)

Total remuneration in cash and kind made by general government to non-medical staff employed in government-produced health services; comprises gross salaries and wages (basic salary and wages plus other payments such as allowances, overtime and payments in kind), employers' actual social contributions and employers' imputed social contributions.

13.02.22.0 Intermediate consumption

13.02.22.1 Pharmaceutical products (IS)

Value of pharmaceutical products consumed in the production of government-produced health services.

13.02.22.2 Other medical goods (IS)

Value of other medical goods consumed in the production of government-produced health services.

13.02.22.3 Therapeutic appliances and equipment (IS)

Value of therapeutic appliances and equipment consumed in the production of government-produced health services.

13.02.22.4 Intermediate consumption n.e.c. (IS)

Value of goods and services (other than pharmaceutical products and therapeutic appliances and equipment) consumed in the production of government-produced health services.

13.02.23.0 Gross operating surplus

13.02.23.1 Gross operating surplus (IS)

Consumption of fixed capital plus operating surplus arising from the production of government-produced health services.

13.02.24.0 Net taxes on production

13.02.24.1 Net taxes on production (IS)

Taxes less subsidies on the production of government-produced health services.

13.02.25.0 Receipts from sales

13.02.25.1 Receipts from sales (IS)

Receipts from sales of government-produced health services.

13.03.00.0 RECREATION AND CULTURE

COFOG 08 Recreation, culture and religion covers government outlays on services provided to individual persons and services provided on a collective basis. Only expenditures on individual services - COFOG 08.1.0 and 08.2.0 - are allocated here. Expenditures on collective services - COFOG 08.3.0 to 08.6.0 - are assigned to 14.01.10.0.

13.03.10.0 RECREATION AND CULTURE

13.03.11.0 Recreation and culture

13.03.11.1 Recreation and culture (IS)

Provision of sporting and recreational services; administration of sporting and recreational affairs; supervision and regulation of sporting facilities; operation or support of facilities for active sporting pursuits or events (playing fields, tennis courts, squash courts, running tracks, golf courses, boxing rings, skating rinks, gymnasia, etc.); operation or support of facilities for passive sporting pursuits or events (chiefly specially equipped venues for playing cards, board games, etc.); operation or support of facilities for recreational pursuits (parks, beaches, camping grounds and associated lodging places furnished on a non-commercial basis, swimming pools, public baths for washing, etc.); grants, loans or subsidies to support teams or individual competitors or players; *includes* facilities for spectator accommodation; national, regional or local team representation in sporting events; *excludes* sporting and recreational facilities associated with educational institutions (13.04.00.0).

Provision of cultural services; administration of cultural affairs; supervision and regulation of cultural facilities; operation or support of facilities for cultural pursuits (libraries, museums, art galleries, theatres, exhibition halls, monuments, historic houses and sites, zoological and botanical gardens, aquaria, arboreta, etc.); production, operation or support of cultural events (concerts, stage and film productions, art shows, etc.); grants, loans or subsidies to support individual artists, writers, designers, composers and others working in the arts or to organisations engaged in promoting cultural activities; *includes* national, regional or local celebrations provided they are not intended chiefly to attract tourists; *excludes* cultural events intended for presentation beyond national boundaries (14.01.10.0); national, regional or local celebrations intended chiefly to attract tourists (14.01.10.0); production of cultural material intended for distribution by broadcasting (14.01.10.0).

13.04.00.0 EDUCATION

COFOG 09 Education covers government outlays on education services provided to individual persons and education services provided on a collective basis. Only expenditures on individual services – CO FOG 09.1.1 to 09.6 0 - are allocated here. Expenditures on collective services - COFOG 09.7.0 and 09.8.0 - are assigned to 14.01.10.0.

The level categories are those of the 1997 International Standard Classification of Education (ISCED 97) of the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

13.04.10.0 EDUCATION

13.04.11.0 Education

Covers both general government expenditure on education services produced by the private sector and General government expenditure on government-produced education services

13.04.11.1 Education (IS)

Pre-primary and primary education (ISCED levels 0 and1); general, vocational or technical secondary education (ISCED levels 2 and 3); post-secondary non-tertiary education (ISCED level 4), tertiary education (ISCED levels 5 and 6); education not definable by level; *includes* literacy programmes for students too old for primary school, out-of-school secondary education for adults and young people; out-of-school post-secondary non-tertiary education for adults and young people; schools for disabled persons where the main aim is to provide students with a general education rather than to help them to overcome their disability; education by radio or television broadcasting; *excludes* crèches, play schools and other child minding facilities (13.05.11.1); schools for disabled persons where the main aim is to help students overcome their disability rather than to provide a general education (13.05.11.1).

13.05.00.0 SOCIAL PROTECTION

COFOG 10 Social protection covers government outlays on services provided to individual persons and services provided on a collective basis. Only expenditures on individual services relating to sickness and disability, old age, survivors, family and children, unemployment and social exclusion n.e.c. - COFOG 10..1.1 to 10.5.0 and 10.7.0 - are allocated here. Expenditures on individual housing services - COFOG 10.6 0 - are assigned to 13.01.11.1. Expenditures on collective services - COFOG 10.8.0 and 10.9.0 - are assigned to 14.01.10.0.

13.05.10.0 SOCIAL PROTECTION

13.05.11.0 Social protection

13.05.11.1 Social protection (IS)

Provision of social protection in the form of cash benefits or benefits in kind; administration, operation or support of social protection schemes; *includes* the cash benefits and the benefits in kind provided.

14.00.00.0 COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT

14.01.00.0 COLLECTIVE SERVICES

Covers COFOG divisions 01 General public services, 02 Defence, 03 Public order and safety, 04 Economic affairs, 05 Environment protection and 06 Housing and community amenities; *including* COFOG classes 07.5.0 R&D Health, 07.6.0 Health n.e.c., 08.3.0 Broadcasting and publishing services, 08.4.0 Religious and other community services, 08.5.0 R&D Recreation, culture and religion, 08.6.0 recreation, culture and religion n.e.c., 09.7.0 R&D Education, 09.8.0 Education n.e.c., 10.8.0 R&D Social protection and 10.9.0 Social protection n.e.c.

14.01.10.0 COLLECTIVE SERVICES

14.01.11.0 Compensation of employees

14.01.11.1 Compensation of employees (collective services relating to defence) (CS)

Total remuneration in cash and kind made by general government to employees working in collective services relating to defence; comprises gross salaries and wages (basic salary and wages plus other payments such as allowances, overtime and payments in kind), employers' actual social contributions and employers' imputed social contributions.

14.01.11.2 Compensation of employees (collective services other than defence) (CS)

Total remuneration in cash and kind made by general government to employees working in collective services other than defence; comprises gross salaries and wages (basic salary and wages plus other payments such as allowances, overtime and payments in kind), employers' actual social contributions and employers' imputed social contributions.

14.01.12.0 Intermediate consumption

14.01.12.1 Intermediate consumption (collective services relating to defence) (CS)

Value of goods and services consumed - that is, transformed or used up - in the production of collective services relating to defence.

14.01.12.2 Intermediate consumption (collective services other than defence) (CS)

Value of goods and services consumed - that is, transformed or used up - in the production of collective services other than defence.

14.01.13.0 Gross operating surplus

14.01.13.1 Gross operating surplus (CS)

Consumption of fixed capital *plus* operating surplus.

14.01.14.0 Net taxes on production

14.01.14.1 Net taxes on production (CS)

Taxes on production *less* subsidies on production.

14.01.15.0 Receipts from sales

14.01.15.1 Receipts from sales (CS)

Receipts from sales.

15.00.00.0 GROSS FIXED CAPITAL FORMATION

15.01.00.0 MACHINERY AND EQUIPMENT

15.01.10.0 METAL PRODUCTS AND EQUIPMENT

15.01.11.0 Fabricated metal products, except machinery and equipment [CPA 28.11 to 28.75]

15.01.11.1 Fabricated metal products, except machinery and equipment (IG)

Prefabricated buildings of metal; bridges, bridge sections, towers and lattice masts of iron or steel; reservoirs, tanks, vats and similar containers of iron, steel or aluminium

for all materials; central heating radiators and boilers; steam generators; nuclear reactors; hand tools; casks, drums, cans, boxes and similar containers of iron, steel or aluminium for all materials except gas; other fabricated metal products n.e.c.

15.01.12.0 General purpose machinery [CPA 29.11 to 29.24]

15.01.12.1 Engines and turbines, pumps and compressors (IG)

Engines and turbines except aircraft, vehicle and cycle engines; pumps and compressors.

15.01.12.2 Other general purpose machinery (IG)

Ovens other than bakery ovens; furnaces, furnace burners and incinerators; lifting and handling equipment such as jacks and hoists for raising vehicles, derricks, cranes, fork-lift trucks, skip hoists, lifts, escalators, and moving walkways; non-domestic cooling and ventilation equipment; other general purpose equipment n.e.c.

15.01.13.0 Special purpose machinery [CPA 29.31 to 29.72]

15.01.13.1 Agricultural and forestry machinery (IG)

Agricultural tractors; ploughs, harrows, cultivators, seeders, planters, manure spreaders, fertilizer distributors and other machinery for the preparation and cultivation of the soil; mowing, harvesting, threshing, hay-making and baling machinery; mechanical appliances for the projecting, dispersing or spraying liquids or powders for agriculture or horticulture; self-loading or unloading trailers and semi-trailers for agriculture and forestry; machines for cleaning, sorting or grading agricultural produce; milking machines; machines for preparing animal feeding stuffs; incubators, brooders and other poultry-keeping machinery; bee-keeping machinery; other agricultural and forestry machinery n.e.c.

15.01.13.2 Machine tools (IG)

Machine tools for working metals, stone, ceramics, concrete, glass, wood, cork, bone, hard rubber, hard plastics and similar hard materials; pneumatic or motorised hand tools; soldering, brazing and welding tools; surface tempering and hot spraying machines and apparatus.

15.01.13.3 Machinery for metallurgy, mining, quarrying and construction (IG)

Converters, ladles, ingot moulds and casting machines for metallurgy; metal-rolling mills; continuous-action elevators and conveyors for underground use; coal or rock cutters and tunnelling machinery; boring and sinking machinery; self-propelled earthmoving and excavating machinery such as bulldozers, angle-dozers, graders, levellers, tamping machines, road rollers, mechanical shovels and shovel loaders; machinery for sorting, grinding and mixing of earth, ores and other mineral substances; foundry moulds forming machinery; track-laying tractors.

15.01.13.4 Machinery for food, beverages and tobacco processing (IG)

Centrifugal cream separators and other dairy machinery; machinery for the milling or working of cereals or dried vegetables; machinery used in the manufacture of wine, cider, fruit juices and similar beverages; non-electric bakery ovens; dryers for agricultural produce; non-domestic equipment for cooking or heating; machinery used in the manufacture of oils and fats; other machinery used in the manufacture of food and beverages; machinery for preparing or making up tobacco.

15.01.13.5 Machinery for textile, apparel and leather production (IG)

Machines for extruding, drawing, texturing or cutting textile materials; machines for preparing textile fibres; textile spinning, weaving or knitting machines; sewing machines; machinery for washing, cleaning, wringing, ironing, pressing, dyeing or reeling of textile yarn and fabrics; felt-finishing machinery; laundry-type washing

machines, drying machines and dry-cleaning machines; machinery for working hides, skins or leather; machinery for making or repairing footwear and other articles.

15.01.13.6 Other special purpose machinery (IG)

Machinery for paper and paperboard production; book-binding and book-sewing machinery; machinery. apparatus and equipment, for type-setting, for preparing or making printing blocks or plates; offset printing and other printing machinery (excluding those of the office type); centrifugal clothes-dryers; dryers for wood, paper pulp, paper or paperboard; other special purpose machinery n.e.c.

15.01.14.0 Electrical and optical equipment [CPA 30.01 to 33.50]

15.01.14.1 Office machinery (IG)

Typewriters and word-processing machines; calculating machines, accounting machines and cash registers; office-type photo-copying apparatus and offset printing machinery; automatic banknote dispensers, coin-sorting, coin-counting and coin-wrapping machines.

15.01.14.2 Computers and other information processing equipment (IG)

Computers and other information processing equipment.

15.01.14.3 Electrical machinery and apparatus (IG)

Electric motors, generators and transformers; electricity distribution and control apparatus; accumulators and batteries; lighting equipment and electric lamps; electrical equipment n.e.c.

15.01.14.4 Radio, television and communications equipment and apparatus (IG)

Radio and television transmitters and receivers; television cameras; electric apparatus for line telephony and telegraphy; videophones; sound or video recording or reproducing apparatus.

15.01.14.5 Medical, precision and optical instruments, watches and clocks (IG)

Medical, surgical, dental and veterinary equipment, instruments, appliances and furniture; instruments and appliances for measuring, checking, testing, navigating and other purposes; industrial process control equipment; optical instruments and photographic equipment; watches and clocks.

15.01.15.0 Other manufactured goods n.e.c. [CPA 36.11 to 36.63]

15.01.15.1 Other manufactured goods n.e.c. (IG)

Office, shop and kitchen furniture; bedroom, dining room, living room and garden furniture; mattresses; musical instruments; sports goods.

15.01.20.0 TRANSPORT EQUIPMENT

15.01.21.0 Road transport equipment [CPA 34.10 to 34.30 and 35.41 to 35.50]

15.01.21.1 Motor vehicles, trailers and semi-trailers (IG)

Passenger cars, taxi cabs, vans, buses, coaches, trolley buses, lorries, trucks, tankers, tractor units for semi-trailers, trailers, semi-trailer, caravans, special purpose motor vehicles such as dumpers for off-highway use, breakdown lorries, crane lorries, ambulances, fire trucks, concrete-mixer lorries, road sweeper lorries, mobile radiological units, motorised sleighs, etc., including their bodies (coachwork), specialised parts and engines.

15.01.21.2 Other road transport (IG)

Motorcycles, side cars, scooters, bicycles, invalid carriages, including their specialised parts and engines.

15.01.22.0 Other transport equipment [CPA 35.11 to 35.30]

15.01.22.1 Ships, boats, steamers, tugs, floating platforms, rigs (IG)

Cruise ships, excursion boats, ferry boats, hovercraft, cargo ships, barges, lighters, tankers, refrigerated vessels, fishing vessels, factory ships; tugboats and pusher craft, ice-breakers, dredgers, cable ships, light vessels, research vessels and other non-trading ships (except naval ships); floating docks, floating dredges, oil rigs and other floating or submersible drilling or production platforms; specialised ship parts other than engines; all vessels which have undergone extensive reconstruction and conversion.

15.01.22.2 Locomotives and rolling stock (IG)

All railway and tramway locomotives, maintenance and service vehicles and rolling stock (passenger coaches, luggage vans, post office coaches, goods wagons, tank wagons, refrigerated vans, etc.) intended for railway service or for service in mining and industrial operations; their specialised parts other than engines.

15.01.22.3 Aircraft, helicopters and other aeronautical equipment (IG)

Aeroplanes, helicopters, balloons, gliders, spacecraft, satellites, including their specialised parts and engines.

15.02.00.0 CONSTRUCTION

Covers the construction of new structures and the renovation of, and the additions and alterations to, existing structures.

15.02.10.0 RESIDENTIAL BUILDINGS

15.02.11.0 Residential buildings [CPA division 45]

15.02.11.1 Residential buildings

Detached, semi-detached and terraced houses; apartment houses with two or more dwelling units *includes* farm houses and dormitories.

15.02.20.0 NON-RESIDENTIAL BUILDINGS

15.02.21.0 Non- residential buildings [CPA division 45]

15.02.21.1 Non-residential buildings

Non-residential farm buildings (stables, barns, granaries, grain bins, tower silos, machine sheds, etc.); industrial buildings (factories, plants, workshops, warehouses, etc.); commercial or administrative buildings (office buildings, bank buildings, parking garages, petrol and service stations, shopping centres and air, rail or road transport terminals); public entertainment buildings (cinemas, theatres, concert halls, dance halls and night clubs; inns, hotels, motels, hostels, restaurants, etc.); educational buildings (schools, colleges, universities, libraries, archives and museums); health buildings (hospitals, clinics, sanatoria, etc.); structures for stadia and sports grounds; other non-residential buildings (religious buildings, prison buildings, etc.).

15.02.30.0 CIVIL ENGINEERING WORKS

15.02.31.0 Civil engineering works [CPA division 45]

15.02.31.1 Civil engineering works

Highways, roads, railways and airfield runways; bridges, elevated highways, tunnels and subways; waterways, harbours, dams and other waterworks; pipelines for oil, gas, water supplies, sewerage or rain water; telecommunication transmission lines; electricity power lines including electricity power lines for railways; power plants and other complex industrial constructions; flatwork for sport and recreation installations; civil engineering work n.e.c.

15.03.00.0 OTHER PRODUCTS

15.03.10.0 OTHER PRODUCTS

15.03.11.0 Products of agriculture, forestry, fisheries and aquaculture [CPA divisions 01, 02 and 05]

15.03.11.1 Products of agriculture, forestry, fisheries and aquaculture (IG)

Plantation, orchard and vineyard development; change in stocks of breeding stock, draught animals, dairy cattle, animals raised for wool clippings, etc.

15.03.12.0 Software [CPA 72.20]

15.03.12.1 Software (IG)

Computer software that a producer expects to use in production for more than one year.

15.03.13.0 Other products n.e.c. [CPA n.e.c.]

15.03.13.1 Other products n.e.c. (IG)

Land improvement including dams and dikes which are part of flood control and irrigation projects; mineral exploration; acquisition of entertainment, literary or artistic originals; other intangible fixed assets.

16.00.00.0 CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES

16.01.00.0 CHANGES IN INVENTORIES

16.01.10.0 CHANGES IN INVENTORIES

16.01.11.0 Changes in inventories

16.01.11.1 Changes in inventories

The value of physical change in: inventories of raw materials, supplies and finished goods held by producers, inventories of goods acquired for resale by wholesalers and retailers; inventories of all goods stored by government; work-in-progress in manufacturing, construction and service industries; work-in-progress on cultivated assets (namely, the natural growth prior to harvest of agricultural crops, vineyards, orchards, plantations and timber tracts and the natural growth in livestock raised for slaughter).

16.02.00.0 ACQUISITIONS LESS DISPOSALS OF VALUABLES

16.02.10.0 ACQUISITIONS LESS DISPOSALS OF VALUABLES

16.02.11.0 Acquisitions less disposals of valuables

16.02.11.1 Acquisitions less disposals of valuables

Acquisitions of valuables (produced assets, such as non-monetary gold, precious stones, antiques, paintings, sculptures and other art objects, that are not used primarily for production or consumption but purchased and held as stores of value) *less* disposals of valuables.

17.00.00.0 BALANCE OF EXPORTS AND IMPORTS

17.01.00.0 BALANCE OF EXPORTS AND IMPORTS

17.01.10.0 BALANCE OF EXPORTS AND IMPORTS

17.01.11.0 Balance of exports and imports

17.01.11.1 Balance of exports and imports

Value (f.o.b.) of exports of goods and services *less* value (c.i.f.) of imports goods and services.

ANNEX IV. QUARANTA EDITING PROCEDURE

IV.1 Introduction

IV.1. Eurostat and the OECD use the Quaranta editing procedure[1] to validate the prices that participating countries report for consumer products, rents, government services and capital goods. The procedure is both an editing tool and an analytical tool. As an editing tool it identifies possible errors that need to be investigated among the prices reported by countries. As an analytical tool it provides information that can be used to assess the reliability of completed price surveys and to assist the planning of future price surveys. In short, the Quaranta editing procedure plays a key role in improving the quality of Eurostat and OECD comparisons.

IV.2. The procedure has been in place since the early 1990s when it was used to edit the prices collected for consumer goods and services: the purpose for which it was originally intended. In the meantime, the procedure has evolved and its application broadened to other price surveys such as those covering equipment goods and construction projects. The Quaranta editing procedure described in this annex is the standard version currently employed. The description focuses on the validation of prices for consumer products as this remains the procedure's principal application.

IV.3. The validation of the prices collected for consumer goods and services is carried out price survey by price survey in two stages. The first stage involves the intra-country editing and verification of individual price observations by product. The second stage involves the Quaranta editing procedure and the inter-country verification of average survey prices by basic heading. The first stage is described in Chapter 5, Section 5.5.7. The second stage is described in the following paragraphs.

IV.2 Standardised price ratios

IV.4 The Quaranta editing procedure is designed to screen the average survey prices reported by countries for possible errors and to assess the reliability of the PPPs they provide. The object is to verify that the prices are for comparable products and that the products have been correctly priced. In other words, to ascertain that countries have interpreted the product specifications the same way and that they have also priced them accurately. The Quaranta editing procedure does this by comparing the average survey prices for the same product across countries and by analysing the dispersion across products and across countries of the price ratios that the average survey prices generate between countries. More specifically, inter-country editing involves detecting possible errors among the average survey prices by identifying outliers among their corresponding price ratios.

IV.5 As participating countries report average survey prices in national currencies, the prices can be compared only if they are converted to a common currency. Once converted to a common currency, the average survey prices of different countries for the same product can be compared with each other and outliers identified according to pre-determined criteria. But prices, even when expressed in the same currency, cannot be compared across products directly. On the other hand, the price ratios of countries pricing a product can be compared with the equivalent price ratios for other products providing that they have first been *standardised*. Standardised price ratios for a product are the ratios between the individual average survey prices of the countries pricing the product and the geometric mean of the average survey prices of all the countries pricing the product when the prices are expressed in a common currency.[2]

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1 The procedure is named after its originator, Vincenzo Quaranta of ISTAT, who first proposed it to the Eurostat Working Party on Price Statistics in January 1990. It was subsequently described in "A data quality control approach in price surveys for PPP estimates", V. Quaranta, *Improving the Quality of Price Indices: CPI and PPP*, (proceedings of an international seminar held in Florence, December 1995), Eurostat and University of Florence, Luxembourg, 1996.

2 A standardised price ratio equals ($CC\text{-}Price_{1A} / [CC\text{-}Price_{1A} \cdot CC\text{-}Price_{1B} \cdot \ldots\ldots CC\text{-}Price_{1N}]^{1/N}$) 100 where $CC\text{-}Price_{1A}$ is the average price for product 1 in country A in the common currency. $CC\text{-}Price_{1A}$ is itself equal to $NC\text{-}Price_{1A} / CC_A$ where $NC\text{-}Price_{1A}$ is the average price for product 1 in country A in national currency and CC_A is the currency conversion rate

IV.6 Both exchange rates and PPPs are used in the Quaranta editing procedure to convert the average survey prices to a common currency and both the exchange rate converted prices and the PPP converted prices are used to derive standardised price ratios. The standardised price ratios based on exchange rate converted prices are called *XR-Indices* and the standardised price ratios based on PPP converted prices are called *PPP-Indices*[3]. Both XR-Indices and PPP-Indices are edited and verified. But only PPP-Indices are used to generate the measures of dispersion referred to below.

IV.7 The PPPs used to convert the average survey prices to a common currency are calculated by basic heading with the prices that are being validated for the basic heading. This means that editing starts with PPPs based on prices that have still to be verified. These opening PPPs are preliminary and the flagging of outliers among the PPP-Indices is preliminary as well. Exchange rates, on the other hand, are not determined by the survey price data and remain unaffected by them. It is for this reason that XR-Indices are used in the initial stages of validation. It may appear paradoxical to use XR-Indices to edit prices with which PPPs are to be derived given that PPPs are calculated because exchange rates do not reflect the relative purchasing power of currencies in their national markets, but experience shows that XR-Indices provide a better "feel" for the reliability of the average survey prices reported at the beginning of the validation process. Experience also shows that many of the ratios initially identified as outliers among the XR-Indices are found to be incorrect.[4]

IV.8 The Quaranta editing procedure is an iterative process and can involve several iterations or rounds before being completed. After each round, as incorrect prices are removed or corrected, the PPPs will become more reliable and so too will the flagging of outliers among the PPP-Indices. Thus, as validation progresses, the focus on outliers shifts from those among the XR-Indices to those among the PPP-Indices. The aim of the exercise is to remove, or at least reduce, the outliers among the PPP-Indices. Providing this is achieved, the outliers remaining among the XR-Indices can be ignored. XR-Indices and PPP-Indices that fall outside the range 80 (4/5) to 125 (5/4)[5] are flagged as outliers. The choice of range is arbitrary but substantiated by experience.[6]

IV.3 Measures of dispersion

IV.9 The Quaranta editing procedure also involves analysing the dispersion among the PPP-Indices. For this purpose, three variation coefficients are calculated. The first coefficient – the product variation coefficient - measures dispersion among the PPP-Indices for a product; the second coefficient – the country variation coefficient - measures the dispersion among a country's PPP-Indices for a basic heading; and the third coefficient – the basic heading variation coefficient - measures dispersion among all PPP-Indices for a basic heading irrespective of product or country.

IV.10 The higher a coefficient's value the less reliable are the PPP-Indices to which it refers. The critical value for all three variation coefficients is 33 per cent. Again, the choice of critical value is arbitrary but supported by experience. Coefficients with values above 33 per cent are outliers requiring countries to investigate the PPP-Indices that are flagged among the PPP-Indices covered by the coefficient. Besides being editing tools, the coefficients provide the means to monitor progress during validation and, at its conclusion, to assess how effective the whole process of editing and verification has been in reducing the incidence of non-sampling error among the price data. In principle, coefficients should be smaller at the end of validation than they were at the beginning.

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between the national currency of A and the common currency. The currency conversion rate is either the exchange rate or the PPP of the product's basic heading: $CC_A = XR_A$ *or* PPP_A.

3 Formerly, PPP-Prices and PPP-Indices were referred to as *CUP-Prices* and *CUP-Indices*. CUP stands for *Conventional Unit for expressing Parities*. For Eurostat comparisons, basic heading PPPs are expressed as the number of national currency units per *scaled euro*. How these PPPs are derived is explained in item (10) of Box IVA.

4 XR-Indices are particularly useful in the detection of systematic errors. For example, if a country has supplied prices for electricity at 1 KWh instead of 1000 KWh or monthly salaries instead of annual salaries for government employees, these errors will not be visible in the PPP-Indices because the price structure is still correct, but they will be visible in the XR-Indices because the price levels are not correct.

5 The intervals of the range are not equal in linear or arithmetic terms but they are equal in logarithmic or geometric terms because it is the relative deviations from a geometric mean that are being measured. When a geometric mean is used then equal lower and upper limits should conform to the following rule: lower limit x upper limit equals 1 if expressed as fractions or 10,000 if expressed as percentages.

6 It is probably too narrow for highly heterogeneous groups of countries for which a range of 66 (2/3) to 150 (3/2), also arbitrary, would be more realistic.

IV.4 Quaranta table

IV.11 Central to the Quaranta editing procedure is the *Quaranta table* and central to the Quaranta table is the basic heading.[7] Inter-country validation of average survey prices takes place at the basic heading level. When a price survey is to be edited, a Quaranta table is prepared for each basic heading covered by the survey. It consists of two tables: a *basic heading table* and a *product table*. For any given basic heading, the Quaranta table will have only one basic heading table, but usually it will have a number of product tables – one for each product specified for the basic heading. Box IV.1A contains an example of a basic heading table and Box IV.2A contains an example of a product table. Box IV.2A is incomplete because it only covers one of the seven products specified for the basic heading. The red numbers in brackets have been added to the tables for ease of reference. They, and the acronyms employed in the tables, are explained in Box IV.1B (the basic heading table) and Box IV.2B (the product table).

IV.12 The basic heading table provides summary information for the basic heading that relates either to the basic heading as a whole or to each country covered by the basic heading. For the basic heading (1), it gives the reference year (2), the method used to calculate the PPPs (3), the date when the table was last updated (4), the average expenditure weight (5), the number of items specified (6) and the basic heading variation coefficient (7). For countries (8), it gives: the exchange rate (9), the PPP (10), the price level index (PLI) (11), the expenditure weight (12), the number of items and representative (asterisk) products priced (13) and the country variation coefficient (14).

IV.13 The product table shows for each product (15)(16): the product variation coefficient (17); the average survey prices reported by countries in national currencies (19) - these are the prices being validated and the prices with which the PPPs shown in the basic heading table are calculated; the average survey prices converted to the common currency with exchange rates (24), their geometric mean (25) and the standardised price ratios based on the exchange rate converted prices (26); the average survey prices converted to the common currency with the PPPs for the basic heading (28), their geometric mean (29) and the standardised price ratios based on the PPP converted prices (30). Standardised price ratios with values that are below the predetermined range of acceptability are flagged by **<** , while those with values that are above the predetermined range are flagged by **>** . Outlying XR-Indices are flagged in column (24) and outlying PPP-Indices in column (31). By taking the flagging of both indices into account, useful information can be gained about the consistency of the average survey prices on which they are based.

- No flags for the XR-indices or the PPP indices: price consistency for both, no further validation required;
- XR-indices flagged but no flagging of PPP-indices: apparent inconsistency as regards exchange rate converted prices but PPP converted prices consistent, no further validation required;
- PPP-indices flagged (either with or without the flagging of XR-indices): apparent inconsistency among the PPP-converted prices, validation required.

[7] The Quaranta editing procedure can be applied at any level of aggregation. But basic headings are the building blocks of a comparison. They cover, at least in principle, relatively homogeneous groups of products with more or less uniform price levels. It makes sense to analyse price level differences at the lowest level of aggregation.

Box IV.1A: The basic heading table

QUARANTA TABLE FOR BASIC HEADING: 11.01.11.1 Rice (1)

Reference year: 2009 (2); **Method:** EKS (3); **Last Update:** 30(10)2009 (4);
Average Weight: 100.47 (5); **No of items:** 7 (6); **Variation Coefficient:** 20.3 (7)

Country (8)	XR (9)	PPP (10)	PLI (11)	Weight/ 100,000 (12)	No of Items (13)	Variation Coefficients (14)
AA	132.581	103.093	77.76	578.10	3: *3	8.1
AB	1.00000	1.03543	103.54	42.29	5: *3	19.8
AC	1.95583	2.14482	109.88	41.87	5: *3	8.1
AD	1.00000	1.05295	105.30	16.65	6: *3	15.7
AE	1.95580	1.53971	78.73	156.34	7: *4	20.5
AF	1.51180	1.29090	85.39	38.03	6: *6	28.0
AG	1.00000	1.23603	123.60	59.77	7: *5	18.5
AH	26.7310	22.9730	85.94	65.88	6: *4	10.1
AI	1.00000	1.14770	114.77	49.05	6: *6	17.0
AJ	7.44680	6.49661	87.24	39.38	6: *2	21.0
AK	15.6466	15.7941	100.94	67.19	5: *4	10.0
AL	1.00000	1.38069	138.07	99.20	7: *6	13.4
AM	1.00000	0.892266	89.23	52.12	7: *5	13.5
AN	1.00000	1.02682	102.68	49.48	5: *3	13.6
AO	1.00000	0.879914	87.99	45.58	7: *7	11.0
AP	7.35150	8.35178	113.61	148.41	6: *3	25.9
AQ	281.930	271.822	96.41	86.17	6: *4	14.4
AR	1.00000	1.29782	129.78	8.61	6: *5	17.9
AS	175.570	186.299	106.14	18.83	5: *4	25.0
AT	1.00000	1.34859	134.86	96.81	6: *5	10.0
AU	3.45280	3.30763	95.80	120.14	5: *5	14.0
AV	1.00000	0.942037	94.20	38.41	6: *4	13.4
AW	0.709200	0.652395	91.99	83.85	5: *3	32.9
AX	1.00000	1.18225	118.23	186.72	5: *3	20.1
AY	61.3968	48.3411	78.74	415.11	2: *1	23.2
AZ	1.00000	0.965763	96.58	84.09	7: *7	12.4
BA	1.00000	0.821909	82.19	35.92	3: *1	12.1
BB	8.79430	10.1866	115.83	28.21	4: *3	28.3
BC	4.41030	3.49731	79.30	53.52	3: *4	4.3
BD	1.00000	0.669431	66.94	149.08	7: *4	29.0
BE	4.17000	3.65208	87.58	334.99	6: *5	15.6
BF	94.7674	106.267	112.13	120.76	5: *3	19.3
BG	10.5820	10.4569	98.82	37.85	6: *4	36.8
BH	1.00000	1.19208	119.21	56.99	6: *4	12.0
BI	1.00000	0.965583	96.56	112.60	5: *3	19.9
BJ	2.12510	2.84315	133.79	101.07	4: *3	25.7
BK	0.884440	0.884668	100.03	50.03	6: *4	19.4

Box IV.1B: Reading the basic heading table in Box IVA

Basic Heading Table	
(1)	Basic heading covered by the table.
(2)	Year to which the price data refers.
(3)	Method used to calculate the PPPs for the basic heading.
(4)	Date at which the PPPs included in the table were calculated.
(5)	Average expenditure weight for the basic heading for the group of countries covered by the table. The unweighted arithmetic mean of the national expenditure weights in column **(12)**. It is scaled to 100,000.
(6)	Number of items specified for the basic heading.
[7]	Basic heading variation coefficient or, more precisely, the average product variation coefficient for the basic heading. The unweighted arithmetic mean of the product variation coefficients at **(17)** in the product tables. The average variation of the standardised price ratios of the products priced for the basic heading. (Products priced by only one country will not be included as the coefficient of variation will be zero per cent.)
(8)	Abbreviated names of countries participating in the comparison.
(9)	Exchange rates (XR) of the countries expressed as the number of units of national currency per euro. The exchange rate is 1.00000 for countries in the euro area.
(10)	PPPs for the basic heading calculated as specified in **(3)** and expressed as the number of units of national currency per euro. The PPPs are not based on an individual country but on all countries covered by the basic heading combined as a group. Hence, after calculation, the PPPs are first standardised and then multiplied by a coefficient to scale them to the euro. The scaling coefficient is the unweighted geometric mean of the euro exchange rates in column **(9)**. The prices used to calculate the PPPs are the average survey prices in national currencies that countries report for the products they priced for the basic heading in column **(19)** of the product tables.
(11)	Price level indices (PLIs). The PPPs in column **(10)** expressed as a percentage of the exchange rates in column **(9)**.
(12)	National expenditure weights scaled to 100,000. That part of a country's actual individual consumption that is spent on the basic heading when both expenditures are expressed in national currency and valued at national price levels.
(13)	Number of items or products that are priced by each country and the number of products priced by each country that are representative – that is, the number of products assigned an asterisk (*).
(14)	Country variation coefficients for the basic heading. The standard deviation of the PPP-Indices in column **(30)** of the product tables for all products priced by the country for the basic heading, irrespective of whether they are representative or unrepresentative, expressed as a percentage of the arithmetic mean of the indices. (PPP-Indices of products priced by only one country are not included as the PPP-Index will be 100 and there will be no inter-country price variation.)

Box IV.2A: The product table

11.01.11.1.01 ab (15) Long-grain rice, parboiled, WKB (16)

Variation Coefficient: 14.0 (17)

Country (18)	NC-Prices (19)	* (20)	QTS (21)	Variation Coefficients (22)	Wn (23)	XR-Prices (24) GM: 2.26 (25)	XR-Indices (26)	Wn (27)	PPP-Prices (28) GM: 2.26 (29)	PPP-Indices (30)	Wn (31)
AA	245.00	*	18	17.0		1.85	81.9		2.38	105.3	
AB	2.24	-	2	20.1		2.24	99.3		2.16	95.9	
AC	5.14	*	10	7.3		2.63	116.5		2.40	106.2	
AD											
AE	2.78	*	12	10.6		1.42	63.1	<	1.81	80.1	
AF	2.66	*	9	9.0		1.76	78.0	<	2.06	91.3	
AG	3.15	*	43	17.6		3.15	139.6	>	2.55	112.9	
AH	62.30	-	8	5.0		2.33	103.3		2.71	120.2	
AI	3.15	*	10	13.2		3.15	139.5	>	2.74	121.5	
AJ	16.33	-	8	17.0		2.19	97.2		2.51	111.4	
AK	35.03	*	12	7.9		2.24	99.3		2.22	98.3	
AL	3.82	*	22	12.8		3.82	169.4	>	2.77	122.6	
AM	1.75	*	30	5.1		1.75	77.7	<	1.96	87.0	
AN	2.14	*	1	0.0		2.14	94.9		2.08	92.3	
AO	2.17	*	16	24.8		2.17	96.1		2.46	109.2	
AP	20.00	*	7	13.9		2.72	120.6		2.39	106.1	
AQ	599.50	*	12	21.2		2.13	94.3		2.21	97.7	
AR	3.13	*	7	19.4		3.13	138.6	>	2.41	106.7	
AS	428.11	*	10	17.3		2.44	108.1		2.30	101.8	
AT	2.86	*	23	22.6		2.86	127.0	>	2.12	94.1	
AU	7.59	*	23	13.6		2.20	97.5		2.30	101.7	
AV	1.66	*	5	20.9		1.66	73.5	<	1.76	78.0	<
AW	1.32	*	16	13.1		1.86	82.6		2.02	89.7	
AX	2.36	*	18	10.1		2.36	104.7		2.00	88.5	
AY											
AZ	1.78	*	7	36.8	>	1.78	78.8	<	1.84	81.5	
BA	1.96	-	11	22.9		1.96	86.9		2.39	105.7	
BB											
BC											
BD	1.38	*	24	11.4		1.38	61.0	<	2.05	91.0	
BE	7.39	*	42	11.7		1.77	78.6	<	2.02	89.7	
BF	344.45	-	23	19.1		3.63	161.1	>	3.24	143.6	>
BG	22.64	*	19	17.5		2.14	94.9		2.17	95.9	
BH	3.16	*	30	14.4		3.16	140.0	>	2.65	117.3	
BI	2.08	*	10	8.9		2.08	92.4		2.16	95.6	
BJ											
BK	1.65	*	21	23.3		1.86	82.6		1.86	82.6	

Box IV.2B: Reading the product table in Box IV.2A

Product table	
(15)	Product code.
(16)	Product name.
(17)	Product variation coefficient. The standard deviation of the PPP-Indices for a product in column **(30)** expressed as a percentage of the arithmetic mean of the indices. Theoretically, this variation coefficient should be calculated using logarithms because the PPP-Indices are based on the geometric mean of the PPP-Prices. It is calculated using the arithmetic mean and standard deviation of the PPP-Indices for practical reasons.
(18)	Abbreviated names of countries participating in the comparison.
(19)	NC-Prices. Average survey prices in national currency (NC).
(20)	Representativity indicator. Representativity is generally indicated by an asterisk (*). Whether or not the asterisks are used to calculate the PPPs in column **(10)** depends on the method specified at **(3)**.
(21)	Number of price quotations on which the NC-Prices in column **(19)** are based.
(22)	Average survey price variation coefficients: The standard deviation of the price quotations in column **(21)** that underlie the NC-Prices in column **(19)** expressed as a percentage of the arithmetic mean of the price quotations.
(23)	Warning flag. Average survey price variation coefficients in column **(22)** with a value greater than the selected critical value of 33 per cent are flagged by **>** .
(24)	XR-Prices. The NC-Prices in column **(19)** converted to euros with the exchange rates in column **(9)** of the basic heading table.
(25)	Geometric mean of the XR-Prices in column **[24]**. The use of a geometric mean insures invariance with respect to choice of numéraire.
(26)	XR-Indices. Indices based on the XR-Prices in column **(24)**. The XR-Prices expressed as a percentage of their geometric mean at **(25)**. Referred to in the text as *standardised price ratios based on exchange rate converted prices*.
(27)	Warning flag. XR-Indices in column **(26)** with a value that falls outside the range of 80 to 125 are flagged. Values below 80 are flagged by **<** , values above 125 are flagged by **>** .
(28)	PPP-Prices. The NC-Prices in column **(19)** converted to euros with the PPPs in column **(10)** of the basic heading table.
(29)	Geometric mean of the PPP-Prices in column **(28)**. The use of a geometric mean insures invariance with respect to choice of numéraire. It will be the same as the geometric mean of the XR-Prices **(25)** if all countries have priced all items.
[30]	PPP-Indices. Indices based on the PPP-Prices in column **(28)**. The PPP-Prices expressed as a percentage of their geometric mean at **(29)**. Referred to in the text as *standardised price ratios based on PPP converted prices*.
(31)	Warning flag: PPP-Indices in column **(30)** with a value that falls outside the range of 80 to 125 are flagged. Values below 80 are flagged by **<**, values above 125 are flagged by **>** .

IV.14 It is important to remember during each round of inter-country editing that average survey prices with XR-Indices or PPP-Indices flagged as outliers in the Quaranta table are only possible errors. They are not errors by definition, no matter how well established are the criteria used to identify them. They cannot be removed automatically, they have to be referred back to the countries reporting them for verification. Participating countries are required to investigate the average survey prices returned to them as outliers and to confirm whether they are correct or incorrect. When prices are found to be incorrect, participating countries are expected to correct them or to suppress them.

IV.15 Strictly speaking, an outlier that is correct should be retained, but the lack of weights within a basic heading at the product level can make this impractical, particularly as the unweighted procedures applied at the basic heading level assume price variation within a basic heading to be moderate. The retention of an outlier that is correct can therefore create "noise" which impacts not only on the basic heading PPP for the participating country reporting the outlier but also on the basic heading PPPs for the other participating countries. If the outlier refers to a representative product, the effect of the noise can be reduced, at least for the reporting country, by suppressing the representativity indicator. The other option is to suppress the outlier. Neither of these actions would be justified if, within the context of the basic heading, the product is representative of the reporting country or if most of the other countries pricing the product have reported it as unrepresentative (which may explain why it is an outlier in the first place). But, if the outlier is unrepresentative, removing it is probably warranted. Whatever action is taken, it has to be decided jointly by the participating country and Eurostat or the OECD on a case-by-case basis.

IV.5 Coefficients of variation

IV.16 A Quaranta table contains four variation coefficients: three of which are calculated when the table is generated and one which is computed during intra-country validation. Two of the coefficients - the basic heading variation coefficient and the country variation coefficients - are in the basic heading table and two – the product variation coefficient and the price observation variation coefficients – are in the product table. They serve different uses not all of which are immediately relevant to inter-country validation.

- *Basic heading variation coefficient* (7): Measures dispersion among all the PPP-Indices for a basic heading. In doing so, it measures the homogeneity of the price structures of the countries covered by the basic heading and the reliability of the PPPs calculated for the basic heading. The higher the coefficient's value the less homogeneous are the price structures and the less reliable are the PPPs. A coefficient with a value over 33 per cent is an outlier requiring verification.

  Conversely, the closer the coefficient's value is to zero the more homogeneous are the price structures of the countries covered by the basic heading. Yet this does not guarantee the reliability of the basic heading's PPPs. This should be substantiated by additional verification using the basic heading PLIs for countries (11).

  During verification of outliers, priority should be given to basic headings with a coefficient value greater than 33 per cent, especially if they have a large expenditure weight. Basic headings with large expenditure weights will have greater influence on the overall PPPs than basic headings with small expenditure weights.

  Usually the value of the coefficient will fall as validation progresses thereby providing a means of assessing the overall effectiveness of the validation process.

  As a summary measure of price variation among products within the basic heading, it can be used, together with the basic heading weight (5), in the planning of the price survey the next time it comes around in the survey cycle – for example, when allocating the number of products to be sampled to basic headings.

- *Country variation coefficient* (14): Measures dispersion among a country's PPP-Indices for a basic heading. In other words, it measures the variation in a country's price levels among the products it priced for the basic heading and the reliability of its PPP for the

basic heading. The higher the coefficient's value the less uniform are the country's price levels and the less reliable are its PPPs. A coefficient with a value over 33 per cent is an outlier and should be investigated.

During verification, countries should give priority to basic headings for which the value of the country variation coefficient is greater than 33 per cent, particularly if the country's expenditure weight for the basic heading is large.

The coefficient can generally be expected to decline in value as validation progresses. This allows a country to assess the effectiveness of its validation.

The country variation coefficient complements the product variation coefficient (see below) by bringing a different perspective to the same set of data. Focusing on countries rather than products can help to detect countries which have suspect data. In this respect, it is useful to compare country coefficients across basic headings.

Together with the country's basic heading weight (12), it can assist countries to decide how many products they need to price to obtain reliable PPPs for the basic heading the next time it is to be surveyed.

- *Product variation coefficient* (17): The most important of the variation coefficients for validation purpose. It measures dispersion among the PPP-Indices for a product. It is an indicator of comparability and accuracy and addresses the questions: have countries pricing the product priced the same product or an equivalent product? and have they priced it correctly? The higher the coefficient's value, the less uniform are the product's price levels and the more suspect is the product's comparability and the accuracy of its pricing across countries. Such products are candidates for splitting or deletion and should be thoroughly investigated.

  During verification, priority should be given to products with a variation coefficient greater than 33 per cent.

- *Price observation variation coefficient* (22): Measures variation in the price observations on which the average price reported for a product by a country is based. It was first used in the Data Entry Table during intra-country validation to identify outliers among a country's average survey prices. Values above 33 per cent are flagged in column (23) indicating that if there are outliers among the product's PPP-Indices, or if the product variation coefficient is over 33 per cent, the price observations may need to be re-visited.

  When participating countries report average survey prices and not individual price observations, as they do for rents, compensation of employees, equipment goods and construction projects, this coefficient of variation is shown as zero in the Quaranta table.

IV.6 Reading a Quaranta table

IV.17 The Quaranta table is the primary means by which Eurostat and the OECD validate the average survey prices reported by participating countries. It is also an invaluable tool from the perspective of participating countries as it facilitates their involvement in the effective validation of their prices through an understanding of how their prices relate to the prices of other countries and an appreciation of the reasons underlying the data queries from Eurostat and the OECD.

IV.18 The Quaranta table in Box IV.3 covers the basic heading for bread for which three products have been priced by four countries. The table is presented for illustrative purposes only as in reality the product list for the basic heading bread specifies over fifteen products and 37 countries participate in Eurostat comparisons. From the table the following can be seen:

At the basic heading level

- The average weight (5) for the basic heading is 0.9 per cent (922.7 per 100,000) of actual individual consumption. This gives an indication of the importance of the basic heading when compared with the average weight for a basic heading. It can be seen in (12) that the basic heading has a similar importance in each country.
- The variation coefficient for the basic heading (7) is 24.7 per cent. This is below the critical value of 33 per cent so the coefficient is not an outlier. Even so, this does not rule out the need to edit for outliers within the basic heading at the product level.
- The range of the PLIs (11) for the basic heading is large: the max-min ratio is 2.6 (163.8 for country C and 62.8 for country A) indicating that the price level of bread products in country C is over twice that of bread products in country A. While this may well be the case, it should be confirmed. Both countries should have their product prices investigated. A comparison should also be made between the PLIs for bread and the PLIs for other basic headings, such as *other bakery products*, to see whether a similar difference in price levels exists between country A and country C.
- All countries have priced at least one representative product (13). In other words, all countries have satisfied the necessary condition for the calculation of EKS PPPs. Note, however, that the pricing of one representative product within a basic heading is not usually a sufficient condition for the calculation of robust PPPs.
- The country variation coefficients for the basic heading (14) are all below the critical value of 33 per cent except that for country A with a coefficient of 42.5 per cent. This is a further indication that the prices of country A should be re-examined.

At the product level

- The XR-Indices (26) for bread 1 show a large dispersion: a max-min ratio of 5.1 (188 for country C and 37 for country A). Indeed, the XR-Indices of bread 1 for countries A, B and C are flagged in (27) as falling outside the critical range of 80 to 125 as are the XR-Indices of bread 3 for countries C and D.
- Bread 2 and 3 show much less dispersion of the XR-Indices. It is therefore likely that the large range of PLIs in (11) is driven by bread 1 and that the prices from countries A and C for this product need to be investigated.
- The product variation coefficients (17) are all below the critical value of 33 per cent except that for bread 3 with a coefficient of 40.6 per cent. The PPP-Indices (30) for bread 3 for countries A and D are flagged in (31) as falling outside the critical range of 80 to 125, indicating that the prices for bread 3 of both countries require scrutiny. However, it should be realised that the PPP-Indices are preliminary. They depend on the basic heading PPPs that are calculated with the prices collected for the basic heading and which may still contain error. As validation continues and errors are corrected, the basic heading PPPs will become more stable and the flagging of outliers more reliable.
- The assignment of asterisks (20) appears broadly consistent overall. One exception is country A which has a high PPP-Index for bread 3 (182) compared to its PPP-Indices for bread 1 (60) and bread 2 (112). This suggests that bread 3 is not a representative product for country A and that an asterisk should not have been assigned to it. Another possible exception is country D, also for bread 3, for which the situation is reversed. No asterisk is assigned yet the PPP-Index for bread 3 (73) is lower than it is for bread 1 (120) and bread 2 (94). However, as country D's PPP-Index for bread 3 is based on only two price quotations (21), while the PPP-Indices for bread 1 and bread 2 are based on 29 and 12 price quotations respectively, the non-assignment is probably justified.
- The average survey price variation coefficients (22) of country B for bread 1 and of countries B and D for bread 3 are flagged in (23) as being above the critical value of 33 per cent. The coefficients for country B can probably be ignored as the corresponding PPP-Indices are not flagged as outliers in (31). This is not the case with country D for which both the XR-index and the PPP-Index for bread 3 are flagged in (27) and (31) respectively indicating that the

accuracy of the price quotations needs to be reassessed. In fact, the high price variation coefficient (22) of 57.0 in combination with the low number of price observations (21) indicates that the reliability of this average price is low and, unless verification provides justification for its retention, it may be best to delete it.

- Neither the product variation coefficient, the average price variation coefficients, the XR-Indices nor the PPP-Indices of bread 2 are flagged as outliers. No verification is required.

Box IV.3: Editing with a Quaranta table

QUARANTA TABLE FOR BASIC HEADING: 11.01.11.3 Bread (1)

Reference year: 2009 (2); **Method:** EKS (3); **Last Update:** 30(10)2009 (4);
Average Weight: 922.7 (5); **No of items:** 3 (6); **Variation Coefficient:** 24.7 (7)

Country (8)	XR (9)	PPP (10)	PLI (11)	Weight /100,000 (12)	No of Items (13)	Variation Coefficients (14)
A	247.690	155.649	62.8	953.4	3:*3	42.5
B	1.00000	1.05012	105.0	958.5	3:*2	15.7
C	117.460	192.415	163.8	843.7	2:*2	12.3
D	1.00000	.925074	92.5	935.4	3:*2	20.5

11.01.11.3.01aa Bread 1 — **Variation coefficient: 25.0 (17)**

Country (18)	NC-Prices (19)	* (20)	QTS (21)	Variation Coefficients (22)	Wn (23)	XR-Prices (24) GM: 0.43 (25)	XR-Indices (26)	Wn (27)	PPP-Prices (28) GM: 0.43 (29)	PPP-Indices (30)	Wn (31)
A	40.00	*	10	18.3		0.16	37	<	0.26	60	<
B	0.56	*	6	34.2	>	0.56	128	>	0.53	122	
C	95.92	*	37	18.6		0.82	188	>	0.50	115	
D	0.48	*	29	28.3		0.48	111		0.52	120	

11.01.11.3.01ab Bread 2 — **Variation coefficient: 8.5 (17)**

Country (18)	NC-Prices (19)	* (20)	QTS (21)	Variation Coefficients (22)	Wn (23)	XR-Prices (24) GM: 0.78 (25)	XR-Indices (26)	Wn (27)	PPP-Prices (28) GM: 0.91 (29)	PPP-Indices (30)	Wn (31)
A	160.00	*	8	22.4		0.65	83		1.03	112	
B	0.91		4	15.2		0.91	118		0.87	95	
C											
D	0.79	*	12	16.9		0.79	102		0.86	94	

11.01.11.3.01ac Bread 3 — **Variation coefficient: 40.6 (17)**

Country (18)	NC-Prices (19)	* (20)	QTS (21)	Variation Coefficients (22)	Wn (23)	XR-Prices (24) GM: 1.42 (25)	XR-Indices (26)	Wn (27)	PPP-Prices (28) GM: 1.42 (29)	PPP-Indices (30)	Wn (31)
A	400.00	*	9	14.4		1.61	114		2.57	182	>
B	1.26	*	5	45.7	>	1.26	89		1.20	85	
C	244.68	*	30	32.6		2.08	147	>	1.27	90	
D	0.95		2	57.0	>	0.95	67	<	1.03	73	<

ANNEX V. CALCULATION AND AGGREGATION OF EKS PPPs

V.1 Introduction

V.1 Countries participating in Eurostat and OECD comparison are required to provide a set of national annual prices for a selection of representative and comparable products chosen from a common basket of goods and services that covers the whole range of GDP expenditures. They are also required to provide a detailed breakdown of GDP expenditures according to a common classification. This annex, which should be read in conjunction with Chapter 12, follows a worked example to demonstrate how the national annual prices are converted into PPPs and how these PPPs are aggregated using GDP expenditures as weights. The worked example is in two parts: the first describes how PPPs are calculated for a basic heading; the second explains how the PPPs for a basic heading are combined with those of other basic headings to obtain weighted PPPs for each aggregation level up to GDP. To calculate and aggregate basic heading PPPs, Eurostat and the OECD employ the Èltetö-Köves-Szulc (EKS) method.

V.2 Calculation of PPPs for a basic heading

V.2 National annual prices are collected at the level of the basic heading. Usually, a basic heading is the lowest aggregation level for which explicit expenditure weights can be estimated. For example, cheese is a basic heading and cheddar, camembert, feta, gorgonzola, gouda, etc. are individual products within it. Expenditure on cheese is known, but expenditures on specific cheese varieties are not. Because explicit expenditure weights are not available below the basic heading level, quasi expenditure weights are used instead.

V.3 Participating countries are required to price not only items that are representative of their own national market but also items that are representative of the national markets of others. They are also required to indicate which of the products they have priced are representative of their national market. A product is said to be representative if it is purchased in sufficient quantities for its price level to be typical for that type of product in the national market. In the cheese example above, cheddar is clearly representative of the United Kingdom, camembert of France, feta of Greece, gorgonzola of Italy and gouda of the Netherlands. But cheddar is sold in sufficient quantities in France and the Netherlands for it to be representative of these countries as well. Similarly, camembert is also representative of Germany, Norway and Sweden, and gouda of Greece, Spain and Portugal. Countries currently indicate representative products by an asterisk (*). Representative products are sometimes referred to as *asterisk products*.

V.4 The representativity of the goods and services priced needs to be taken into account when calculating PPPs for a basic heading because the price levels of representative products are generally lower than the price levels of unrepresentative products. Failure to do so may result in the price level for the basic heading being underestimated or overestimated and the corresponding volume level being overestimated or underestimated. To avoid this bias, products that are representative – that is, the products identified by an asterisk - are assigned a quasi expenditure weight of 1 and products that are not representative – that is, the products with no asterisks - are given a quasi expenditure weight of 0.

V.5 The choice of 1 and 0 as quasi expenditure weights is an arbitrary convention. Weights of 2 and 1, or any other similar combination, could also be used. Weights of 1 and 0 are used because it has been decided that for Eurostat and OECD comparisons it is preferable to exclude price relatives that are based on products that are unrepresentative of both countries when calculating PPPs between two countries for a basic heading. Irrespective of the quasi expenditure weights employed, products that are representative of both countries receive double the weight of products that are only representative of one of them. This is because they enter the calculation twice, first for one country and then for the second country.

V.6 There are six stages to the calculation of EKS PPPs for a basic heading:

- Calculation of a matrix of Laspeyres type PPPs.
- Calculation of a matrix of Paasche type PPPs.
- Calculation of a matrix of Fisher type PPPs.
- Completing the matrix of Fisher type PPPs.
- Calculation of the matrix of EKS PPPs.
- Standardising the matrix of EKS PPPs.

V.7 *Type* is used to qualify Laspeyres, Paasche and Fisher for two reasons. The first is that standard Laspeyres, Paasche and Fisher indexes are typically used for temporal comparisons rather than spatial comparisons. Temporal Laspeyres, Paasche and Fisher indexes have a *base period* and a *current period*, whereas spatial Laspeyres, Paasche and Fisher type PPPs have a *base country* and a *partner country*. The second reason is that a standard Laspeyres index is a weighted arithmetic average and a standard Paasche index is a weighted harmonic average, while the Laspeyres and Paasche type PPPs calculated for a basic heading are quasi-weighted geometric averages.[1]

V.8 The starting point of the calculation is the price matrix for the basic heading such as that of Table V.1. The matrix contains each country's national annual prices in national currency for a selection of products covered by the basic heading. The representative products for each country are indicated by an asterisk (*). For example, product 1 is representative for countries B and D; product 2 is representative for countries A, B and C; and so on. As required, each country has at least one representative product which is priced in at least one other country. Prices for products 2 and 3 are not available for country D and country A respectively; product 5 is not priced by either country A or country C.

Table V.1: Matrix of national annual prices

Product	Country							
	A		B		C		D	
1	P_{1a}	3.43	P_{1b}	17.04*	P_{1c}	633	P_{1d}	9.57*
2	P_{2a}	1.27*	P_{2b}	15.67*	P_{2c}	588*	P_{2d}	- -
3	P_{3a}	- -	P_{3b}	27.27	P_{3c}	443*	P_{3d}	9.95*
4	P_{4a}	2.25	P_{4b}	20.93	P_{4c}	755	P_{4d}	10.22*
5	P_{5a}	- -	P_{5b}	15.75*	P_{5c}	- -	P_{5d}	11.32*

V.2.1 Calculation of a matrix of Laspeyres type PPPs

V.9 The Laspeyres type PPP for a basic heading between any pair of countries is defined as the quasi-weighted geometric mean of the price relatives between the two countries for the products that are representative of the base country. In other words, only products that are representative of the base country are taken into account. They receive a weight of 1. All other products have a weight of 0. Hence, when A is the base country, the price relatives for product 2 are computed; when B is the base country, the price relatives for products 1, 2 and 5 are computed; and so on. When there is more than one representative product, a simple geometric average of the price relatives is taken.

V.10 The Laspeyres type PPPs of Table V.2 were calculated with the national annual prices and asterisks (the representative products) of Table V.1 as follows.

[1] Note that this second reason is only valid for the Laspeyres and Paasche type PPPs calculated for a basic heading. The Laspeyres and Paasche type PPPs calculated for aggregates in Section V.3 are, like standard Laspeyres and Paasche indexes, weighted arithmetic and harmonic means respectively.

Base A:

$L_{A/A}$ $= P_{2a}/P_{2a} = 1.27/1.27 = 1.0000$

$L_{B/A}$ $= P_{2b}/P_{2a} = 15.67/1.27 = 12.339$

$L_{C/A}$ $= P_{2c}/P_{2a} = 588/1.27 = 462.99$

Base B:

$L_{A/B}$ $= [(P_{1a}/P_{1b})(P_{2a}/P_{2b})]^{1/2} = [(3.43/17.04)(1.27/15.67)]^{1/2} = 0.12773$

$L_{B/B}$ $= [(P_{1b}/P_{1b})(P_{2b}/P_{2b})(P_{5b}/P_{5b})]^{1/3} = [(17.04/17.04)(15.67/15.67)(15.75/15.75)]^{1/3} = 1.0000$

$L_{C/B}$ $= [(P_{1c}/P_{1b})(P_{2c}/P_{2b})]^{1/2} = [(633/17.04)(588/15.67)]^{1/2} = 37.335$

$L_{D/B}$ $= [(P_{1d}/P_{1b})(P_{5d}/P_{5b})]^{1/2} = [(9.57/17.04)(11.32/15.75)]^{1/2} = 0.63534$

Base C:

$L_{A/C}$ $= P_{2a}/P_{2c} = 1.27/588 = 0.00216$

$L_{B/C}$ $= [(P_{2b}/P_{2c})(P_{3b}/P_{3c})]^{1/2} = [(15.67/588)(27.27/443)]^{1/2} = 0.04050$

$L_{C/C}$ $= [(P_{2c}/P_{2c})(P_{3c}/P_{3c})]^{1/2} = [(588/588)(443/443)]^{1/2} = 1.0000$

$L_{D/C}$ $= P_{3d}/P_{3c} = 9.95/443 = 0.02246$

Base D:

$L_{A/D}$ $= [(P_{1a}/P_{1d})(P_{4a}/P_{4d})]^{1/2} = [(3.43/9.57)(2.25/10.22)]^{1/2} = 0.28090$

$L_{B/D}$ $= [(P_{1b}/P_{1d})(P_{3b}/P_{3d})(P_{4b}/P_{4d})(P_{5b}/P_{5d})]^{1/4}$

$= [(17.04/9.57)(27.27/9.95)(20.93/10.22)(15.75/11.32)]^{1/4} = 1.9310$

$L_{C/D}$ $= [(P_{1c}/P_{1d})(P_{3c}/P_{3d}(P_{4c}/P_{4d})]^{1/3} = [(633/9.57)(443/9.95)(755/10.22)]^{1/3} = 60.144$

$L_{D/D}$ $= [(P_{1d}/P_{1d})(P_{3d}/P_{3d}(P_{4d}/P_{4d})(P_{5d}/P_{5d})]^{1/4}$

$= [(9.57/9.57)(9.95/9.95)(10.22/10.22)(11.32/11.32)]^{1/4} = 1.0000$

Table V.2: Matrix of Laspeyres type PPPs

A		B		C		D	
$L_{A/A}$	1.0000	$L_{A/B}$	0.12773	$L_{A/C}$	0.00216	$L_{A/D}$	0.28090
$L_{B/A}$	12.339	$L_{B/B}$	1.0000	$L_{B/C}$	0.04050	$L_{B/D}$	1.9310
$L_{C/A}$	462.99	$L_{C/B}$	37.335	$L_{C/C}$	1.0000	$L_{C/D}$	60.144
$L_{D/A}$	- -	$L_{D/B}$	0.63534	$L_{D/C}$	0.02246	$L_{D/D}$	1.0000

V.2.2 Calculation of a matrix of Paasche type PPPs

V.11 The Paasche type PPP for a basic heading between any pair of countries is defined as the quasi-weighted geometric mean of the price relatives between the two countries for the products that are representative of the partner country. In other words, only products that are representative of the partner country are taken into account. They receive a weight of 1. All other products have a weight of 0. Hence, when A is the partner country, the price relatives for product 2 are computed; when B is the partner country, the price relatives for products 1, 2 and 5 are computed; and so on. When there is more than one representative product, a simple geometric average of the price relatives is taken.

V.12 It can be seen from Table V.1 that $P_{B/A}$ – the Paasche type PPP when B is the partner country and A is the base country - is equal to $[(P_{1b}/P_{1a})(P_{2b}/P_{2a})]^{1/2}$. It can also be seen that $L_{A/B}$ - the Laspeyres type PPP when A is the partner country and B is the base country – is equal to $[(P_{1a}/P_{1b})(P_{2a}/P_{2b})]^{1/2}$. $L_{A/B}$ and $P_{B/A}$ are based on the same representative products. $L_{A/B}$ is the transpose of $P_{B/A}$ (and vice versa). Its reciprocal – $1/L_{A/B}$ – is equal to $[(P_{1b}/P_{1a})(P_{2b}/P_{2a})]^{1/2}$ which is equal to $P_{B/A}$.

V.13 Paasche type PPPs can be calculated either directly by following the procedure described in paragraph V.11 or indirectly by applying the identity established in paragraph V.12. The Paasche type PPPs of Table V.3 were obtained by transposing the matrix of Laspeyres type PPPs of Table V.2 and taking the reciprocals of the transposed PPPs as follows:

Base A:

$P_{A/A} = P_{2a}/P_{2a} = 1/L_{A/A} = 1/1.0000 = 1.0000$

$P_{B/A} = [(P_{1b}/P_{1a})(P_{2b}/P_{2a})]^{1/2} = 1/L_{A/B} = 1/0.12773 = 7.8293$

$P_{C/A} = P_{2c}/P_{2a} = 1/L_{A/C} = 1/0.00216 = 462.99$

$P_{D/A} = [(P_{1d}/P_{1a})(P_{4d}/P_{4a})]^{1/2} = 1/L_{A/D} = 1/0.28090 = 3.5599$

Base B:

$P_{A/B} = P_{2a}/P_{2b} = 1/L_{B/A} = 1/12.339 = 0.08105$

$P_{B/B} = [(P_{1b}/P_{1b})(P_{2b}/P_{2b})(P_{5b}/P_{5b})]^{1/3} = 1/L_{B/B} = 1/1.0000 = 1.0000$

$P_{C/B} = [(P_{2c}/P_{2b})(P_{3c}/P_{3b})]^{1/2} = 1/L_{B/C} = 1/0.04050 = 24.690$

$P_{D/B} = [(P_{1d}/P_{1b})(P_{3d}/P_{3b})(P_{4d}/P_{4b})(P_{5d}/P_{5b})]^{1/4} = 1/L_{B/D} = 1/1.9310 = 0.51785$

Base C:

$P_{A/C} = P_{2a}/P_{2c} = 1/L_{C/A} = 1/462.99 = 0.00216$

$P_{B/C} = [(P_{1b}/P_{1c})(P_{2b}/P_{2c})]^{1/2} = 1/L_{C/B} = 1/37.335 = 0.02678$

$P_{C/C} = [(P_{2c}/P_{2c})(P_{3c}/P_{3c})]^{1/2} = 1/L_{C/C} = 1/1.0000 = 1.0000$

$P_{D/C} = [(P_{1d}/P_{1c})(P_{3d}/P_{3c})(P_{4d}/P_{4c})]^{1/3} = 1/L_{C/D} = 1/60.144 = 0.01663$

Base D:

$P_{B/D} = [(P_{1b}/P_{1d})(P_{5b}/P_{5d})]^{1/2} = 1/L_{D/B} = 1/0.63534 = 1.5740$

$P_{C/D} = P_{3c}/P_{3d} = 1/L_{D/C} = 1/0.02246 = 44.523$

$P_{D/D} = [(P_{1d}/P_{1d})(P_{3d}/P_{3d})(P_{4d}/P_{4d})(P_{5d}/P_{5d})]^{1/4} = 1/L_{D/D} = 1/1.0000 = 1.0000$

Table V.3: Matrix of Paasche type PPPs

A		B		C		D	
$P_{A/A}$	1.0000	$P_{A/B}$	0.08105	$P_{A/C}$	0.00216	$P_{A/D}$	- -
$P_{B/A}$	7.8293	$P_{B/B}$	1.0000	$P_{B/C}$	0.02678	$P_{B/D}$	1.5740
$P_{C/A}$	462.99	$P_{C/B}$	24.690	$P_{C/C}$	1.0000	$P_{C/D}$	44.523
$P_{D/A}$	3.5599	$P_{D/B}$	0.51785	$P_{D/C}$	0.01663	$P_{D/D}$	1.0000

V.2.3 Calculation of a matrix of Fisher type PPPs

V.14 The Fisher type PPP for a basic heading between any pair of countries is defined as the unweighted geometric mean of their Laspeyres type PPP for the basic heading and their Paasche type PPP for the basic heading. Direct application of this definition would require the Fisher type PPPs of Table V.4 to be calculated using the Laspeyres type PPPs of Table V.2 and the corresponding Paasche type PPPs of Table V.3. But, because of the identity established in paragraph V.12, they were computed using just the Laspeyres type PPPs of Table V.2 as follows:

$F_{A/A} = [L_{A/A}.P_{A/A}]^{1/2} = [L_{A/A}/L_{A/A}]^{1/2} = [1.0000/1.0000]^{1/2} = 1.0000$

$F_{B/A} = [L_{B/A}.P_{B/A}]^{1/2} = [L_{B/A}/L_{A/B}]^{1/2} = [12.339/0.12773]^{1/2} = 9.8286$

$F_{A/B} = [L_{A/B}.P_{A/B}]^{1/2} = [L_{A/B}/L_{B/A}]^{1/2} = [0.12773/12.339]^{1/2} = 0.10174$

$F_{C/A} = [L_{C/A}.P_{C/A}]^{1/2} = [L_{C/A}/L_{A/C}]^{1/2} = [462.99/0.00216]^{1/2} = 462.99$

$F_{A/C} = [L_{A/C}.P_{A/C}]^{1/2} = [L_{A/C}/L_{C/A}]^{1/2} = [0.00216/462.99]^{1/2} = 0.00216$

$F_{C/B} = [L_{C/B}.P_{C/B}]^{1/2} = [L_{C/B}/L_{B/C}]^{1/2} = [37.335/0.04050]^{1/2} = 30.361$

$F_{B/C} = [L_{B/C}.P_{B/C}]^{1/2} = [L_{B/C}/L_{C/B}]^{1/2} = [0.04050/37.335]^{1/2} = 0.03294$

$F_{D/B} = [L_{D/B}.P_{D/B}]^{1/2} = [L_{D/B}/L_{B/D}]^{1/2} = [0.63534/1.9310]^{1/2} = 0.57360$

$F_{B/D} = [L_{B/D}.P_{B/D}]^{1/2} = [L_{B/D}/L_{D/B}]^{1/2} = [1.9310/0.63534]^{1/2} = 1.7434$ …… etc.

Table V.4: Matrix of Fisher type PPPs

A		B		C		D	
$F_{A/A}$	1.0000	$F_{A/B}$	0.10174	$F_{A/C}$	0.00216	$F_{A/D}$	- -
$F_{B/A}$	9.8286	$F_{B/B}$	1.0000	$F_{B/C}$	0.03294	$F_{B/D}$	1.7434
$F_{C/A}$	462.99	$F_{C/B}$	30.361	$F_{C/C}$	1.0000	$F_{C/D}$	51.747
$F_{D/A}$	- -	$F_{D/B}$	0.57360	$F_{D/C}$	0.01932	$F_{D/D}$	1.0000

V.15 The Fisher type PPPs of Table V.4 satisfy the country reversal test – that is, $F_{B/A}.F_{A/B} = 1$; $F_{C/A}.F_{A/C} = 1$; etc. But they are not transitive – that is, $F_{B/A}/F_{C/A} \neq F_{B/C}$; $F_{A/B}/F_{C/B} \neq F_{A/C}$; etc. Transitivity is obtained by applying the EKS procedure. And for this, the EKS procedure requires the matrix of Fisher type PPPs to be complete. But the matrix in Table V.4 is incomplete. There is no PPP for $F_{D/A}$ or $F_{A/D}$.

V.2.4 Completing the matrix of Fisher type PPPs

V.16 The matrix is incomplete because the Laspeyres type PPP - $L_{D/A}$ - and the Paasche type PPP - $P_{A/D}$ – could not be calculated because country D did not price any products that were representative of country A. Therefore the respective Fisher type PPPs - $F_{D/A}$ and $F_{A/D}$ – could not be calculated either.

V.17 As the missing Fisher type PPPs could not be calculated, they were estimated instead. This was done by taking the geometric mean of all the indirect Fisher PPPs connecting - or bridging - the countries for which PPPs were missing as follows:

$F_{D/A} = [(F_{D/B}/F_{A/B})(F_{D/C}/F_{A/C})]^{1/2} = [(0.5736/0.10174)(0.01932/0.00216)]^{1/2} = 7.1022$

$F_{A/D} = [(F_{A/B}/F_{D/B})(F_{A/C}/F_{D/C})]^{1/2} = [(0.10174/0.5736)(0.00216/0.01932)]^{1/2} = 0.14080$

Table V.5: Completed matrix of Fisher type PPPs

A		B		C		D	
$F_{A/A}$	1.0000	$F_{A/B}$	0.10174	$F_{A/C}$	0.00216	$F_{A/D}$	0.14080
$F_{B/A}$	9.8286	$F_{B/B}$	1.0000	$F_{B/C}$	0.03294	$F_{B/D}$	1.7434
$F_{C/A}$	462.99	$F_{C/B}$	30.361	$F_{C/C}$	1.0000	$F_{C/D}$	51.747
$F_{D/A}$	7.1022	$F_{D/B}$	0.57360	$F_{D/C}$	0.01932	$F_{D/D}$	1.0000

V.2.5 Calculation of the matrix of EKS PPPs

V.18 With the EKS procedure, the transitive PPP for any two countries is derived by taking the unweighted geometric mean of the Fisher type PPP calculated between the pair directly and all the PPPs that can be calculated between the pair indirectly when each of the other countries is used as a bridge. The EKS PPPs of Table V.6 were computed following this procedure using the Fisher type PPPs in Table V.5 to provide the direct and indirect PPPs required:

$EKS_{A/A} = F_{A/A} = 1.0000$

$EKS_{B/A} = [(F_{B/A}/F_{A/A})(F_{B/B}/F_{A/B})(F_{B/C}/F_{A/C})(F_{B/D}/F_{A/D})]^{1/4}$

$= [(F_{B/A})^2(F_{B/C}/F_{A/C})(F_{B/D}/F_{A/D})]^{1/4}$

$= [(9.8286)^2(0.03294/0.00216)(1.7434/0.14080)]^{1/4} = 11.621$

$EKS_{C/A} = [(F_{C/A})^2(F_{C/B}/F_{A/B})(F_{C/D}/F_{A/D})]^{1/4}$

$= [(462.99)^2(30.361/0.10174)(51.747/0.14080)]^{1/4} = 391.57$

$EKS_{D/A} = [(F_{D/A})^2(F_{D/B}/F_{A/B})(F_{D/C}/F_{A/C})]^{1/4}$

$= [(7.1022)^2(0.57360/0.10174)(0.01932/0.00216)]^{1/4} = 7.1022$

$EKS_{A/B} = [(F_{A/B})^2(F_{A/C}/F_{B/C})(F_{A/D}/F_{B/D})]^{1/4}$

$= [(0.10174)^2(0.00216/0.03294)(0.14080/1.7434)]^{1/4} = 0.08605$

$EKS_{C/B} = [(F_{C/B})^2(F_{C/A}/F_{B/A})(F_{C/D}/F_{B/D})]^{1/4}$

$= [(30.361)^2(462.99/9.8286)(51.747/1.7434)]^{1/4} = 33.694$

$EKS_{D/B} = [(F_{D/B})^2(F_{D/A}/F_{B/A})(F_{D/C}/F_{B/C})]^{1/4}$

$= [(0.57360)^2(7.1022/9.8286)(0.01932/0.03294)]^{1/4} = 0.61113$ …… etc.

Table V.6: Matrix of EKS PPPs

A		B		C		D	
$EKS_{A/A}$	1.0000	$EKS_{A/B}$	0.08605	$EKS_{A/C}$	0.00255	$EKS_{A/D}$	0.14080
$EKS_{B/A}$	11.621	$EKS_{B/B}$	1.0000	$EKS_{B/C}$	0.02968	$EKS_{B/D}$	1.6363
$EKS_{C/A}$	391.57	$EKS_{C/B}$	33.694	$EKS_{C/C}$	1.0000	$EKS_{C/D}$	55.133
$EKS_{D/A}$	7.1022	$EKS_{D/B}$	0.61113	$EKS_{D/C}$	0.01814	$EKS_{D/D}$	1.0000

V.19 Transitivity requires that the direct PPP between each pair of countries is equal to the indirect PPP derived via any third country. For example, $EKS_{B/A}$ should equal $EKS_{B/C}/EKS_{A/C}$ or $EKS_{B/D}/EKS_{A/D}$. That the EKS PPPs of Table V.6 meet this requirement is demonstrated below:

$EKS_{B/A}$ = $EKS_{B/C}$ / $EKS_{A/C}$ = 0.02968/0.00255 = 11.621

$EKS_{B/A}$ = $EKS_{B/D}$ / $EKS_{A/D}$ = 1.6363/0.14080 = 11.621

$EKS_{C/A}$ = $EKS_{C/B}$ / $EKS_{A/B}$ = 33.694 /0.08605 = 391.57

$EKS_{C/A}$ = $EKS_{C/D}$ / $EKS_{A/D}$ = 55.133 /0.14080 = 391.57

$EKS_{D/A}$ = $EKS_{D/B}$ / $EKS_{A/B}$ = 0.61113/0.08605 = 7.1022

$EKS_{D/A}$ = $EKS_{D/C}$ / $EKS_{A/C}$ = 0.01814/0.00255 = 7.1022

$EKS_{A/B}$ = $EKS_{A/C}$ / $EKS_{B/C}$ = 0.00255/0.02968 = 0.08605

$EKS_{A/B}$ = $EKS_{A/D}$ / $EKS_{B/D}$ = 0.14080/1.6363 = 0.08605

$EKS_{C/B}$ = $EKS_{C/A}$ / $EKS_{B/A}$ = 391.57/11.621 = 33.694

$EKS_{C/B}$ = $EKS_{C/D}$ / $EKS_{B/D}$ = 55.133/1.6363 = 33.694 …… etc.

V.2.6 Standardising the matrix of EKS PPPs

V.20 In the matrix of EKS PPPs of Table V.6, the PPPs in each column are expressed with the corresponding country as a base. For example, in column A country A is the base – $EKS_{A/A}$, $EKS_{B/A}$, $EKS_{C/A}$ and $EKS_{D/A}$; in column B country B is the base – $EKS_{A/B}$, $EKS_{B/B}$, $EKS_{C/B}$ and $EKS_{D/B}$; and so on. As these PPPs are now transitive, the ratios between the PPPs for each base are the same. In order to obtain a set of PPPs that has the group of countries as a base – thereby ensuring a neutral presentation - it is necessary to standardise the PPPs in the matrix. This is done by dividing each PPP by the geometric mean of the PPPs in its column. The standardised PPPs of Table V.7 were computed following this procedure:

EKS_A = $EKS_{A/A}$ / ($EKS_{A/A}$ x $EKS_{B/A}$ x $EKS_{C/A}$ x $EKS_{D/A}$)$^{1/4}$

= 1.000 / (1.000 x 11.621 x 391.57 x 7.1022)$^{1/4}$ = 0.0746

EKS_B = $EKS_{B/A}$ / ($EKS_{A/A}$ x $EKS_{B/A}$ x $EKS_{C/A}$ x $EKS_{D/A}$)$^{1/4}$

= 11.621 / (1.000 x 11.621 x 391.57 x 7.1022)$^{1/4}$ = 0.8667

EKS_C = $EKS_{C/A}$ / ($EKS_{A/A}$ x $EKS_{B/A}$ x $EKS_{C/A}$ x $EKS_{D/A}$)^{¼}

= 391.56 / (1.000 x 11.621 x 391.57 x 7.1022)$^{1/4}$ = 29.204

EKS_D = $EKS_{D/A}$ / ($EKS_{A/A}$ x $EKS_{B/A}$ x $EKS_{C/A}$ x $EKS_{D/A}$)^{¼}

= 7.1022 / (1.000 x 11.621 x 391.57 x 7.1022)$^{1/4}$ = 0.5297

EKS_A = $EKS_{A/B}$ / ($EKS_{A/B}$ x $EKS_{B/B}$ x $EKS_{C/B}$ x $EKS_{D/B}$)$^{1/4}$

= 0.08605 / (0.08605 x 1.000 x 33.694 x 0.61113)$^{1/4}$ = 0.0746

EKS_B = $EKS_{B/B}$ / ($EKS_{A/B}$ x $EKS_{B/B}$ x $EKS_{C/B}$ x $EKS_{D/B}$)$^{1/4}$

= 1.000 / (0.08605 x 1.000 x 33.694 x 0.61113)$^{1/4}$ = 0.8667

EKS_C = $EKS_{C/B}$ / ($EKS_{A/B}$ x $EKS_{B/B}$ x $EKS_{C/B}$ x $EKS_{D/B}$)^{¼}

= 33.694 / (0.08605 x 1.000 x 33.694 x 0.61113)$^{1/4}$ = 29.204

EKS_D = $EKS_{D/B}$ / ($EKS_{A/B}$ x $EKS_{B/B}$ x $EKS_{C/B}$ x $EKS_{D/B}$)^{¼}

= 0.61113 / (0.08605 x 1.000 x 33.694 x 0.61113)$^{1/4}$ = 0.5297 …… etc.

Table V.7: Matrix of standardised EKS PPPs

	A	B	C	D
EKS_A	0.0746	0.0746	0.0746	0.0746
EKS_B	0.8667	0.8667	0.8667	0.8667
EKS_C	29.2040	29.2040	29.2040	29.2040
EKS_D	0.5297	0.5297	0.5297	0.5297

V.21 The matrix of standardised EKS PPPs of Table V.7 reduces to the vector of standardised EKS PPPs in Table V.7A.

Table V.7A: Vector of standardised EKS PPPs

	A	B	C	D
EKS	0.0746	0.8667	29.204	0.5297

V.3 Aggregation of basic heading PPPs

V.22 There are five stages to the calculation of EKS PPPs for an aggregate:

- Calculation of a matrix of Laspeyres type PPPs.
- Calculation of a matrix of Paasche type PPPs.
- Calculation of a matrix of Fisher type PPPs.[2]
- Calculation of the matrix of EKS PPPs.
- Standardising the matrix of EKS PPPs.

V.23 The starting points of the calculation are the matrix of basic heading EKS PPPs and the matrix of expenditures on the basic headings. For the worked example, the matrices cover five basic headings – v, w, x, y and z. The worked example shows how EKS PPPs are calculated for three aggregates, though only the calculations for aggregate 1 are described in detail. The three aggregates are:

- Aggregate 1 = v + w
- Aggregate 2 = x + y + z
- Aggregate 3 = v + w + x + y + z (the overall PPPs)

V.24 The matrix of Table V.8 shows standardised EKS PPPs by basic heading and by country. The PPPs have been calculated following the procedures described in the previous section. The PPPs for each basic heading come from a separate vector of standardised EKS PPPs. The PPPs for basic heading v are those from the vector of standardised EKS PPPs of Table V.7A.

[2] The matrix of Fisher type PPPs is usually complete at the aggregate level. If, however, it is not, it is completed as described in Section V.2.4 for a basic heading.

Table V.8: Matrix of basic heading EKS PPPs

Basic Heading	Country							
	A		B		C		D	
v	PPP_{va}	0.0746	PPP_{vb}	0.8667	PPP_{vc}	29.204	PPP_{vd}	0.5297
w	PPP_{wa}	0.0731	PPP_{wb}	0.9504	PPP_{wc}	20.725	PPP_{wd}	0.6945
x	PPP_{xa}	0.0739	PPP_{xb}	1.1382	PPP_{xc}	25.129	PPP_{xd}	0.4730
y	PPP_{ya}	0.0695	PPP_{yb}	0.8758	PPP_{yc}	27.803	PPP_{yd}	0.5908
z	PPP_{za}	0.0745	PPP_{zb}	0.7454	PPP_{zc}	26.833	PPP_{zd}	0.6708

V.25 The matrix of Table V.9 contains expenditure values in national currencies by basic heading and by country.

Table V.9: Matrix of basic heading expenditures

Basic Heading	Country							
	A		B		C		D	
v	E_{va}	5	E_{vb}	110	E_{vc}	2000	E_{vd}	120
w	E_{wa}	20	E_{wb}	240	E_{wc}	5300	E_{wd}	180
x	E_{xa}	15	E_{xb}	300	E_{xc}	3500	E_{xd}	200
y	E_{ya}	35	E_{yb}	450	E_{yc}	10000	E_{yd}	250
z	E_{za}	25	E_{zb}	500	E_{zc}	6500	E_{zd}	250

V.3.1 Calculation of a matrix of Laspeyres type PPPs

V.26 The Laspeyres type PPP for an aggregate between any pair of countries is defined as the weighted arithmetic average of the EKS PPPs between the two countries for the basic headings constituting the aggregate with the expenditures on the basic headings of the base country being used as weights.

V.27 The Laspeyres type PPPs for aggregate 1 of Table V.10 were calculated using the EKS PPPs of Table V.8 and the expenditure values of Table V.9 for the basic headings v and w as follows:

Base A:

$L1_{A/A} = [(PPP_{va}/PPP_{va})E_{va} + (PPP_{wa}/PPP_{wa})E_{wa}] / (E_{va} + E_{wa})$

$= [(0.0746/0.0746)5 + (0.0731/0.0731)20] / (5 + 20) = 1.0000$

$L1_{B/A} = [(PPP_{vb}/PPP_{va})E_{va} + (PPP_{wb}/PPP_{wa})E_{wa}] / (E_{va} + E_{wa})$

$= [(0.8667/0.0746)5 + (0.9504/0.0731)20] / (5 + 20) = 12.725$

$L1_{C/A} = [(PPP_{vc}/PPP_{va})E_{va} + (PPP_{wc}/PPP_{wa})E_{wa}] / (E_{va} + E_{wa})$

$= [(29.204/0.0746)5 + (20.725/0.0731)20] / (5 + 20) = 305.13$

$L1_{D/A} = [(PPP_{vd}/PPP_{va})E_{va} + (PPP_{wd}/PPP_{wa})E_{wa}] / (E_{va} + E_{wa})$

$= [(0.5297/0.0746)5 + (0.6945/0.0731)20] / (5 + 20) = 9.0210$

Base B:

$L1_{A/B}$ = $[(PPP_{va}/PPP_{vb})E_{vb} + (PPP_{wa}/PPP_{wb})E_{wb}] / (E_{vb} + E_{wb})$

= [(0.0746/0.8667)110 + (0.0731/0.9504)240] / (110 + 240) = 0.07982

$L1_{B/B}$ = $[(PPP_{vb}/PPP_{vb})E_{vb} + (PPP_{wb}/PPP_{wb})E_{wb}]/(E_{vb} + E_{wb})$

= [(0.8667/0.8667)110 + (0.9504/0.9504)240]/(110 + 240) = 1.0000

$L1_{C/B}$ = $[(PPP_{vc}/PPP_{vb})E_{vb} + (PPP_{wc}/PPP_{wb})E_{wb}] / (E_{vb} + E_{wb})$

= [(29.204/0.8667)110 + (20.725/0.9504)240] / (110 + 240) = 25.543

$L1_{D/B}$ = $[(PPP_{vd}/PPP_{vb})E_{vb} + (PPP_{wd}/PPP_{wb})E_{wb}] / (E_{vb} + E_{wb})$

= [(0.5297/0.8667)110 + (0.6945/0.9504)240] / (110 + 240) = 0.69315

Base C:

$L1_{A/C}$ = $[(PPP_{va}/PPP_{vc})E_{vc} + (PPP_{wa}/PPP_{wc})E_{wc}] / (E_{vc} + E_{wc})$

= [(0.0746/29.204)2000 + (0.0731/20.725)5300] / (2000 + 5300) = 0.00326

$L1_{B/C}$ = $[(PPP_{vb}/PPP_{vc})E_{vc} + (PPP_{wb}/PPP_{wc})E_{wc}] / (E_{vc} + E_{wc})$

= [(0.8667/29.204)2000 + (0.9504/20.725)5300] / (2000 + 5300) = 0.04141

$L1_{C/C}$ = $[(PPP_{vc}/PPP_{vc})E_{vc} + (PPP_{wc}/PPP_{wc})E_{wc}]/(E_{vc} + E_{wc})$

= [(29.204/29.204)2000 + (20.725/20.725)5300]/(2000+5300) = 1.0000

$L1_{D/C}$ = $[(PPP_{vd}/PPP_{vc})E_{vc} + (PPP_{wd}/PPP_{wc})E_{wc}] / (E_{vc} + E_{wc})$

= [(0.5297/29.204)2000 + (0.6945/20.725)5300] / (2000 + 5300) = 0.02929

Base D:

$L1_{A/D}$ = $[(PPP_{va}/PPP_{vd})E_{vd} + (PPP_{wa}/PPP_{wd})E_{wd}] / (E_{vd} + E_{wd})$

= [(0.0746/0.5297)120 + (0.0731/0.6945)180] / (120 + 180) = 0.11948

$L1_{B/D}$ = $[(PPP_{vb}/PPP_{vd})E_{vd} + (PPP_{wb}/PPP_{wd})E_{wd}] / (E_{vd} + E_{wd})$

= [(0.8667/0.5297)120 + (0.9504/0.6945)180] / (120 + 180) = 1.4756

$L1_{C/D}$ = $[(PPP_{vc}/PPP_{vd})E_{vd} + (PPP_{wc}/PPP_{wd})E_{wd}] / (E_{vd} + E_{wd})$

= [(29.204/0.5297)120 + (20.725/0.6945)180] / (120 + 180) = 39.958

$L1_{D/D}$ = $[(PPP_{vd}/PPP_{vd})E_{vd} + (PPP_{wd}/PPP_{wd})E_{wd}]/(E_{vd} + E_{wd})$

= [(0.5297/0.5297)120 + (0.6945/0.6945)180] / (120 + 180) = 1.0000

Table V.10: Matrix of Laspeyres type PPPs for aggregate 1

A		B		C		D	
$L1_{A/A}$	1.0000	$L1_{A/B}$	0.07982	$L1_{A/C}$	0.00326	$L1_{A/D}$	0.11948
$L1_{B/A}$	12.725	$L1_{B/B}$	1.0000	$L1_{B/C}$	0.04141	$L1_{B/D}$	1.4756
$L1_{C/A}$	305.13	$L1_{C/B}$	25.543	$L1_{C/C}$	1.0000	$L1_{C/D}$	39.958
$L1_{D/A}$	9.0210	$L1_{D/B}$	0.69315	$L1_{D/C}$	0.02929	$L1_{D/D}$	1.0000

V.28 The Laspeyres type PPPs for aggregate 2 of Table V.11 were computed with the EKS PPPs of Table V.8 and the expenditure values of Table V.9 for the basic headings x, y and z following the procedure used for aggregate 1.

Table V.11: Matrix of Laspeyres type PPPs for aggregate 2

A		B		C		D	
$L2_{A/A}$	1.0000	$L2_{A/B}$	0.08413	$L2_{A/C}$	0.00267	$L2_{A/D}$	0.12632
$L2_{B/A}$	12.296	$L2_{B/B}$	1.0000	$L2_{B/C}$	0.03270	$L2_{B/D}$	1.6138
$L2_{C/A}$	374.75	$L2_{C/B}$	31.126	$L2_{C/C}$	1.0000	$L2_{C/D}$	46.272
$L2_{D/A}$	8.2485	$L2_{D/B}$	0.70255	$L2_{D/C}$	0.02204	$L2_{D/D}$	1.0000

V.29 The Laspeyres type PPPs for aggregate 3 of Table V.12 were computed using the EKS PPPs of Table V.8 and the expenditure values of Table V.9 for the basic headings v, w, x, y and z following the procedure described for aggregate 1.

Table V.12: Matrix of Laspeyres type PPPs for aggregate 3

A		B		C		D	
$L3_{A/A}$	1.0000	$L3_{A/B}$	0.08319	$L3_{A/C}$	0.00283	$L3_{A/D}$	0.12426
$L3_{B/A}$	12.403	$L3_{B/B}$	1.0000	$L3_{B/C}$	0.03503	$L3_{B/D}$	1.5721
$L3_{C/A}$	357.35	$L3_{C/B}$	29.905	$L3_{C/C}$	1.0000	$L3_{C/D}$	44.378
$L3_{D/A}$	8.4416	$L3_{D/B}$	0.70056	$L3_{D/C}$	0.02398	$L3_{D/D}$	1.0000

V.30 They could also have been calculated as the weighted averages of the PPPs for aggregate 1 of Table V.10 and the corresponding PPPs for aggregate 2 of Table V.11. For example:

$$L3_{B/A} = [L1_{B/A}\,(E_{va} + E_{wa}) + L2_{B/A}\,(E_{xa} + E_{ya} + E_{za})] / (E_{va} + E_{wa} + E_{xa} + E_{ya} + E_{za})$$
$$= [12.725\,(5 + 20) + 12.296\,(15 + 35 + 25)] / (5 + 20 + 15 + 35 + 25) = 12.403$$

V.3.2 Calculation of a matrix of Paasche type PPPs

V.31 The Paasche type PPP for an aggregate between any pair of countries is defined as the weighted harmonic average of the EKS PPPs between the two countries for the basic headings constituting the aggregate with the expenditures on the basic headings of the partner country being used as weights. But, for the reason given in paragraph V.12, the Paasche type PPPs for aggregate 1 of Table V.13 were obtained by transposing the matrix of Laspeyres type PPPs of Table V.10 and taking the reciprocals of the transposed PPPs as follows:

Base A

$P1_{A/A} = 1/L1_{A/A} = 1/1.0000 = 1.0000$

$P1_{B/A} = 1/L1_{A/B} = 1/0.07982 = 12.534$

$P1_{C/A} = 1/L1_{A/C} = 1/0.00326 = 306.70$

$P1_{D/A} = 1/L1_{A/D} = 1/0.11948 = 8.3698$

Base B

$P1_{A/B} = 1/L1_{B/A} = 1/12.725 = 0.07860$

$P1_{B/B} = 1/L1_{B/B} = 1/1.0000 = 1.0000$

$P1_{C/B} = 1/L1_{B/C} = 1/0.04141 = 24.140$

$P1_{D/B} = 1/L1_{B/D} = 1/1.4756 = 0.67779$

Base C

$P1_{A/C}$ = $1/L1_{C/A}$ = 1/305.13 = 0.00328

$P1_{B/C}$ = $1/L1_{C/B}$ = 1/25.543 = 0.03915

$P1_{C/C}$ = $1/L1_{C/C}$ = 1/1.0000 = 1.0000

$P1_{D/C}$ = $1/L1_{C/D}$ = 1/39.958 = 0.02502

Base D

$P1_{A/D}$ = $1/L1_{D/A}$ = 1/9.0210 = 0.11085

$P1_{B/D}$ = $1/L1_{D/B}$ = 1/0.69315 = 1.4427

$P1_{C/D}$ = $1/L1_{D/C}$ = 1/0.02929 = 34.131

$P1_{D/D}$ = $1/L1_{D/D}$ = 1/1.0000 = 1.0000

Table V.13: Matrix of Paasche type PPPs for aggregate 1

A		B		C		D	
$P1_{A/A}$	1.0000	$P1_{A/B}$	0.07860	$P1_{A/C}$	0.00328	$P1_{A/D}$	0.11085
$P1_{B/A}$	12.534	$P1_{B/B}$	1.0000	$P1_{B/C}$	0.03915	$P1_{B/D}$	1.4427
$P1_{C/A}$	306.70	$P1_{C/B}$	24.140	$P1_{C/C}$	1.0000	$P1_{C/D}$	34.131
$P1_{D/A}$	8.3689	$P1_{D/B}$	0.67779	$P1_{D/C}$	0.02502	$P1_{D/D}$	1.0000

V.32 The Paasche type PPPs for aggregate 2 of Table V.14 and the Paasche type PPPs for aggregate 3 of Table V.15 were obtained by transposing the Laspeyres type PPPs of Table V.11 and Table V.12 respectively and taking the reciprocals of the transposed PPPs.

Table V.14: Matrix of Paasche type PPPs for aggregate 2

A		B		C		D	
$P2_{A/A}$	1.0000	$P2_{A/B}$	0.08133	$P2_{A/C}$	0.00267	$P2_{A/D}$	0.12123
$P2_{B/A}$	11.886	$P2_{B/B}$	1.0000	$P2_{B/C}$	0.03213	$P2_{B/D}$	1.4234
$P2_{C/A}$	374.97	$P2_{C/B}$	30.577	$P2_{C/C}$	1.0000	$P2_{C/D}$	45.365
$P2_{D/A}$	7.9166	$P2_{D/B}$	0.61965	$P2_{D/C}$	0.02161	$P2_{D/D}$	1.0000

Table V.15: Matrix of Paasche type PPPs for aggregate 3

A		B		C		D	
$P3_{A/A}$	1.0000	$P3_{A/B}$	0.08063	$P3_{A/C}$	0.00280	$P3_{A/D}$	0.11846
$P3_{B/A}$	12.022	$P3_{B/B}$	1.0000	$P3_{B/C}$	0.03344	$P3_{B/D}$	1.42760
$P3_{C/A}$	353.91	$P3_{C/B}$	28.542	$P3_{C/C}$	1.0000	$P3_{C/D}$	41.695
$P3_{D/A}$	8.0474	$P3_{D/B}$	0.63559	$P3_{D/C}$	0.02253	$P3_{D/D}$	1.0000

V.3.3 Calculation of a matrix of Fisher type PPPs

V.33 The Fisher type PPP for an aggregate between any pair of countries is defined as the unweighted geometric mean of their Laspeyres type PPP for the aggregate and their Paasche type PPP for the aggregate. But, as explained in paragraph V.13, the Fisher type PPPs for aggregate 1 of Table V.16 were not calculated directly using the Laspeyres type PPPs of Table V.10 and the corresponding Paasche type PPPs of Table V.13. Instead, they were computed using just the Laspeyres type PPPs of Table V.10 as follows:

$F_{A/A} = [L_{A/A}.P_{A/A}]^{1/2} = [L_{A/A}/L_{A/A}]^{1/2} = [1.0000/1.0000]^{1/2} = 1.0000$

$F_{B/A} = [L_{B/A}.P_{B/A}]^{1/2} = [L_{B/A}/L_{A/B}]^{1/2} = [12.725/0.07982]^{1/2} = 12.629$

$F_{A/B} = [L_{A/B}.P_{A/B}]^{1/2} = [L_{A/B}/L_{B/A}]^{1/2} = [0.07982/12.725]^{1/2} = 0.07921$

$F_{C/A} = [L_{C/A}.P_{C/A}]^{1/2} = [L_{C/A}/L_{A/C}]^{1/2} = [305.13/0.00326]^{1/2} = 305.91$

$F_{A/C} = [L_{A/C}.P_{A/C}]^{1/2} = [L_{A/C}/L_{C/A}]^{1/2} = [0.00326/305.13]^{1/2} = 0.00327$

$F_{D/A} = [L_{D/A}.P_{D/A}]^{1/2} = [L_{D/A}/L_{D/A}]^{1/2} = [9.0210/0.11948]^{1/2} = 8.6894$

$F_{A/D} = [L_{A/D}.P_{A/D}]^{1/2} = [L_{A/D}/L_{D/A}]^{1/2} = [0.11948/9.0210]^{1/2} = 0.11508$

$F_{C/B} = [L_{C/B}.P_{C/B}]^{1/2} = [L_{C/B}/L_{B/C}]^{1/2} = [25.543/0.04141]^{1/2} = 24.831$

$F_{B/C} = [L_{B/C}.P_{B/C}]^{1/2} = [L_{B/C}/L_{C/B}]^{1/2} = [0.04141/25.543]^{1/2} = 0.04025$ …… etc.

Table V.16: Matrix of Fisher type PPPs for aggregate 1

A		B		C		D	
$F1_{A/A}$	1.0000	$F1_{A/B}$	0.07921	$F1_{A/C}$	0.00327	$F1_{A/D}$	0.11508
$F1_{B/A}$	12.629	$F1_{B/B}$	1.0000	$F1_{B/C}$	0.04025	$F1_{B/D}$	1.4590
$F1_{C/A}$	305.91	$F1_{C/B}$	24.831	$F1_{C/C}$	1.0000	$F1_{C/D}$	36.930
$F1_{D/A}$	8.6894	$F1_{D/B}$	0.68538	$F1_{D/C}$	0.02708	$F1_{D/D}$	1.0000

V.34 The Fisher type PPPs for aggregate 2 of Table V.17 and the Fisher type PPPs for aggregate 3 of Table V.18 were obtained using the Laspeyres type PPP of Table V.11 and Table V.12 respectively following the same procedure as that used for aggregate 1.

Table V.17: Matrix of Fisher Type PPPs for aggregate 2

A		B		C		D	
$F2_{A/A}$	1.0000	$F2_{A/B}$	0.08272	$F2_{A/C}$	0.00267	$F2_{A/D}$	0.12375
$F2_{B/A}$	12.090	$F2_{B/B}$	1.0000	$F2_{B/C}$	0.03241	$F2_{B/D}$	1.5156
$F2_{C/A}$	374.86	$F2_{C/B}$	30.850	$F2_{C/C}$	1.0000	$F2_{C/D}$	45.816
$F2_{D/A}$	8.0808	$F2_{D/B}$	0.65980	$F2_{D/C}$	0.02183	$F2_{D/D}$	1.0000

Table V.18: Matrix of Fisher type PPPs for aggregate 3

A		B		C		D	
$F3_{A/A}$	1.0000	$F3_{A/B}$	0.08189	$F3_{A/C}$	0.00281	$F3_{A/D}$	0.12133
$F3_{B/A}$	12.211	$F3_{B/B}$	1.0000	$F3_{B/C}$	0.03422	$F3_{B/D}$	1.4980
$F3_{C/A}$	355.62	$F3_{C/B}$	29.215	$F3_{C/C}$	1.0000	$F3_{C/D}$	43.016
$F3_{D/A}$	8.2421	$F3_{D/B}$	0.66755	$F3_{D/C}$	0.02325	$F3_{D/D}$	1.0000

V.35 The Fisher type PPPs of Tables V.16, V.17 and V.18 satisfy the country reversal test – that is, $F_{B/A}.F_{A/B} = 1$; $F_{C/A}.F_{A/C} = 1$; etc. But they are not transitive – that is $F_{B/A}/F_{C/A} \neq F_{B/C}$; $F_{A/B}/F_{C/B} \neq F_{A/C}$; etc. Transitivity is obtained by applying the EKS procedure.

V.3.4 Calculation of the matrix of EKS PPPs

V.36 With the EKS procedure, the transitive PPP for any two countries is obtained by taking the unweighted geometric mean of the Fisher type PPP calculated between the pair directly and all PPPs that can be calculated between the pair indirectly when each of the other countries is used as a bridge. The EKS PPPs for aggregate 1 of Table V.19 were computed following this procedure using the Fisher type PPPs in Table V.16 to provide the direct and indirect PPPs required:

$EKS1_{A/A} = F_{A/A} = 1.00000$

$EKS1_{B/A} = [(F_{B/A}/F_{A/A})(F_{B/B}/F_{A/B})(F_{B/C}/F_{A/C})(F_{B/D}/F_{A/D})]^{1/4}$

$= [(F_{B/A})^2(F_{B/C}/F_{A/C})(F_{B/D}/F_{A/D})]^{1/4}$

$= [(12.62913)^2(0.04025/0.00327)(1.45905/0.11508)]^{1/4} = 12.563$

$EKS1_{C/A} = [(F_{C/A})^2(F_{C/B}/F_{A/B})(F_{C/D}/F_{A/D})]^{1/4}$

$= [(305.9139)^2(24.83137/0.07921)(36.93008/0.11508)]^{1/4} = 311.52$

$EKS1_{D/A} = [(F_{D/A})^2(F_{D/B}/F_{A/B})(F_{D/C}/F_{A/C})]^{1/4}$

$= [(8.68941)^2(0.68538/0.07921)(0.02707/0.00326)]^{1/4} = 8.5778$

$EKS1_{A/B} = [(F_{A/B})^2(F_{A/C}/F_{B/C})(F_{A/D}/F_{B/D})]^{1/4}$

$= [(0.07921)^2(0.00326/0.04025)(0.11508/1.45905)]^{1/4} = 0.07963$

$EKS1_{C/B} = [(F_{C/B})^2(F_{C/A}/F_{B/A})(F_{C/D}/F_{B/D})]^{1/4}$

$= [(24.83137)^2(305.9135/12.62913)(36.93008/1.45905)]^{1/4} = 24.796$

$EKS1_{D/B} = [(F_{D/B})^2(F_{D/A}/F_{B/A})(F_{D/C}/F_{B/C})]^{1/4}$

$= [(0.68538)^2(8.68941/12.62913)(0.02707/0.04025)]^{1/4} = 0.68277$ …… etc.

Table V.19: Matrix of EKS PPPs for aggregate 1

A		B		C		D	
$EKS1_{A/A}$	1.0000	$EKS1_{A/B}$	0.07963	$EKS1_{A/C}$	0.00321	$EKS1_{A/D}$	0.11655
$EKS1_{B/A}$	12.563	$EKS1_{B/B}$	1.0000	$EKS1_{B/C}$	0.04031	$EKS1_{B/D}$	1.4646
$EKS1_{C/A}$	311.52	$EKS1_{C/B}$	24.796	$EKS1_{C/C}$	1.0000	$EKS1_{C/D}$	36.317
$EKS1_{D/A}$	8.5778	$EKS1_{D/B}$	0.68277	$EKS1_{D/C}$	0.02753	$EKS1_{D/D}$	1.0000

V.37 Transitivity requires that the direct PPP between each pair of countries is equal to the indirect PPP derived via any third country. For example, $EKS1_{B/A}$ should equal $EKS1_{B/C} / EKS1_{A/C}$ or $EKS1_{B/D} / EKS1_{A/D}$. That the EKS PPPs for aggregate 1 of Table V.19 meet this requirement is demonstrated below:

$EKS1_{B/A}$ = $EKS1_{B/C} / EKS1_{A/C}$ = 0.04031/0.00321 = 12.563

$EKS1_{B/A}$ = $EKS1_{B/D} / EKS1_{A/D}$ = 1.4646/0.11655 = 12.563

$EKS1_{C/A}$ = $EKS1_{C/B} / EKS1_{A/B}$ = 24.796/0.07963 = 311.52

$EKS1_{C/A}$ = $EKS1_{C/D} / EKS1_{A/D}$ = 36.317/0.11655 = 311.52

$EKS1_{D/A}$ = $EKS1_{D/B} / EKS1_{A/B}$ = 0.68277/0.07963 = 8.5778

$EKS1_{D/A}$ = $EKS1_{D/C} / EKS1_{A/C}$ = 0.02753/0.00321 = 8.5778

$EKS1_{A/B}$ = $EKS1_{A/C} / EKS1_{B/C}$ = 0.00321/0.04031 = 0.07963

$EKS1_{A/B}$ = $EKS1_{A/D} / EKS1_{B/D}$ = 0.11655/1.4646 = 0.07963

$EKS1_{C/B}$ = $EKS1_{C/A} / EKS1_{B/A}$ = 311.52/12.563 = 24.796

$EKS1_{C/B}$ = $EKS1_{C/D} / EKS1_{B/D}$ = 36.317/1.4646 = 24.796 …… etc.

V.38 The EKS PPPs for aggregate 2 of Table V.20 and the EKS PPPs for aggregate 3 of Table V.21 were obtained following the procedure described in paragraph V.35 and using the Fisher type PPPs in Table V.17 and Table V.18 to provide the direct and indirect PPPs required.

Table V.20: Matrix of EKS PPPs for aggregate 2

A		B		C		D	
$EKS2_{A/A}$	1.0000	$EKS2_{A/B}$	0.08234	$EKS2_{A/C}$	0.00268	$EKS2_{A/D}$	0.12377
$EKS2_{B/A}$	12.144	$EKS2_{B/B}$	1.0000	$EKS2_{B/C}$	0.03254	$EKS2_{B/D}$	1.5030
$EKS2_{C/A}$	373.23	$EKS2_{C/B}$	30.733	$EKS2_{C/C}$	1.0000	$EKS2_{C/D}$	46.193
$EKS2_{D/A}$	8.0797	$EKS2_{D/B}$	0.66531	$EKS2_{D/C}$	0.02165	$EKS2_{D/D}$	1.0000

Table V.21: Matrix of EKS PPPs for aggregate 3

A		B		C		D	
$EKS3_{A/A}$	1.0000	$EKS3_{A/B}$	0.08174	$EKS3_{A/C}$	0.00281	$EKS3_{A/D}$	0.12157
$EKS3_{B/A}$	12.236	$EKS3_{B/B}$	1.0000	$EKS3_{B/C}$	0.03440	$EKS3_{B/D}$	1.4876
$EKS3_{C/A}$	355.64	$EKS3_{C/B}$	29.065	$EKS3_{C/C}$	1.0000	$EKS3_{C/D}$	43.236
$EKS3_{D/A}$	8.2254	$EKS3_{D/B}$	0.67224	$EKS3_{D/C}$	0.02313	$EKS3_{D/D}$	1.0000

V.3.5 Standardising the matrix of EKS PPPs

V.39 In the matrix of EKS PPPs for aggregate 1 of Table V.19, the PPPs in each column are expressed with the corresponding country as a base. For example, in column A country A is the base – $EKS1_{A/A}$, $EKS1_{B/A}$, $EKS1_{C/A}$ and $EKS1_{D/A}$; in column B country B is the base – $EKS1_{A/B}$, $EKS1_{B/B}$, $EKS1_{C/B}$ and $EKS1_{D/B}$; and so on. As these PPPs are now transitive, the ratios between the PPPs foe each base are the same. In order to obtain a set of PPPs that has the group of countries as a base – thereby ensuring base country invariance - it is necessary to standardise the PPPs in the matrix. This is done by dividing each PPP by the geometric mean of the PPPs in its column. The standardised EKS PPPs for aggregate 1 of Table V.22 were computed following this procedure:

$EKS1_A = EKS1_{A/A} / (EKS1_{A/A} \times EKS1_{B/A} \times EKS1_{C/A} \times EKS1_{D/A})^{1/4}$

$= 1.000 / (1.000 \times 12.563 \times 311.52 \times 8.5778)^{1/4} = 0.0739$

$EKS1_B = EKS1_{B/A} / (EKS1_{A/A} \times EKS1_{B/A} \times EKS1_{C/A} \times EKS1_{D/A})^{1/4}$

$= 12.563 / (1.000 \times 12.563 \times 311.52 \times 8.5778)^{1/4} = 0.9281$

$EKS1_C = EKS1_{C/A} / (EKS1_{A/A} \times EKS1_{B/A} \times EKS1_{C/A} \times EKS1_{D/A})^{1/4}$

$= 311.52 / (1.000 \times 12.563 \times 311.52 \times 8.5778)^{1/4} = 23.01$

$EKS1_D = EKS1_{D/A} / (EKS1_{A/A} \times EKS1_{B/A} \times EKS1_{C/A} \times EKS1_{D/A})^{1/4}$

$= 8.5778 / (1.000 \times 12.563 \times 311.52 \times 8.5778)^{1/4} = 0.6337$ …… etc.

Table V.22: Matrix of standardised EKS PPPs for aggregate 1

	A	B	C	D
$EKS1_A$	0.0739	0.0739	0.0739	0.0739
$EKS1_B$	0.9281	0.9281	0.9281	0.9281
$EKS1_C$	23.0100	23.0100	23.0100	23.0100
$EKS1_D$	0.6337	0.6337	0.6337	0.6337

V.40 The standardised EKS PPPs of Table V.23 and V.24 were obtained by standardising the EKS PPPs Tables V.20 and V.21 respectively following the procedure described in paragraph V.37.

Table V.23: Matrix of standardised EKS PPPs for aggregate 2

	A	B	C	D
$EKS2_A$	0.0723	0.0723	0.0723	0.0723
$EKS2_B$	0.8779	0.8779	0.8779	0.8779
$EKS2_C$	26.9800	26.9800	26.9800	26.9800
$EKS2_D$	0.5841	0.5841	0.5841	0.5841

Table V.24: Matrix of standardised EKS PPPs for aggregate 3

	A	B	C	D
$EKS3_A$	0.0727	0.0727	0.0727	0.0727
$EKS3_B$	0.8896	0.8896	0.8896	0.8896
$EKS3_C$	25.86	25.8600	25.8600	25.8600
$EKS3_D$	0.5980	0.5980	0.5980	0.5980

V.41 The three matrices of standardised EKS reduce to three vectors of standardised EKS PPPs:

	A	B	C	D
Aggregate 1	0.0739	0.9281	23.01	0.6337
Aggregate 2	0.0723	0.8779	26.98	0.5841
Aggregate 3	0.0727	0.8896	25.86	0.5980

ANNEX VI. DIFFERENCES BETWEEN EUROSTAT AND OECD COMPARISONS

VI.1 Introduction

VI.1 The original purpose of the PPP Programme was to compare the GDPs of EU Member States and OECD Member Countries, but this has since been broadened to countries that have an association with the European Union or the OECD other than membership.[1] The Programme comprises comparisons organised by Eurostat and comparisons organised by the OECD. Eurostat comparisons cover European countries and are made every year. OECD comparisons cover non-European countries and are made every three years. Eurostat comparisons include all EU Member States, but OECD comparisons do not include all OECD Member Countries which are predominantly European. Consequently joint comparisons that cover both European and non-European countries – thereby enabling European and non-European Member Countries of OECD to be compared with each other - are also made every three years.

VI.2 Responsibility for the joint comparisons is shared between Eurostat and the OECD. Eurostat co-ordinates the collection and validation of data in European countries and calculates their PPPs and real expenditures. The OECD does the same for non–European countries. The OECD is also responsible for combining the PPPs and real expenditures for European countries with those for non-European countries when it calculates the PPPs and real expenditures for all countries included in the joint comparison. Eurostat and the OECD use the same methodology for their comparisons, but there are differences in their approaches. Most of these have already been identified either in the text or in footnotes to the text in the relevant chapters of the manual. This annex provides a summary of the differences between the two comparisons.

VI.2 Timetable and organisation

VI.3 The principal difference between Eurostat and OECD comparisons is their frequency. It arises because of the different institutional arrangements that exist between the two organisations and their members.[2] Price collections in European countries are, with one or two exceptions, partially funded by Eurostat. Price collections in non-European countries are funded by the countries themselves. Data requirements of three-yearly comparisons are less demanding than are those of annual comparisons. By making comparisons every three years, the OECD reduces the financial burden and the response burden on non-European countries. Three-yearly comparisons also allow participants greater flexibility in implementation.

VI.4 Eurostat and the OECD follow the rolling survey approach for the price surveys of consumer goods and services.[3] The approach involves continuous data collection over a three-year period. Other surveys have other frequencies as shown in Box VI.1. Non-European countries conduct these surveys every third year whereas European countries conduct them every year or, as in the case of the price surveys for equipment goods, every second year.

VI.5 Because of their large number, European countries are divided into four smaller, more manageable country groups for the surveys of consumer prices. Each group is coordinated by a group leader and it is the group leaders together with Eurostat who oversee the consumer price surveys. All other surveys are managed centrally by Eurostat. Non-European countries are not broken down into country groups. All surveys are co-ordinated by the OECD. Because non-European countries are linked to European countries at the product level, the OECD is also responsible for

1 Participating countries are listed Chapter 3, Box 3.2.

2 An important institutional difference is the PPP Regulation underlying Eurostat comparisons. The Regulation clearly defines the roles and responsibilities of Eurostat and the EU Member States as well as the methods and procedures to be followed. OECD comparisons have no such specific legal support.

3 The rolling survey approach is described in Chapter 3, Box 3.1A and Box 3.1B.

ensuring that there are sufficient overlaps between the product lists priced by non-European countries and those priced by European countries.

Box VI.1: Data requirements of Eurostat and OECD comparisons[1]

Data	Survey	Frequency of collection	
		Eurostat	OECD
Prices	01. Food, drinks and tobacco	Every three years	Every three years
	02. Personal appearance	..	..
	03. House and garden	..	..
	04. Transport, restaurants and hotels	..	..
	05. Services	..	..
	06. Furniture and health[2]	..	..
	07. Equipment goods	Every two years	..
	08. Construction projects	Every year	..
	09. Compensation of government employees[3]	..	..
	10A. Housing	..	..
Quantity and quality indicators	10B. Housing[4]	..	..
	11. Education	..	..
Expenditures	12. GDP expenditure weights	..	..
Other	13. Spatial adjustment factors[5]	Every six years[6]	
	14. Temporal adjustment factors	Every year	Every year
	15. Global rate for VAT paid on capital goods[5]	..	
	16. Global rate for tips to waiters and hairdressers[5]	..	
	17. Annual average exchange rates	..	Every three years
	18. Annual average resident population	..	..

[1] Eurostat comparisons are made every year while OECD comparisons are made every three years.
[2] Pharmaceutical products, medical goods, therapeutic appliances and out-patient medical services but not inpatient medical services.
[3] Collective services and government-produced hospital services.
[4] Countries with small or unrepresentative rent markets provide data on the housing stock instead of prices.
[5] Not required from countries participating in OECD comparisons as they report national prices with non-deductible VAT and tips as appropriate.
[6] Spatial adjustment factors are reported each year but only for the consumer price surveys conducted in that year. They have to be updated at least once every six years.

VI.3 Expenditures

VI.6 Eurostat and the OECD use the same classification of GDP expenditures. The classification follows the definitions, concepts, classifications and accounting rules of the SNA 93[4] and the ESA 95[5]. The Eurostat version of the classification has 206 basic headings; the OECD version has 196. Eurostat's 206 sum exactly to the OECD's 196. The main difference between the two versions is that the OECD version has just one basic heading for furniture and one basic heading for non-profit institutions serving households (NPISHs), whereas the Eurostat version has four basic headings for furniture and six basic headings for NPISHs.

VI.7 European countries report the details of their final expenditures annually. Non-European countries report their detailed expenditures every three years. Both groups of countries experience difficulties providing expenditures at the basic heading level. Non-European countries find it particularly difficult to identify the expenditures of NPISHs. They have also had difficulties providing breakdowns of health and education expenditures. But these difficulties are expected to disappear because the output based approaches adopted for health and education require much simpler breakdowns of expenditure.

VI.4 Consumer goods and services

VI.8 Non-European countries observe the same cycle of price surveys as European countries. But, as OECD comparisons are only made every third year, at the end of the cycle, non-European countries do not adhere strictly to the survey schedule established for European countries. Both groups of countries conduct two price surveys a year, but non-European countries have greater leeway as to when they collect and report prices. There are no intermediate deadlines for non-European countries within a cycle because the OECD, unlike Eurostat, does not publish results on an annual basis. Non-European countries report prices at diversely different times and this delays editing. The validation of the various surveys takes considerably longer for non-European countries than it does for European countries.

VI.9 Non-European countries are not as actively involved in product selection as European countries. Before each price survey, European countries first carry out a pre-survey to ascertain how their markets have evolved in the three years since the survey was last held. Group leaders then draft a product list based on the replies to the pre-survey questionnaire which countries can modify online and at group meetings. Non-European countries meet once a year to discuss, among other things, the product lists for forthcoming surveys. There are no pre-surveys beforehand. Instead, using the experience gained from the last time the surveys were conducted, the OECD identifies those basic headings where there is a need to add products that are representative for non-European countries. The specifications for these additional products are developed by the countries and the OECD together. If the products are also representative for European countries, they are added to Eurostat product lists. Otherwise, they stand alone as *P products* – that is, their code numbers have the single suffix "P". Generally there only few stand alone P products. It depends on the survey.

VI.10 The product lists for non-European countries consist of the product lists of the four Eurostat country groups after they have been edited by the OECD and the list of additional P products. When editing the product lists of the country groups, the OECD tends to remove products that are either specific to one country group or an overlap product between two country groups and to retain products that overlap three or four country groups. Specifications that are considered to be too Eurocentric are also removed. After editing, non-European countries are faced with product lists that are some ten to twenty per cent longer than those faced by European countries, but they have a greater choice of products which improves representativity. To guide non-European countries in their selection of products to be priced, the OECD adds a "P" to the suffixes of some of the Eurostat products. This indicates that either the product has been included on the Eurostat list at the request

[4] *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

[5] European System of Accounts 1995, Eurostat, Luxembourg, 1996.

of the OECD or the product has a generic specification which the OECD feels that non-European countries should at least consider pricing. In general, when selecting products to price, non-European countries are required to give priority to European-non-European overlap products. To facilitate this, non-European countries are permitted more flexibility when pricing brand and model specifications. European countries have to price the brands and models specified. Often it is not possible for non-European countries to find these brands or models on their markets.[6] When this happens, non-European countries are allowed to price brands and models that are equivalent to those specified.

VI.11 European countries report individual prices observations. For the majority of countries, these price observations have been collected in the capital city. European countries reporting capital city prices have to provide spatial adjustment factors with which to convert their capital city prices to national prices. Non-European countries report national average prices, so spatial adjustment factors are not required. Both groups of countries report point-in-time prices, so both have to provide temporal adjustment factors with which to convert the point-in-time prices to annual prices.

VI.12 To enable Eurostat to obtain annual average prices for seasonal food products, European countries are expected to supply monthly quantity weights in addition to temporal adjustment factors. Non-European countries are required to report annual average prices for seasonal food products. It is left to the countries to decide how the averages are derived.

VI.13 European countries report their individual price observations by means of an electronic reporting form that is programmed to edit the price observations entered on it. This enables the intra-country editing of the price observations to be reviewed by the country and by the group leader. Non-European countries report national average prices on the understanding that they edit the price observations on which the averages are based before reporting them. Non-European countries have a much simpler electronic reporting form to complete than European countries.

VI.5 Housing

VI.14 European countries complete the rent survey every year. Non-European countries complete the survey every three years. Both groups of countries report actual and imputed rents that are national annual averages. European countries are required to report either rent per square metre or rent per dwelling, but preferably both; non-European countries are only required to report rent per dwelling.

VI.15 The OECD reporting form for actual and imputed rents covers a longer list of dwellings than the Eurostat reporting form. This is to accommodate the various circumstances of non-European countries. The definitions of these additional dwellings specify either the number of bedrooms or, like Eurostat definitions, the number of rooms.

VI.16 The OECD reporting form on the quantity and quality of the housing stock does not make a distinction between houses and apartments as does the Eurostat reporting form. Eurostat requires the breakdown for validation. it does not distinguish between houses and apartments when calculating the volume indices for those European countries that cannot provide rent data.

[6] In general, markets are less homogeneous among non-European countries than they are among European countries. More specifically, many of the brands specified are European brands that are not available in non-European countries or, if available, are not representative. Even so for some products, such as cars and electronic goods, European and non-European markets are beginning to converge.

VI.6 Health, education and collective services other than defence

V1.17 European countries provide data on the compensation of employees paid by general government to a selection of occupations in health and in collective services other than defence every year. Non-European countries provide such data once every three years. Both groups of countries report compensation of employees for the same list of occupations and both groups report compensation of employees that are national annual averages. Usually the data required are extracted from government payroll statistics.

VI.18 In addition to the compensation of employees paid to each occupation, European and non-European countries provide the actual hours worked by employees in each occupation. Eurostat uses this information to standardise the working hours of occupations in both health and collective services other than defence. The OECD only uses it to standardise the working hours of occupations in collective services other than defence.

VI.19 For the basic heading collective services other than defence, occupations are divided into two groups: those in public order and safety and those in other collective services not elsewhere classified. European countries provide percentage shares (of either expenditure or numbers employed) for the two groups. Non-European countries do not provide the percentage shares and their PPPs for the basic heading are unweighted.

VI.20 Both Eurostat and the OECD apply the output approach for education in line with the frequency of their comparisons. Both will also adopt the output-price approach for health when it is introduced.

VI.7 Capital goods

VI.21 European countries survey construction prices every year and the prices of equipment goods every two years. Non-European countries survey the prices of capital goods every three years. Both groups of countries follow the same approach.

VI.22 Equipment good prices are collected through specification pricing. European countries price the brands and models specified, but non-European countries generally price products that are equivalent to those specified.[7] The basis of the price collections in the two groups of countries is the product list drawn up by Eurostat. There is also a supplementary product list for non-European countries that has been drawn up by the OECD. It contains products specifically representative of non-European countries.

VI.23 Construction prices are obtained by countries pricing a set of standard construction projects each of which is defined in a bill of quantities. The OECD set of projects is larger than the Eurostat set. It contains three additional projects that improve its representativity for non-European countries. These are a North American single-family house, a Japanese single-family house and a Japanese factory.

VI.24 European countries report national average prices for capital goods that refer to the survey months of the survey year which are April, May and June for equipment goods and May, June and July for construction. The prices are net of non-deductible taxes and data on non-deductible taxes are provided later as part of a separate exercise. Non-European countries also report national average prices for capital goods. But the prices refer to July of the survey year and include non-deductible taxes.

VI.25 When the PPPs for capital goods are calculated, the representativity of the equipment goods priced is taken into account for European countries but not for non-European countries. The

[7] For the reasons given in footnote 7.

representativity of the construction projects priced is not taken into account for either group of countries.

VI.8 Calculation and aggregation of PPPs

VI.26 Eurostat and the OECD use the Èltetö-Köves-Szulc or EKS method to calculate and aggregate PPPs. Both apply the same reference PPPs for basic headings for which no prices are collected. The EKS PPPs and real expenditures are the official results for Eurostat comparisons and for OECD comparisons. The results of the two comparisons are *fixed* when they are combined in a joint comparison.[8] The Geary Khamis or GK method is also used to aggregate PPPs for joint comparisons. The GK results are secondary to the EKS results and only the indices that assist inter-country analysis of price and volume structures are published. Box VI.2 provides an outline of the GK method.[9]

VI.9 Presentation of results

VI.27 Eurostat disseminates the results of its comparisons and the OECD disseminates the results of joint comparisons[10] using a similar set of standard tables. Eurostat tables cover more analytical categories than do OECD tables; they also cover more country groups.[11] The principal difference between the two presentations concerns the reference country and the numéraire. Results of Eurostat comparison are presented with the European Union as reference country and the purchasing power standard (PPS) as numéraire. Results of joint comparisons are presented with the OECD as reference country and the OECD dollar as numéraire.

VI.10 Updating PPPs

VI.28 Eurostat uses the rolling survey approach to makes annual comparisons for European countries. The annual comparisons provide PPPs and real expenditures for each level of aggregation up to GDP. The OECD makes such detailed calculations only once every three years. For the years between these three-yearly benchmark calculations, the OECD estimates PPPs for non-European countries for three aggregates - GDP, actual individual consumption (AIC) and household final consumption expenditure - by extrapolation. The extrapolators are the implicit price deflators for the three aggregates that the OECD extracts from its in-house national accounts database. The OECD subsequently links the PPPs for non-European countries with Eurostat's PPPs for European OECD Member Countries.

VI.29 In addition to estimating annual PPPs for non-benchmark years for GDP, AIC and household final consumption expenditure, the OECD also estimates monthly price level indices (PLIs) for household final consumption expenditure for its Member Countries. The PLIs are based on extrapolations of the PPPs for household final consumption expenditure from the latest benchmark calculation. The price deflators used as extrapolators are the overall consumer price indices of Member Countries.

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8 How fixity is obtained at the basic heading level and at the aggregate level is described in Chapter 12, Section 12.2.6.

9 See also Annex VIII on aggregation methods.

10 The OECD does not disseminate detailed results separately either for non-European countries or for the OECD as a whole.

11 Differences in standard tables, analytical categories and country groups are detailed in Chapter 13, Section 13.2.

Box VI.2: The Geary Khamis method

The original GK method provides a way of calculating PPPs from price and quantity data for individual products when such data are available. It entails valuing a matrix of quantities using a vector of international prices which is obtained by averaging national prices, after they have been converted to a common currency and a uniform price level by global PPPs, across the group of countries being compared. International prices and global PPPs are derived simultaneously. Technically, the method is defined through the system of interrelated linear equations (1) and (2) below:

(1) and (1a)

$$P_i = \frac{\sum_{j=1}^{M}(p_{ij} / PPP_j)q_{ij}}{\sum_{j=1}^{M} q_{ij}}$$

$$P_i = \frac{\sum_{j=1}^{M}(p_{ij} q_{ij}) / PPP_j}{\sum_{j=1}^{M} q_{ij}}$$

and

(2) and (2a)

$$PPP_j = \frac{\sum_{i=1}^{N} p_{ij} q_{ij}}{\sum_{i=1}^{N} P_i q_{ij}}$$

$$PPP_j = \frac{\sum_{i=1}^{N} p_{ij} q_{ij}}{\sum_{i=1}^{N} p_{ij} q_{ij} /(p_{ij} / P_i)}$$

Let p_{ij} and q_{ij} denote the price and quantity of product *i* in country *j* and let P_i denote the international average price of product *i*. PPP*j* is the PPP for an aggregate that includes the products *i = 1…n* for country *j*; *N* is the number of products; and *M* is the number of countries. These equations are used for all products and all countries in the comparison.

In practice, the input data are not prices and quantities for individual products, but notional prices and quantities for basic headings that comprise sets of products (see equations (1a) and (2a)). The notional prices are the PPPs for the basic headings expressed as national currency units per unit of numéraire currency. The notional quantities are the expenditures on the basic headings expressed in terms of the numéraire currency – that is, national expenditures on the basic headings divided by the corresponding basic heading PPPs.

GK PPPs are commensurable, base country invariant and transitive. They provide real expenditures that are additive. It is sufficient to calculate GK international average prices (PPPs) from the equations above and GK real expenditures for basic headings only. The real expenditure for an aggregate is obtained by summing the real expenditures on its constituent basic headings. The PPPs for the aggregate is derived by dividing the national expenditure on the aggregate by the real expenditure on the aggregate. The volume measures derived from GK real expenditures satisfy the average test.

The GK method treats countries as members of a group, each with weights equal to its shares of

basic heading volumes for the group. One disadvantage of this is that a change in the composition of the group can change significantly the average international prices as well as the relationships between countries.

Another more important disadvantage is that the real expenditures are subject to the Gerschenkron effect because the average international prices gravitate to the prices of large or rich countries. The Gerschenkron effect can be large.

GK results are considered to be better suited to inter-country comparisons of price and volume structures than to inter-country comparisons of price and volume levels of individual aggregates.

ANNEX VII. INTERNATIONAL COMPARISON PROGRAMME

VII.1 Introduction

VII.1 This annex provides a summary of the methods used in the inter-country price and volume comparisons of GDP expenditures organised by the international Comparison Programme (ICP).[1] It concentrates on the methods used in the 2011 round, the results of which are due to be published at the end of 2013. Since the 2011 round is in full progress at the time of writing this annex, the methodology may still develop. A short history of the ICP can be found in Annex I.

VII.2 Governance and organisation

VII.2 The 2011 round of the ICP is managed and coordinated by the Global Office which is situated in the headquarters of the World Bank in Washington DC. Monitoring the work programme and budget of the Global Office and providing strategic leadership is the Executive Board made up of established economists and experienced statistical managers. The Board meets twice a year, generally back-to-back with another meeting such as the United Nations Statistical Commission. Between meetings the Board is kept informed about programme implementation through a mid-year progress report prepared by the Global Office. Helping the Global Office to resolve conceptual and methodological issues is the Technical Advisory Group composed of international experts in index numbers, price statistics and national accounts. The Group meets twice a year, usually in tandem with the meetings of regional coordinating agencies mentioned below.

VII.3 The ICP is organised by region. There are six regions in the 2011 round of which five – Africa, Asia-Pacific, the Commonwealth of Independent States (CIS), Latin America & Caribbean and Western Asia – are ICP regions overseen by the Global Office. The sixth "region" is the Eurostat-OECD PPP Programme. The methodology employed by Eurostat and the OECD is, with a few exceptions, basically the same as that used in the five ICP regions, but the Eurostat-OECD PPP Programme has its own work plan and schedule. Eurostat, the OECD and the Global Office work closely together to ensure that the countries in the sixth region can be included in a global comparison with those in the five ICP regions. A memorandum of understanding to this effect exists between them.[2]

VII.4 Each ICP region carries out a regional comparison following a timetable common to all five regions and using methods compatible with those employed in the other regions. This ensures that the results of the regional comparison can be combined in a timely fashion with the results of other regional comparisons in a global comparison. The price and other data required for the regional comparison are supplied by the national statistical institutes (NSIs) of the countries participating in the regional comparisons.[3] The activities of the NSIs are guided by a regional coordinating agency (RCA).[4] The RCA is responsible for liaison with the NSIs, the Global Office and other RCAs; the compilation of regional product lists; the coordination of price collections and the estimation of detailed GDP expenditures, the supervision of data validation; and the calculation and dissemination of the results of the regional comparison. RCAs hold regular meetings with the NSIs of their region to

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1 A more detailed review of ICP methodology can be found in the ICP Book Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP), edited by the World Bank, forthcoming. See http://siteresources.worldbank.org/ICPEXT/Resources/ICP_2011.html

2 In addition to the countries in the six regions, there are two other categories of countries participating in the ICP. These are the Pacific islands and individual countries not associated with any region and referred to as *singleton countries.*

3 Country participation in ICP 2011: Africa 52; Asia 23; CIS 10, Latin America 18; Western Asia 14; Eurostat-OECD 47; other 39 (15 Pacific islands, 21 Caribbean islands, 3 singleton countries) - 203 countries in total but as three countries (Egypt, Russian Federation and Sudan) are participating in two comparisons the total is actually 200 countries.

4 The regional coordinating agencies are: African Development Bank; Asian Development Bank; Federal State Statistical Service of the Russian Federation and Interstate Statistical Committee of the Commonwealth of Independent States; United Nations Economic Commission for Latin America and the Caribbean; United Nations Economic and Social Commission for Western Asia.

explain the methods and procedures to be followed and the metadata to be provided, to finalise product lists, to validate price and expenditure data and to review and approve comparison results.

VII.5 Responsibility for making sure that the regional comparisons can be combined in a global comparison and then combining them rests with the Global Office. To this end the Global Office convenes meetings of the RCAs twice a year, in spring and autumn. The meetings focus on methodological developments, data and metadata requirements, implementation and timetable – particularly the situation with regard to the collection, estimation and validation of data for both regional and global comparisons – and difficulties encountered. The meetings provide important input to the progress reports that the Global Office prepares periodically for the Executive Board.

VII.3 Linking regional comparisons

VII.6 With some exceptions, the regions participating in the 2011 round will be combined into a global comparison by means of a set of *core products* that are priced in all regions. Core products allow direct comparisons to be made between countries in different regions. The Global Office is responsible for preparing the lists of core products in consultation with RCAs and NSIs. Being comparable and available across regions are essential requirements of core products. It is also desirable that they are representative in as many regions as possible. The Global Office is also responsible for the inter-regional validation of the prices that countries in each region report for core products.

VII.7 Core product lists are used for the five types of products for which prices are collected: consumer goods and services, housing, government services, equipment goods and construction. The Global Office prepares a core product list for each. RCAs prepare regional product lists for consumer goods and services only; they do not compile regional product lists for housing, government services, equipment and construction. For these four types of products, the Global Office's core product lists are adopted, after modifications for regional circumstances, as regional product lists. The CIS region is an exception to this. It compiles its own regional product lists for housing, government and capital goods to which it adds core products from the Global Office's core product lists as necessary. The same procedure is followed by Eurostat and the OECD.

VII.8 For consumer goods and services, RCAs add to their regional product lists a subset of core products that they, in consultation with the region's NSIs, have selected from the Global Office's core product list. Global Office guidelines for the selection require RCAs to ensure that there are sufficient core products for each basic heading so that each country in their region can price at least one core product per basic heading and that more than one country can price each core product in a basic heading. In principle, this is not an unrealistic objective as the global core list contains around 600 products, an average of just over five products per basic heading. For their part, NSIs are expected to price one core product and three regional products per basic heading as a minimum.

VII.9 The prices of core products are used in the calculation of regional PPPs as well as in the calculation of global PPPs. RCAs and NSIs are responsible for the intra-regional validation of the prices of core products as well as the prices of regional products. RCAs are expected to provide the Global Office with validated quarterly and annual national average prices for all the core products priced in their region, in addition to basic heading regional PPPs, in order to calculate the links between regional comparisons needed for the global comparison. Eurostat and the OECD are also expected to comply with this requirement, except for the provision of quarterly average prices.

VII.4 Classification of expenditures

VII.10 The classification of GDP expenditures used for the ICP is an abridged version of the classification used for the Eurostat-OECD PPP Programme. It is therefore in line with the definitions, concepts, classifications and accounting rules of the SNA 93[5] and the ESA 95[6]. The Eurostat-OECD version of the classification has 206 basic headings, the ICP version has 152. The 206 basic headings sum to the 152 exactly. One of the two main differences between the two versions concerns individual consumption expenditure by households for which Eurostat and the OECD have 143 basic headings and the ICP has 110. The other concerns machinery and equipment under gross fixed capital formation for which the Eurostat and OECD have twenty basic headings and the ICP has eight.

VII.5 Data collection

VII.5.1 Consumer goods and services

VII.11 The NSIs of countries participating in an ICP regional comparison are expected to collect prices for consumer goods and services from a sample of outlets suitably stratified to provide national average prices. Both rural and urban locations should be covered and the types of outlets selected should reflect the purchasing habits of the population. Price collection, which covers the whole basket of consumer products, should be quarterly with a view to providing annual national average prices.[7] Quarterly price collection requires quarterly intra-country validation and inter-country validation and adds a new dimension – changes over time – to the validation process.

VII.12 Countries participating in Eurostat and OECD comparisons price the basket of consumer goods and services over three years following the rolling survey approach and not every quarter as do ICP countries. Eurostat countries report individual price observations. The price observations are point-in-time prices usually collected in the capital city. Eurostat averages the price observations and converts the average prices obtained to national annual average prices with spatial and temporal adjustment factors provided by countries. OECD countries report national average prices. These too are point-in-time prices. The OECD converts them to annual averages with temporal adjustment factors supplied by countries.

VII.5.2 Housing

VII.13 There are two Global Office questionnaires for housing: one for the direct calculation of PPPs by the price approach, the other for the direct calculation of volumes by the quantity approach. The questionnaire for the price approach is for countries that have representative and nationwide rent markets and estimate imputed rents in their national accounts by the stratification method. The 2011 questionnaire lists 64 dwellings specified by type, size, facilities, age and location. RCAs are expected to prune the list to suit their region. NSIs completing the questionnaire are required to report the annual rent - both actual and imputed - for each dwelling on the regional questionnaire, preferably by location. In the first instance, existing data sources should be mined before mounting a rent survey especially for the ICP.

VII.14 The questionnaire for the quantity approach is for all countries, especially those that have unrepresentative and localised rent markets and are unable to estimate imputed rents by the stratification approach. It is designed to collect quantitative and qualitative data on the housing stock. Dwellings are specified by type of dwelling, type of construction and location. For each specification NSIs are asked to report the total number of dwellings, rooms, occupants and usable surface area as

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5 *System of National Accounts 1993*, Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 1993.

6 European System of Accounts 1995, Eurostat, Luxembourg, 1996.

7 For each product priced, at least three price observations are required from each location where the product is available for each quarter.

well as the total land area occupied by the dwellings specified. Also to be reported for each specification are the number of dwellings with different types of facilities. Data should be for the latest year available.

VII.15 The ICP methodology is close to that of Eurostat and the OECD. The two differ in the characteristics included in a specification. For example, Eurostat and the OECD specify size by number of rooms (or bedrooms) and not by area as they did formerly. Also they no longer specify the age of the structure. Both the price approach questionnaire and the quantity approach questionnaire used by Eurostat and the OECD are simpler than those of the Global Office, but the countries covered by the ICP are much more heterogeneous than those participating in the Eurostat-OECD PPP Programme.

VII.5.3 Government services

VII.16 The government services covered specifically by the ICP and the Eurostat-OECD PPP Programme are health, education and collective services. Health and education services are either purchased from market producers or obtained free or at prices that are not economically significant from government as a non-market producer. Collective services are not purchased, they are non-market services provided free to the community as a whole by government. For health and education services purchased from market producers, the ICP applies the output-price approach. For health and education services provided by non-market producers, the ICP applies the input-price approach. The input-price approach is also used by the ICP for collective services. Eurostat and OECD employ the same approaches as the ICP for health and collective services, but not for education. For education it uses an output method – that is, a quantity method with quality adjustments – that makes no distinction between market and non-market and provides volume measures directly. The method is explained in detail in Chapter 8.

V.17 For the output-price approach, the Global Office has compiled lists of core products for health and education. NSIs are expected to collect the prices paid to market producers for the core products. The prices should be the total prices when two independent buyers are involved in the purchase as can sometimes be the case with medical goods and services. Prices for health products should be collected quarterly throughout the reference year. Prices for education should be collected in the first quarter following the reference year.

V.18 For the input-price approach, the Global Office has prepared a questionnaire to collect the compensation that government pays to its employees engaged in non-market production of health, education and collective services. The 2011 questionnaire specifies 44 occupations: 18 in health, 16 in education and 31 in collective services including defence (some occupations are common to all three services). Compensation of employees is defined in line with the SNA 93 and ESA 95 and the basis of its derivation are government wage and salary scales. NSIs are required to report the compensation paid to employees at four career levels: when starting and after five, ten and 20 years of service. The Global Office recommends making productivity adjustments when the input price approach is used. Eurostat and the OECD do not make productivity adjustments. Productivity adjustments for government will be made for all countries when estimating inter-regional linking factors for the global comparison.

V.19 The list of health products used for the Eurostat-OECD PPP Programme is similar to the global core list but more extensive. For example, the global list specifies 43 pharmaceutical products, while the Eurostat-OECD list specifies over 150 (of which a minimum of 50 have to be priced). Conversely, the questionnaire for the survey of compensation of government employees used by Eurostat and OECD is shorter than the ICP questionnaire. It covers only 26 occupations: nine in heath and 17 in collective services other than defence. Seventeen of the occupations are common to both questionnaires. The compensation of employees to be reported for an occupation is the average extracted from government payroll statistics. No account is taken of career levels.

VII.5.4 Equipment goods

V.20 The methodology followed by the ICP is the same as that followed by the Eurostat-OECD PPP Programme. The core list for the 2011 round compiled by the Global Office consists of 77 products and 177 item specifications – a rough average of over two item specifications per product.[8] Of the 177 items specifications, 125 are brand and model specific and 52 are generic. For brand and model specifications, NSIs are expected to price the brand and model specified. For generic specifications, NSIs are expected to price the product with technical characteristics that best match the technical characteristics specified. All items priced should be new, second hand items are not to be priced. The prices reported should be mid-year national prices and should include trade margins, transport costs, assembly and installation costs, discounts and non-deductible taxes[9].

VII.5.5 Construction

VII.21 The ICP and the Eurostat-OECD PPP Programme employ different methods for construction. Both start with the same three basic headings: residential buildings, non-residential buildings and civil engineering work. Both have the same objective: to calculate PPPs for each basic heading and to aggregate the basic heading PPPs to obtain overall PPPs for construction. And both use the same weights to aggregate basic heading PPPs: the expenditure weights from the national accounts. The point of departure is the calculation of PPPs for the basic headings.

VII.22 The ICP uses input prices or, more precisely, the unit prices that the contractor pays for materials, equipment hire and labour. For each basic heading, the Global Office has compiled a list of the materials to be purchased, the equipment to be hired and the labour to be employed. NSIs are required to provide a unit price for each type of material, equipment and labour specified for the basic heading. In addition to unit prices, the NSIs are expected to provide the resource mix for each basic heading - in other words, the percentage shares of materials, equipment and labour in the total costs for the type of structure covered by the basic heading. NSIs are also expected to provide for each basic heading contractor's mark-ups for general and preliminary expenses, overhead costs and profit as well as the overall percentage addition for architect and engineering services. The unit prices are used to calculate unweighted PPPs separately for materials, equipment and labour for each basic heading. These PPPs are then combined using resource mix percentages as weights to provide overall PPPs for each basic heading. The approach does not take into account differences in productivity or the quality of output between countries. The Global Office is considering an adjustment based on total factor productivity levels.

VII.23 The Eurostat-OECD PPP Programme uses output prices. Participating countries price seven construction projects (three residential buildings, two non-residential buildings and two civil engineering works). The construction projects are defined in bills of quantities that specify the elementary components for which unit prices are to be reported. For each elementary component a quantity is given which, when multiplied by the unit price, gives the total price for the component. By summing the total prices of the elementary components, an overall price for the project is obtained. PPPs for basic headings are calculated with the overall prices of their projects. Elementary components are composite products combining materials, equipment and labour. Besides covering the cost of these items, the unit price of a component also includes a share of the contractor's general and preliminary expenses, overhead costs and profit. The unit prices thus are output prices and, when multiplied by their quantities and summed, give an overall output price for the project (after it has been adjusted for architect and engineering fees). Considerable time is spent during validation to ensuring that countries have interpreted the elementary components the same way and have priced them to a constant quality. The unit prices are based on tender prices which are bids for work to be undertaken in the future. As such they are price forecasts and are influenced by the nature and duration of the project as well as by the tendering practices in different countries. The approach is also expensive requiring the hiring of construction experts to do the pricing.

[8] The 2011 Eurostat-OECD product list for equipment goods contains 233 products and 549 item specifications. Participating countries are required to select 90 products and price 150 items as a minimum.

[9] Countries participating in Eurostat comparisons report prices net of non-deductible taxes. Data on non deductible taxes are reported later as part of a separate exercise. Countries participating in OECD comparisons report prices with non-deductible taxes included.

VII.24 In order to be able to link the construction PPPs from Eurostat and OECD to those of the ICP, a number of countries that participate in the Eurostat-OECD PPP Programme have agreed to also report the prices needed for the ICP method.

VII.6 Calculation of PPPs at regional level

VII.25 The calculation of the global PPPs is a two-step process, following the regional organisation of the ICP. Each region is responsible for the calculation and dissemination of its own PPPs. The PPPs from all regions are then combined into a global comparison by means of the core products described above. In doing so, the PPPs as calculated by each region are *fixed*, that means that the PPPs between countries within a region do not change when they are combined in the global comparison. The principle is the same as the fixity principle applied to the PPPs of the 27 EU Member States when they are combined with the PPPs of non-member countries.

VII.26 In this section, the calculation methods at regional level are described. The next section describes how the regional PPPs are combined into a global comparison.

VII.6.1 Basic heading PPPs: CPD method

VII.27 The ICP recommends to their regions the use of the *Country Dummy Product* (CPD) *method* for the calculation of the basic heading PPPs; the Eurostat-OECD PPP Programme uses the *Èltetö-Köves-Szulc* (EKS) *method*. The EKS method is described in Chapter 12 and Annex V. The CPD method is described below.

VII.28 The CPD is the multilateral method applied by the ICP to obtain transitive PPPs at the basic heading level through regression analysis.[10] The method treats the calculation of PPPs as a matter of statistical inference, an estimation problem rather than an index number problem. Its underlying hypothesis is that, apart from random disturbance, the pattern of relative prices of the different products within a given basic heading is the same in all countries. In other words, it is assumed that there is a common set of prices for the countries being compared. It is also assumed that each country has its own overall average price level for the basic heading and it is this price level which fixes the levels of absolute prices of the products in the basic heading for the country. By treating the prices observed in the countries for the basic heading as random samples, the PPPs between any country and the common pattern of relative prices can be estimated using classical least square methods.

VII.29 More specifically, the CPD is a statistical tool that can be used to derive the PPPs for a particular basic heading by regressing the logarithm of observed prices against a set of dummy variables that are defined with respect to the products priced and the participating countries. The procedure involves the model:

$$\ln p_{ij} = \eta_1 D_{1j} + \eta_2 D_{2j} + \ldots + \eta_m D_{mj} + \pi_1 D^*_{i1} + \pi_2 D^*_{i2} + \ldots + \pi_n D^*_{in} + u_{ij} \quad (1)$$

p_{ij} is the price of the ith product in country j. D_{ij} and D^*_{ij} (i = 1, 2, …, m; j = 1, 2, …, n) are, respectively, dummy variables for the m products in the basic heading and the n countries involved in the comparison. D_{ij} equals 1 if the price observation p_{ij} concerns the ith product, otherwise D_{ij} equals zero. D^*_{ij} equals 1 if the price observation p_{ij} belongs to country j, otherwise D^*_{ij} equals 0. Once this regression equation is estimated, the PPP for currency of country k with country j as base can be obtained by the exponential of the difference in the estimates of π_j and π_k taken from the regression equation: $PPP_{k/j} = exp\ (\pi_k - \pi_j)$

[10] The CPD method was proposed by Robert Summers in "International price comparisons based upon incomplete data", *The Review of Income and Wealth*, Vol. 19, March 1973.

VII.30 The CPD has been criticised because it does not follow the traditional index number approach to calculating PPPs and so does not address the index number problems involved.[11] The method is also criticised because the underlying assumption - that the pattern of relative prices within a basic heading is the same in all countries irrespective of whether or not the product is representative: in other words, all products are equally important in all countries - is unrealistic. But the CPD can be modified to take account of representativity. A general factor of representativity of products (γ) can be included directly in the original CPD formula (1) as an additional dummy variable.[12]

$$\ln p_{ij} = \eta_1 D_{1j} + \eta_2 D_{2j} + \ldots + \eta_m D_{mj} + \\ + \pi_1 D^*_{i1} + \pi_2 D^*_{i2} + \ldots + \pi_n D^*_{in} + \gamma D_{\mathrm{ij}} + u_{ij} \qquad (2)$$

This is the called the *Country Product Representativity Dummy* (CPRD) *method*.[13] Another approach is to use a weighted CPD in which representative products receive a higher weight in the regression than non-representative products. For example, representative products could have the weight of 2 or 3 and unrepresentative products a weight of 1. The choice of weights is arbitrary as it is with the EKS. However, the weights of 1 for a representative product and 0 for an unrepresentative product used in the EKS cannot be used in a weighted CDP because the assignment of 0 to prices of unrepresentative products will remove them from the calculation.

VII.6.2 CPD and EKS approaches compared

VII.31 Both the EKS and the CPD provide PPPs that satisfy the properties of commensurability, invariance, transitivity and characteristicity. Both the EKS and the CPD (through its variants) take account of the representativity of the products priced for a comparison.

VII.32 The EKS views the calculation of PPPs as an index number problem.[14] It starts with a binary approach and subsequently moves to a multilateral approach. The object is to maximise consistency between multilateral and binary PPPs – that is, to obtain multilateral transitive PPPs for the basic heading which are as close as possible to the binary intransitive PPPs initially calculated for the basic heading. The maximisation refers to general consistency – that is, consistency for the whole set of participating countries rather than for individual pairs of countries. Additionally, because of its binary approach, the EKS can be data demanding because in theory direct binary PPPs based on bilateral product lists are required between each pair of participating countries. In practice, there may be an imbalance in the matching of representative products priced between a single pair of countries making it impossible to estimate the Fisher type PPP directly. And, as a consequence, price data will be ignored when the missing Fisher type PPPs are estimated indirectly.[15]

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11 In *Multilateral Measurement of Purchasing Power and Real GDP* (Eurostat, 1982), Peter Hill asks "whether or not it is legitimate to by-pass index number problems in this way by falling back on the somewhat unfashionable concept of price level, even at the very detailed level of disaggregation of a basic heading" though he concedes that "there is much more justification for associating specific price levels with countries when dealing with individual basic headings containing small numbers of fairly homogeneous items" than "at a much higher levels of aggregation with larger and more heterogeneous groups of goods and services whose relative prices have much greater scope for variation from country to country".

12 The inclusion of a variable for representativity in the CPD was first suggested by J. Cuthbert and M. Cuthbert, in "On aggregation methods of purchasing power parities", *OECD Department of Economics and Statistics Working papers*, No. 56, November 1988, http://www.oecd.org/dataoecd/15/26/2002058.pdf

13 As proposed by P. Hill in "The estimation of PPPs for basic headings within regions", Chapter 11, *ICP Handbook,* http://siteresources.worldbank.org/ICPINT/Resources/270056-1183395201801/icp_Ch11rev.doc.

14 It can also be formulated as a stochastic method such as the CPD. See footnote 3 for reference.

15 This is not the only example of price data being ignored. As explained in Chapter 12, when calculating the Laspeyres and Paasche type PPPs between a pair of countries, Eurostat and the OECD assign weights of 1 and 0 to representative and unrepresentative products respectively. As a consequence, no account is taken of the prices of products that are unrepresentative of both countries and which both have priced.

VII.33 The CPD considers the calculation of PPPs to be a question of statistical inference.[16] It has a multilateral approach from the beginning. The aim is to calculate transitive PPPs for the basic heading with maximum use of the price data collected for the basic heading. The CPD produces PPPs that are immediately transitive. In this respect, it is considered to be more transparent than the EKS. The method also allows sampling errors to be estimated for the PPPs. However, the sampling errors depend on how equations (5) and (6) are specified and their use in practice is limited.

VII.34 Neither method is thought to be absolutely better than the other. When all products are priced in all countries and representativity is not taken into account, the CPD and the EKS produce identical basic heading PPPs because both methods lead to simple geometric means in these circumstances. Experimental applications of the EKS, EKS-S, CPD and CPRD methods with actual data suggest that in practice the differences in results are usually not significant. In fact, calculating PPPs according to different methods is a useful way of verifying the input data: if large differences in the results of different methods exist this may point at potential issues with either the prices or the representativity indicators.

VII.6.3 Aggregation of basic heading PPPs

VII.35 With one exception, the ICP aggregates basic heading PPPs with the EKS method. The exception is the regional comparison for Africa for which basic heading PPPs are aggregated with the Iklé method. As explained in Annex VIII, the Iklé method provides real expenditures that are additive and close to EKS real expenditures which are not additive. As an additive method, Iklé real expenditures are not free of the Gerschenkron effect, but, as their closeness to EKS real expenditures demonstrates, the effect is less pronounced than it is with other additive methods such as the Geary-Khamis method. The Eurostat-OECD PPP Programme aggregates basic heading PPPs with the EKS method, as described in Chapter 12 and Annex V.

VII.7 Calculation of PPPs at global level

VII.36 The basic heading PPPs for the five ICP regions and the Eurostat-OECD PPP programme are combined as follows:

- The starting point is the 2011 average prices for the global core list products for all countries, with their corresponding representativity[17] indicators, and the matrices of basic heading PPPs and expenditures for all regions.
- All global core list product prices of countries are converted into a regional numéraire by dividing them by the regional PPP for the corresponding basic heading.
- For each basic heading, a CPD-type regression is carried out in which a dummy variable is included for each region instead of each country.
- The coefficients of the regional dummy variables for each basic heading are the *regional linking factors*. They provide estimates of the relative price levels of the regions as a whole and are used to link the PPPs for the six regions.

The result is a matrix of basic heading PPPs for all countries in the global comparison. Moreover, the method ensures that the regional basic heading PPPs are fixed when combined in the global comparison. There are different ways of taking the representativity on board. Either a version of the CPRD method described above in which dummies are included for representativity could be used or

[16] It can also be formulated as an index number method. In Annex 2 of the paper cited below Sergey Sergeev points out that the economics of the regression equation are not obvious making the CPD appear as a stochastic exercise. He also points out that the stochastic assumptions for the regression procedure are not realistic in practice when the number of products priced per basic heading is small. This leads him to propose an alternative formulation of the CPD method that makes possible its presentation as an index number method. *Equi-representativity and Some Modifications of the EKS Method at the Basic Heading Level* at the Joint Consultation on the ECP, ECE, Geneva, 2003. http://www.unece.org/fileadmin/DAM/stats/documents/2003/03/ecp/wp.8.e.pdf

[17] Called *importance* in ICP.

a version of the weighted CPD in which representative products receive a higher weight in the regression could be applied. The weighted CPD has been recommended by the Global Office for ICP 2011.

VII.37 To aggregate these PPPs to higher levels, the *Country Approach with Redistribution* (CAR) *procedure* is followed:

- The EKS method is applied to aggregate the basic heading PPPs for all countries to any defined aggregate (such as individual consumption expenditure by households or GDP).
- For each region, the share in the global volume (real expenditures) of the aggregate is calculated.
- The volume share of each region in the global calculation is broken down by country on the basis of the volume shares calculated in each regional comparison and indirect PPPs are calculated. This way, all intra-regional aggregated results remain fixed.

ANNEX VIII. A COMPARISON OF DIFFERENT AGGREGATION METHODS

VIII.1 Of the many methods that have been developed to calculate and aggregate basic heading PPPs[1], the manual focuses on those that are relevant to the Eurostat-OECD PPP Programme. Chapter 12 and Annex V explain the calculation and aggregation methods used for Eurostat and OECD comparisons and Annex VII summarises the methods used by the International Comparison Programme. Annex VII also compares the methods employed by the two Programmes to calculate basic heading PPPs. This annex considers aggregation methods that have been employed either for a Eurostat or an OECD comparison or for an ICP comparison.

VIII.2 There are four methods meeting this criterion:

- **Èltetö-Köves-Szulc (EKS) method**[2]: used in all Eurostat and OECD comparisons since 1990 and in the ICP global comparison and in all but one of the ICP regional comparisons for 2005.
- **Geary-Khamis (GK) method**[3]: used in Eurostat and OECD comparisons for 1980 and 1985 and in all ICP comparisons from 1970 to 1993.
- **Gerardi Unit-Country-Weight (Gerardi) method**[4]: used in the 1975 Eurostat comparison of EU Member States.
- **Iklé method**[5]: used in the 2005 ICP regional comparison for Africa.

All four methods provide multilateral PPPs that have the properties listed in Chapter 12, Section 12.2.1: commensurability, base country invariance, transitivity and characteristicity (although the degree to which characteristicity is met depends on the homogeneity of the price structures of the countries being compared).

VIII.3 The EKS method is different from the other three methods in that unlike them it is not an additive aggregation method[6]. EKS multilateral PPPs are obtained by first calculating binary PPPs between each pair of participating countries and then averaging them. They provide non-additive real expenditures that are free of the Gerschenkron effect which is seen as one of the principal advantages of the method. Because the real expenditures are not additive, PPPs have to be calculated for each level of aggregation. Moreover, EKS price indices and volume indices do not satisfy the average test. Nor are the PPPs and real expenditures suitable for comparing price and volume structures across countries. EKS PPPs and real expenditures are considered to be best suited to inter-country comparisons of the price and volume levels of individual aggregates.

VIII.4 The GK method, the Gerardi method and the Iklé method are additive aggregation methods.[7] Basic heading real expenditures are obtained using a vector of average international prices to value

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1 See footnote 1 of Chapter 12 for references.

2 "On a problem of index number computation relating to international comparisons", O. Èltetö and P. Köves, *Statisztikai Szemle*, No. 42, 1964; and "Indices for multiregional comparisons", B. Szulc, Przeglad Statystyczny 3, 1964. Referred to as the GEKS method in recent literature because the formula was first proposed by Gini in "On the circular test of index numbers", *International Review of Statistics*, Vol. 9, No. 2, 1931.

3 The GK method was proposed by R. C. Geary in "A note on the comparison of exchange rates and the purchasing power between countries", *Journal of the Royal Statistical Society*, Series A, Vol. 121, 1958. Practical application was developed by S. H. Khamis in: "Properties and conditions for the existence of a new type of index numbers", *Sankhya*, Series , Vol. 2, 1970; "A new system of index numbers for national and international purposes", *Journal of the Royal Statistical Society*, Series A, Vol. 135, 1972; and "On aggregation methods for international comparisons", *The Review of Income and Wealth*, Vol. 30, 1984. See also Annex VI, Box VI.2.

4 "Selected problems of inter-country comparisons on the basis of the experience of the EEC", D. Gerardi, *The Review of Income and Wealth*, Vol. 28, 1982.

5 "A new approach to the index number problem", D.M. Iklé, *Quarterly Journal of Economics*, Vol. 86, 1972.

6 An aggregation method is additive if, for each country being compared, it provides real expenditures for basic headings that sum to the real expenditures of the aggregates of which they are components.

7 Additive methods generally require the simultaneous calculation of international prices and global PPPs. Prices and PPPs are defined by a system of interrelated equations expressing international prices as a function of the global PPPs. Both the GK method and the Iklé method are defined in this way, the Gerardi method is not. The GK and Iklé methods obtain the vector of international prices by averaging national prices across participating countries after they have been converted to a

a matrix of basic heading national expenditures at a uniform price level. The basic heading real expenditures are additive, they can be summed to provide real expenditures and PPPs for each level of aggregation up to GDP. The real expenditures are not free from the Gerschenkron effect, though the severity of the effect varies with the method. The presence of the Gerschenkron effect is seen as a major weakness of additive methods and their PPPs and real expenditures are considered to be second best to those of the EKS method when comparing the price and volume levels of individual aggregates across countries. The volume indices of additive aggregation methods satisfy the average test. Additivity is required when analysing the price and volume structures of different countries.

VIII.5 To compare the four methods, volume indices for GDP per capita have been calculated for the 37 countries covered by the Eurostat comparison for 2010. The calculations were made with fixity and the indices that resulted are shown ranked in descending order in Box VIII.1. For most countries, there are no significant differences between the four sets of indices. This is to be expected since they refer to GDP rather than to its component expenditures. Differences are likely to be more pronounced at lower levels of aggregation.

VIII.6 The Gerardi indices and the Iklé indices are similar to each other and both are closer to the EKS indices than the GK indices. The differences tend to be larger for countries at the top or bottom of the table, giving evidence of the Gerschenkron effect. The Gerschenkron effect is applicable only to aggregation methods that use either a reference price structure to obtain volumes or a reference volume structure to obtain PPPs. For methods, such as the GK, Gerardi and Iklé, that employ a reference price structure, a country's share of total GDP - that is, the total for the group of countries being compared - will rise as the reference price structure becomes less characteristic of its own price structure. In other words, its GDP per capita will increase relative to the GDP per capita of countries with price structures close to the reference price structure.

VIII.7 The Gerschenkron effect is expected to narrow the gap between high income countries and low income countries. This happens when the economies of the high income countries are large relative to those of other countries in the comparison. Countries with large economies will have greater weight when prices are averaged across countries to derive the reference price structure. As a result, the reference price structure will be more characteristic of their price structures than of the price structures of countries with small economies and less weight.

VIII.8 The data in Box VIII.1 show that low income countries have higher volume indices in the three additive methods than in the EKS. For the high income countries the opposite would have been expected, but this is not the case of Luxembourg, Norway and Switzerland. This is due to the specific economic structures of these three countries, which are quite different from those of other European countries, and to their economies being relatively small and having a low weight.

common currency with global PPPs and weighted. The GK method uses quantity shares as weights. The Iklé method uses expenditure shares as weights. In addition, GK international prices are arithmetic means while Iklé international prices are harmonic means. The Iklé method is designed to prevent prices in countries with large expenditures dominating the average prices. With the Gerardi method International prices are calculated as the geometric mean of the national prices of participating countries expressed in national currencies. When a geometric mean is used, the pattern of relative average prices is the same whether or not the national prices are converted into a common currency. It avoids the problem of calculating PPPs with which to convert national prices to a common currency before averaging them.

Box VIII.1: Per capita volume indices for GDP for the 37 countries participating in the 2010 Eurostat comparison calculated with fixity by four different aggregation methods (EU27=100)

Countries	Per capita volume indices			Percentage difference with the EKS			
	EKS	Geary Khamis	Gerardi	Iklé	Geary Khamis	Gerardi	Iklé
Luxembourg	272	286	302	290	5.1	11.3	6.9
Norway	181	188	196	195	3.7	8.3	7.6
Switzerland	147	151	158	157	2.4	7.5	6.9
Netherlands	133	132	133	132	-1.1	0.2	-0.4
Ireland	128	127	130	127	-0.7	1.9	-0.5
Denmark	127	127	128	127	-0.2	1.0	0.3
Austria	126	125	127	126	-0.7	0.8	0.2
Sweden	123	123	125	124	0.0	1.4	0.9
Belgium	119	118	119	119	-0.4	0.2	0.1
Germany	118	116	118	118	-1.3	0.4	0.0
Finland	115	115	114	115	-0.6	-1.0	-0.5
United Kingdom	112	111	112	112	-0.7	-0.2	0.3
Iceland	111	112	113	114	0.4	1.7	2.1
France	108	107	107	107	-0.9	-1.0	-0.6
Italy	101	100	101	101	-0.6	0.0	0.2
Spain	100	101	99	99	0.2	-1.1	-1.0
Cyprus	99	100	98	98	1.3	-1.1	-1.1
Greece	90	90	88	88	0.8	-2.1	-1.9
Slovenia	85	84	83	83	-1.2	-1.8	-2.2
Malta	83	86	83	82	3.4	-0.1	-1.4
Portugal	80	81	79	80	0.9	-0.9	-0.5
Czech Republic	80	80	78	78	-0.2	-1.6	-1.7
Slovakia	74	75	73	73	1.8	-0.7	-0.5
Hungary	65	66	65	64	2.5	-0.2	-0.8
Estonia	64	65	63	63	1.3	-1.3	-1.9
Poland	63	65	63	63	3.6	0.5	0.7
Croatia	61	62	59	59	1.7	-2.7	-3.2
Lithuania	58	59	57	57	2.9	-0.3	0.0
Latvia	51	54	51	51	4.4	0.2	0.1
Turkey	49	53	51	50	6.8	2.8	2.2
Romania	46	51	48	48	11.4	5.6	5.0
Bulgaria	44	50	47	47	14.1	7.8	6.6
Montenegro	41	49	44	44	17.9	7.2	6.0
FYR Macedonia	36	42	39	38	16.4	8.2	7.1
Serbia	35	40	37	37	14.5	6.0	5.6
Bosnia-Herzegovina	31	34	32	32	12.5	5.2	4.7
Albania	28	34	31	31	19.6	10.0	9.9
EU27	100	100	100	100			

Glossary

Accounting period	The period to which the estimates of GDP refer. Usually a calendar year or a quarter. For international price and volume comparisons of GDP the accounting period is generally a calendar year. See also *reference year*.
Actual collective consumption	The final consumption expenditure of general government on collective services. A measure of the services that general government provides to the community as a whole and which households consume collectively. Also referred to as *collective consumption expenditure*. See as well *collective services.*
AIC	*Actual individual consumption*. The total value of the individual consumption expenditures of households, NPISHs and general government. A measure of the individual goods and services that households actually consume as opposed to what they actually purchase. See also *individual services*.
Additivity	The values of the national accounts aggregates of countries participating in a comparison are equal to the sum of the values of their components when both aggregates and components are valued at current national price levels. Additivity requires this identity to be preserved when the values of the aggregates and their components are valued at international price levels. An aggregation method is additive if, for each country being compared, it provides real values for aggregates that are equal to sum of the real values of their constituent basic headings. An additive aggregation method provides volumes that satisfy the average test for volumes but are subject to the Gerschenkron effect. Also referred to as *matrix consistency*.
Aggregate	A set of transactions relating to a specified flow of goods and services in a given accounting period, such as the total purchases made by resident households on consumer goods and services or the total expenditure by government on collective services or the total value of gross fixed capital formation. The term is also used to mean the value of the specified set of transactions.
Aggregation	The computing of PPPs above the basic heading level. The process of weighting and averaging basic heading PPPs to obtain PPPs for each level of aggregation up to and including GDP.
Aggregation levels	The hierarchy of levels that make up the expenditure classification: basic headings, expenditure classes, expenditure groups, expenditure categories, main aggregates and GDP.
Analytical categories	GDP, the main aggregates, the expenditure categories, the expenditure groups and expenditure classes for which the results of a comparison are published.
Asterisk (*)	The indicator used in Eurostat and OECD comparisons to identify a representative product. See also *representativity indicators*.
Asterisk product	A representative product so called because, when reporting prices, countries participating in Eurostat and OECD comparisons assign

	asterisks (*) to identify which of the products they have priced are representative. See also *representativity indicators*.
Average test for PPPs	A test that requires the PPP for an aggregate to lie between the smallest and the largest of its component PPPs.
Average test for volumes	A test that requires the volume index for an aggregate to lie between the smallest and the largest of its component volume indices.
Balance of exports and imports	The f.o.b. value of exports of goods and services less the f.o.b. value of imports of goods and services. If no distinction between goods and services is required, it may be defined as the f.o.b. value of exports of goods and services less the c.i.f. value of imports of goods and services.
Base-country invariance	The property whereby the relativities between the PPPs, the price level indices and the volume indices of countries are not affected by either the choice of national currency as numéraire or the choice of reference country.
Basic heading	*The lowest level of aggregation of items in the GDP breakdown for which parities are calculated*. Article 3(e) PPP Regulation. This level of aggregation is generally determined by the lowest level of final expenditure for which explicit expenditure weights can be estimated. Hence, while in principle a basic heading would consist of a group of similar well-defined goods or services, in practice it can cover a broader range of products than is theoretically desirable. Basic headings are the building blocks of a comparison. It is at the level of the basic heading that expenditures are defined, products selected, prices collected, prices edited and PPPs first calculated and averaged.
Basic price	The amount received by the producer from the purchaser for a unit of good or service produced as output. It includes subsidies on products and other taxes on production. It excludes taxes on products, other subsidies on production, supplier's retail and wholesale margins and separately invoiced transport and insurance charges. Basic prices are the prices most relevant for decision-making by suppliers (producers).
Basket	A term often used for the common list of well-defined goods and services from which countries participating in a comparison make a selection of products to price for the purpose of compiling PPPs. Also referred to as *product list* and *item list*.
Bias	A systematic error in a PPP or volume index. Bias can arise for a number of reasons including failure to respect either representativity, comparability or consistency, the price collection and measurement procedures followed, and the calculation and aggregation formula employed.
Bilateral comparison	Also referred to as a *binary comparison*. See *direct binary comparison*.

Bilateral PPP	Also referred to as a *binary PPP*. See *direct binary PPP*.
Bill of quantities	The product specification that details the operations required to build a construction project. It covers the costs of inputs (labour, materials and plant), subcontracting, preliminaries and overheads. It also covers contractor's profit or loss, architect's and engineer's fees and non-deductible taxes. A bill of quantities is structured to provide a weighted price for each component specified which, when summed across components, provide the purchasers' price for the construction project described.
Binary comparison	Also referred to as a *bilateral comparison*. See *direct binary comparison*.
Binary PPP	Also referred to as a *bilateral PPP*. See *direct binary PPP*.
Brand and model specification	See *product specification*.
Brandless	The term in a product specification that indicates that the good specified is without a brand label or with a brand label that is meaningless to consumers. In other words, there is no brand value attached to the good.
Brand value	The importance that consumers attach to a brand name. Consumers often perceive products with certain brand names as preferable to similar products sold under other brand names. This is usually because some brands are considered to be of superior quality to others. Alternatively, it may have nothing to do with quality and is due to an image of uniqueness or desirability fostered by publicity, fashion or both. Whatever the reason, if consumers are prepared to pay more for a particular brand name than for another, this gives the brand name a brand value. A brand name with a brand value is a price determining characteristic and as such should be included in the product specification.
Bridge country	A country that provides the link or bridge between two or more separate comparisons involving different groups of countries. The bridge country participates in all comparisons and by doing so enables the countries in one comparison to be compared with the countries in the other comparisons and vice versa.
Change in inventories	The acquisition, less disposals, of stocks of raw materials, semi-finished goods and finished goods that are held by producer units prior to their being further processed or sold or otherwise used. Inventories also cover all raw materials and goods stored by government as strategic reserves. Semi-finished goods include work-in-progress - that is, goods and services that are only partially completed and whose production process will be continued by the same producer in a period following the accounting period. Work-in-progress is particularly important for production processes with long gestation periods, such as the construction of large-scale civil engineering works, the manufacture of aeroplanes and ships, and reforestation. Also covered by work-in-progress is the natural growth prior to harvest of agricultural crops and

	the natural growth in livestock raised for slaughter.
Characteristicity	A country's PPPs in a multilateral comparison are influenced by the data of all countries participating in the comparison. Characteristicity requires that the country's multilateral PPPs should reflect the essential features of the structure of its input data. Characteristicity in multilateral methods, such as the EKS, that are based on the averaging of the binary PPPs is the property that the resulting multilateral PPPs differ as little as possible from the original binary PPPs. Characteristicity in multilateral methods, such as the CPD or GK, that are based on average international prices is the property that the structure of the average international prices is close as possible to the price structure of the country. The extent to which characteristicity can be obtained depends on the degree of homogeneity among the price structures of the group of countries being compared.
Characteristics	The physical and economic attributes of a product that serve to identify it and enable it to be located under some heading of a product classification. The technical parameters and price determining properties of a product listed in a product specification.
C.i.f. price	*Cost, insurance and freight price*. The price of a good delivered at the customs frontier of the importing country or the price of a service delivered to a resident. It includes any insurance and freight charges incurred to that point. It excludes any import duties or other taxes on imports and trade and transport margins within the importing country.
Circularity	See *transitivity*.
COFOG	*Classification of the functions of government*. COFOG allows a range of transactions by general government - including outlays on final consumption expenditure, intermediate consumption, gross fixed capital formation and capital and current transfers – to be classified by function or purpose. A major use of COFOG is to identify which final consumption expenditures of general government benefit households individually and which benefit households collectively.
COICOP	*Classification of individual consumption according to purpose*. COICOP classifies the individual consumption expenditures of three institutional sectors - households, NPISHs and general government – by the ends that they wish to achieve through these expenditures. Individual consumption expenditures are those which are made for the benefit of individual households. All final consumption expenditures by households and NPISHs are defined as individual, but only the final consumption expenditures by general government on individual services are treated as individual.
Collective consumption expenditure	See *actual collective consumption*.
Collective services	Services provided by general government that benefit the community as a whole. Such services include general public services, defence, public order and safety, economic affairs, environment protection, and housing and community amenities. They also include the overall policy-making,

	planning, budgetary, co-ordinating responsibilities of government ministries overseeing individual services and government research and development for individual services. These activities cannot be identified with specific individual households and are considered to benefit households collectively.
Commensurability	The property that requires the results of a comparison to be invariant to changes in units of measurement for prices and quantities.
Commodity	See *product*.
Comparative price level index	See *PLI* or *price level index*.
Comparability	The requirement that countries price products that are identical or, if not identical, equivalent. Products are said to be comparable if they have identical or equivalent physical and economic characteristics – that is, if they have the same or similar technical parameters and price determining properties. In this context, equivalence or similarity between products is defined as meeting the same needs with equal efficiency so that purchasers are indifferent between them and are not prepared to pay more for one than for the other. The pricing of comparable products ensures that the differences in prices between countries for a product reflect pure price differences and are not affected by differences in quality. If the requirement is not respected, differences in quality will be mistaken for price differences leading to an underestimation or overestimation of price levels and a corresponding overestimation and underestimation of volume levels.
Comparison	One of two terms used in the manual as a contraction of *international price and volume comparison of GDP*. The other term is *international comparison*.
Comparison resistant	A term first used to describe non-market services which are difficult to compare across countries because: they have no economically-significant prices with which to value outputs, their units of output cannot be otherwise defined and measured, the institutional arrangements for their provision and the conditions of payment differ from country to country, and their quality varies between countries but the differences cannot be identified and quantified. Increasingly, the term is being used to describe construction and market services such as telecommunications whose complexity, variation and country specificity make it difficult for them to be price comparably across countries.
Compensation of employees	All payments in cash and in kind made by employers to employees in return for work done by them during the accounting period. These payments comprise: gross wages and salaries in cash and in kind, employers' actual social contributions, and imputed social contributions.
Component	A subset of goods and/or services that make up some defined aggregate.

Consistency	The requirement that the prices collected by countries for an international price and volume comparison of GDP are consistent with the prices underlying their estimates of the expenditure components of GDP. In most cases this means that they should be national annual purchasers' prices. As the basis of a comparison is the identity *expenditure = price x volume* and volumes are obtained by dividing expenditures by prices, using prices that do not correspond to those used to derive the expenditures will result in the volumes being either underestimated or overestimated.
Consumption of fixed capital	The reduction in the value of the fixed assets used in production during the accounting period resulting from physical deterioration, normal obsolescence or normal accidental damage.
COPNI	*Classification of the purposes of non-profit institutions serving households*. COPNI allows outlays by NPISHs, including outlays on final consumption expenditure, to be classified by function or purpose. By convention, all final consumption expenditures of NPISHs are treated as individual consumption. A major use of COPNI is to ensure that the individual consumption expenditures of NPISHs are classified consistently with those of households and general government.
CPA	*The standard classification of products by activity within the European Economic Community*. CPA classifies products by their physical characteristics as goods or by their intrinsic nature as services and by originating activity. Originating activities are those defined by NACE.
CPD method	*Country-product-dummy method*. The multilateral method used by the ICP to obtain transitive PPPs at the basic heading level through regression analysis. It treats the calculation of PPPs as a matter of statistical inference, an estimation problem rather than an index number problem. The underlying hypothesis is that, apart from random disturbance, the PPPs for individual products within a basic heading are all constant between any given pair of countries. In other words, it is assumed that the pattern of relative prices of the different products within a given basic heading is the same in all countries. It is also assumed that each country has its own overall price level for the basic heading and it is that which fixes the levels of absolute prices of the products in the basic heading for the country. By treating the prices observed in the countries for the basic heading as random samples, the PPPs between each pair of countries and the common pattern of relative prices can be estimated using classical least square methods. The method allows sampling errors to be estimated for the PPPs. See also *CPRD method* and *weighted CPD method*.
CPI	*Consumer price index*. A monthly or quarterly price index compiled and published by an official statistical agency that measures the changes in the prices of consumption goods and services acquired or used by households. Its exact definition may vary from country to country. In Eurostat and OECD comparisons, CPI sub-indices are used as *temporal adjustment factors* to adjust the average survey prices collected for consumer products to annual average prices. They are also used in to extrapolate basic heading PPPs for a survey year to non-survey years as required by the *rolling survey approach*.

CPRD method	*Country-product-representativity-dummy method*. A variant of the CPD method which has an additional dummy variable to denote whether or not the product is representative. The assumption is that the ratio of price levels for representative and non-representative products is the same for all products within a basic heading. In theory the ratio should be less than one because unrepresentative products are expected to be more expensive than representative products.
Core product	See *overlap product*.
Deductible VAT	The value added tax payable on purchases of goods and services intended for intermediate consumption, gross fixed capital formation or for resale which producers are permitted to deduct from their own VAT liability to the government in respect of VAT invoiced to their customers. See also *VAT* and *non-deductible VAT*.
Deflation	The division of the current value of an aggregate by a price index - described as a *deflator* - in order to value its volumes at the prices of the price reference-period.
Direct binary comparison	A price or volume comparison between two countries that draws upon data only for those two countries. See also *indirect binary comparison*.
Direct binary PPP	A PPP between two countries calculated using only the prices and weights for those two countries. See also *indirect binary comparison.*
Direct price comparison	A price comparison between two or more countries that is made by comparing the prices for a representative sample of comparable products. PPPs are generally derived from direct price comparisons. Also referred to as the *price approach*.
Direct volume comparison	A volume comparison between two or more countries that is made by comparing the volumes of a representative sample of comparable products. Volume comparisons are not usually made directly, but indirectly as described under *indirect volume comparison*. Also referred to as the *quantity approach*.
Discount	A deduction from the list or offer price of a good or a service that is available to specific customers under specific conditions. Examples include cash discounts, prompt payment discounts, quantity discounts, trade discounts and advertising discounts.
Durable good	A good that can be used repeatedly or continuously over a period of considerably more than one year and has a substantially higher purchasers' price than semi-durable goods and non-durable goods. See also *semi-durable good* and *non-durable good*.
Economically significant price	A price that has a significant influence on the amounts producers are willing to supply and on the amounts purchasers wish to buy. This is the basic price for producers and the purchasers' price for purchasers.

Economic territory	The geographical territory of a country plus any territorial enclaves in the rest of the world. By convention, it includes embassies, military bases and ships and aircraft abroad. The economic territory does not include extra-territorial enclaves – that is, the parts of the country's own geographical territory used by general government agencies of other countries or by international organisations under international treaties or agreements between states.
Economic welfare	See *material well-being.* Also referred to as *economic well-being.*
ECP	*European comparison programme*. The ICP regional programme for Europe that was carried out under the auspices of the United Nations Economic Commission for Europe. It was organised by Eurostat, the OECD, Statistics Austria, the Interstate Statistical Committee of the Commonwealth of Independent States and the State Committee of the Russian Federation on Statistics. Although the ECP formally ceased to exist after 1996, the term is still in use as shorthand for the Eurostat PPP Programme.
Editing	The first step of validation: scrutinizing data reported for errors. The process of checking survey prices for non-sampling errors by identifying those prices that have extreme values – that is, prices whose value is determined to be either too high or too low vis-à-vis the average according to given criteria. The price may score a value for a given test that exceeds a pre-determined critical value or its value may fall outside some pre-specified range of acceptable values. Both are standard ways of detecting errors in survey data and both are employed by Eurostat and the OECD. Prices with extreme values are not necessarily wrong. But the fact that their values are considered extreme suggests that they could be wrong. They are possible errors and, as such, they need to be investigated to establish whether or not they are actual errors.
EKS method	*Èltetö-Köves-Szulc method*. The method used by Eurostat and the OECD to calculate PPPs for basic headings and to aggregate basic heading PPPs to obtain PPPs for each level of aggregation up to and including GDP. Strictly speaking, the EKS is a procedure whereby any set of intransitive binary index numbers are made transitive while respecting characteristicity. The procedure is independent of the method used to calculate the intransitive binary indices. But in the manual, EKS covers both the way the intransitive binary PPPs are calculated and the procedure to make them transitive and multilateral. Basically, the method used to obtain the intransitive binary PPPs for a basic heading or aggregate involves calculating first a matrix of Laspeyres type PPPs, then a matrix of Paasche type PPPs and finally, by taking the geometric mean of the two, a matrix of Fisher type PPPs. The Fisher type PPPs are made transitive and multilateral by applying the EKS procedure which involves replacing the Fisher type PPP between each pair of countries by the geometric mean of itself squared and all the corresponding indirect Fisher type PPPs between the pair obtained using the other countries as bridges. The resulting EKS PPPs provide real expenditures that are not subject to the Gerschenkron effect but nor are they additive. Within the context of Eurostat and OECD comparisons, EKS results are considered to be better suited to comparisons across countries of the price and volume levels of individual aggregates. EKS results are the official results of Eurostat

	and OECD comparisons. See also *Laspeyres type PPP* and *Paasche type PPP* because their formulation depends on whether they are being used to calculate basic heading PPPs or to aggregate basic heading PPPs. Note that there are two versions of the EKS at the basic heading level: one that takes account of the representativity of the products priced and one that does not. Throughout the manual, unless stated otherwise, EKS refers to the version that takes the representativity of products into consideration. See also *GEKS method*.
EKS-S method	*Èltetö-Köves-Szulc-Sergeev method.* A variant of the EKS method for calculating PPPs for basic headings that, under certain circumstances, is better able to handle the asymmetry in the number of representative products priced by countries. With the EKS method, the Fisher type index is calculated as the geometric mean between two PPPs: the PPPs based on products representative in the first country and the PPPs based on products representative in the second country. Products representative in both countries are used for both PPPs. With the EKS-S method, the Fisher type index between two countries is calculated as the geometric mean of three PPPs: the PPPs based on products representative in both countries, the PPPs based on products representative in the first country but not the second, and the PPPs based on products representative in the second country but not the first. Symmetry is obtained by giving equal weight in the calculation to the two PPPs that are based on products representative of only one country.
Employers' actual social contributions	Payments actually made by employers to social security funds, insurance enterprises or autonomous pension funds for the benefit of their employees.
Equilibrium exchange rates	The underlying rates of exchange to which actual exchange rates are assumed to converge in the long term.
Equi-representativity	*The property required of the composition of the item list for a basic heading (such that) each Member State (or participating country) is able to price that number of representative items which is commensurate with the heterogeneity of products and price levels covered by the basic heading and its expenditure on the basic heading*. Article 3(m) PPP Regulation. The object is to obtain PPPs that are both unbiased and reliable. See *representativity*.
Error	The difference between the observed value of a PPP or volume index and its correct value. Errors maybe random or systematic. Random errors are generally referred to as *errors*. Systematic errors are called *biases*.
ESA	*European system of accounts*. A version of the SNA appropriate to the circumstances and needs of the European Union. The SNA provides guidelines and makes recommendations for global implementation. The ESA specifies how these guidelines and recommendations should be interpreted and implemented by EU Member States. It has legal status

	in the European Union. See also *SNA*.
Expenditure category	The aggregation level between main aggregates and expenditure groups.
Expenditure class	The aggregation level between expenditure groups and basic headings.
Expenditure group	The aggregation level between expenditure categories and expenditure classes.
Expenditure weights	*The shares of expenditure components (basic headings) in current-price GDP*. Article 3(d) PPP Regulation.
Factor reversal test	A test that requires the product of a price index and a quantity index, when both indexes are of the same type, to be equal to the value index. For example, Fisher price and quantity indexes satisfy this test. Laspeyres and Paasche indexes do not.
Final consumption expenditure	The expenditure on goods and services consumed by individual households or the community to satisfy their individual or collective needs or wants.
Final consumption expenditure of government	See *government final consumption expenditure*.
Final consumption expenditure of households	See *individual consumption expenditure by households*.
Final consumption expenditure of NPISHs	See *individual consumption expenditure by NPISHs*.
Fisher type PPP	The PPP for a basic heading or an aggregate between two countries that is defined as the geometric mean of the Laspeyres type PPP and the Paasche type PPP for the basic heading or the aggregate. See also *Laspeyres type PPP* and *Paasche type PPP* because their formulation depends on whether they are being used to calculate basic heading PPPs or to aggregate basic heading PPPs.
FISIM	*Financial intermediation services indirectly measured*. An indirect measure of the value of the financial intermediation services that financial institutions provide clients but for which they do not charge explicitly.
Fixity	*When results are calculated originally for a group of Member States (countries) and then later the results are calculated for a wider group of Member States (countries), the PPPs between the original group of Member States (countries) shall nevertheless be preserved*. Article 4(q) PPP Regulation.

The convention whereby the relativities between a group of countries that were established in a comparison covering just that group of countries remain unchanged, or fixed, when the countries of the group are included in comparisons with a wider group of countries. For example, the relativities for EU Member States established by Eurostat remain unchanged when the EU Member States are included in a comparison covering OECD Member Countries. If fixity was not observed, there would be two sets of relativities for EU Member States. The two set would not necessarily be in agreement because the relatives and ranking of countries can change as the composition of the group of countries being compared changes. Fixity ensures that Eurostat, the OECD and participating countries have only one set of results to explain to users.

F.o.b. price

Free on board price. The price of a good delivered at the customs frontier of the exporting country. It includes the freight and insurance charges incurred to that point and any exports duties or other taxes on exports levied by the exporting country.

GDP

Gross domestic product. GDP can be estimated using three alternative approaches which, in theory, yield the same result, namely: the production approach – which sums all the value added generated by the country's resident institutional sectors during the accounting period; the expenditure approach – which sums all the final expenditures incurred by the country's resident institutional sectors during the accounting period; and the income approach – which sums all the factor incomes paid by the country's resident institutional sectors engaged in domestic production during the accounting period.

Unless stated otherwise, the manual refers to GDP estimated by the expenditure approach and is defined as the total value of the final consumption expenditures of households, NPISHs and general government plus gross capital formation plus the balance of exports and imports.

GEKS method

Gini-Èltetö-Köves-Szulc method. The EKS method is named after the three individuals who independently advocated its use in the mid-1960s. The formula, however, was actually proposed by Gini some thirty years earlier in a paper on circularity and in recent literature the method is called the GEKS. The EKS or GEKS method as originally proposed did not take into account the representativity of the products priced when calculating PPPs at the basic heading level. This refinement was introduced later by Eurostat in its 1980 comparison. As a consequence, there are two versions of the method: the classic version without representativity and the Eurostat-OECD version with representativity. In current literature, the classic version is referred to as EKS or GEKS and the Eurostat-OECD version as EKS* or GEKS*. (An asterisk is the representativity indicator used by Eurostat and the OECD. In debate it is pronounced *star*. Hence *EKS star* or *GEKS star*.)

Eurostat and the OECD have always referred to EKS* or GEKS* as EKS. EKS is used in the PPP Regulation. It is also used throughout the reports and papers that Eurostat and the OECD have prepared relating to their joint PPP Programme. To preserve clarity and continuity, Eurostat and the OECD have not adopted the new terminology and continue to employ EKS instead of EKS* or GKS* when discussing the calculation of PPPs at the basic heading level.

Note that EKS can also refer to the aggregation of basic heading PPPs.

	See *EKS method*.
General government	The institutional sector that consists of central, regional, state and local government units together with social security funds imposed and controlled by those units. It includes non-profit institutions engaged in non-market production that are controlled and mainly financed by government units or social security funds. Also referred to as *government*.
Generic specification	See *product specification*.
Gerardi method	The average price aggregation method used in the 1975 Eurostat comparison of EU Member States. International prices are calculated as the geometric mean of the national prices of participating countries expressed in national currencies. When a geometric mean is used, the pattern of relative average prices is the same whether or not the national prices are converted into a common currency. It avoids the problem of calculating PPPs with which to convert national prices to a common currency before averaging them. Gerardi real expenditures are additive and all countries, both small and large, are treated symmetrically.
Gerschenkron effect	Applicable only to aggregation methods that use either a reference price structure, whereby each country's quantities are valued by a uniform set of prices to obtain volumes, or a reference volume structure, whereby each country's prices are used to value a uniform set of quantities to obtain PPPs. For methods employing a reference price structure, a country's share of total GDP - that is, the total for the group of countries being compared - will rise as the reference price structure becomes less characteristic of its own price structure. For methods employing a reference volume structure, a country's share of total GDP will fall as the reference volume structure becomes less characteristic of its own volume structure. The Gerschenkron effect arises because of the negative correlation between prices and volumes.
GFCE	*Government final consumption expenditure*. The actual and imputed final consumption expenditure incurred by general government on individual goods and services and collective services. The total value of individual consumption expenditure and collective consumption expenditure by general government. Also referred to as *final consumption expenditure of government*.
GFCF	*Gross fixed capital formation*. The total value of acquisitions less disposals of fixed assets by resident institutional units during the accounting period plus the additions to the value of non-produced assets realised by the productive activity of resident institutional units.
GK method	*Geary-Khamis method*. An average price aggregation method first used by the ICP to compute PPPs and real expenditures above the basic heading. It entails valuing a matrix of quantities using a vector of international prices. The vector is obtained by averaging national prices across participating countries after they have been converted to a common currency with PPPs and weighted by country quantity shares. The country PPPs are obtained by averaging the ratios of national and international prices weighted by country expenditure shares. The

	international prices and the PPPs are defined by a system of interrelated linear equations that require solving simultaneously. The GK method produces PPPs that are transitive and real expenditures that are additive. It has a number of disadvantages. One is that a change in the composition of the group can change significantly the international prices as well as the relationships between countries. Another is that the real expenditures are subject to the Gerschenkron effect which can be large. Within the context of Eurostat and OECD comparisons, GK results are considered to be better suited to the analysis of price and volume structures across countries. The OECD publishes a selection of GK results chosen specifically for such structural analysis.
Goods	Physical objects for which a demand exists, over which ownership rights can be established and whose ownership can be transferred from one institutional unit to another by engaging in transactions on the market. They are in demand because they may be used to satisfy the needs or wants of households or the community or used to produce other goods or services.
Gross capital formation	The total value of gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables.
Gross operating surplus	The surplus or deficit accruing from production before taking any account of: (a) consumption of fixed capital; (b) any interest, rent or similar charges payable on financial or tangible non-produced assets borrowed or rented by the enterprise; or (c) any interest, rent or similar charges receivable on financial or tangible non-produced assets owned by the enterprise.
Gross value added (at basic prices)	The value of output at basic prices less the value of intermediate consumption at purchasers' prices. It is a measure of the contribution to GDP made by an individual producer, industry or sector.
Gross wages and salaries	The wages and salaries in cash and in kind paid by enterprises to employees before the deduction of taxes and social contributions payable by employees.
HICP	*Harmonised index of consumer prices*. A price index that measures the changes in the prices of consumer goods and services that households acquire by means of monetary transactions - that is, the changes in the prices that households pay for the goods and services they themselves purchase. HICPs are compiled monthly by the national statistical agencies of EU Member States, EU candidate counties and countries of the European Economic Area. Compilation is according to the harmonised statistical methods and single set of definitions established by Commission regulations. National HICPs are combined by Eurostat to provide HICPs for the Euro Area, the European Union and the European Economic Area. In Eurostat and OECD comparisons, sub-indices of national HICPs are used as *temporal adjustment factors* to adjust the average survey prices collected for consumer products to annual average prices. They are also used in to extrapolate basic heading PPPs for a survey year to non-survey years as required by the *rolling survey approach*.

Household	A small group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly food and housing. A household can consist of only one person.
Household final consumption expenditure	See *individual consumption expenditure by households*.
ICP	*International comparison project* prior to 1989 and *International comparison programme* since 1989. It started as a research project in the 1960s with the ultimate goal of establishing a regular programme of worldwide PPP comparisons of GDP. Comparisons were organised for 1970, 1973, 1975, 1980, 1985, and 1993. They covered 10, 16, 34, 60, 64 and 83 countries respectively. Responsibility for these comparisons was shared by the United Nations Statistics Division and the University of Pennsylvania. The World Bank is the current global co-ordinator of the ICP. A comparison covering 147 countries was organised for 2005 and a comparison covering around 200 countries is being organised for 2011
Ikle method	An average price aggregation method similar to the GK method. It was used in the 2005 ICP regional comparison for Africa. Like the GK method, it derives a vector of international prices by averaging national prices across participating countries after the prices have been converted to a common currency with PPPs and weighted. The GK method uses quantity shares as weights. The Ikle method uses expenditure shares as weights. In addition, GK international prices are arithmetic means while Ikle international prices are harmonic means. The Ikle method is designed to prevent prices in countries with large expenditures dominating the average prices. Because the sum of expenditure shares in each country is equal to one, the Ikle method can be regarded as being equi-representative of all countries. The Iklé method produces PPPs that are transitive and real expenditures that are additive. Compared to the GK method, the Iklé method minimises the Gerschenkron effect.
Imputed expenditure	Some transactions which it is desirable to include in GDP do not take place in money terms and so cannot be measured directly. Expenditures on these non-monetary transactions are obtained by imputing a value to them. The values to be imputed are defined by national accounting conventions. These vary from case to case and are described in the SNA and the ESA.
Imputed rents	See *owner-occupied housing*.
Imputed social contributions	The imputations that need to be made when employers provide social benefits themselves directly to their employees, former employees or dependents out of their own resources without involving an insurance enterprise or autonomous pension fund, and without creating a special fund or segregated reserve for the purpose.
Indirect binary comparison	A price or volume comparison between two countries made through a third country. For example, in the case of countries A, B and C, the PPP between A and C is obtained by dividing the PPP between A and B by

	the PPP between C and B as follows: $PPP_{A/C} = PPP_{A/B} / PPP_{C/B}$.
Indirect price comparison	A price comparison between two countries made by dividing the expenditure ratio by the volume ratio. The indirect price comparison between country A and country B for product I is $(P_{IA}Q_{IA} / P_{IB}Q_{IB}) / Q_{IA}/Q_{IB} = P_{IA} / P_{IB}$ where the P's are the prices and the Q's the volumes (quantities) of the product. Price comparisons are usually made directly.
Indirect volume comparison	A volume comparison between two countries made by dividing the expenditure ratio by the price ratio. The indirect volume comparison between country A and country B for product I is $(P_{IA}Q_{IA} / P_{IB}Q_{IB}) / P_{IA}/P_{IB} = Q_{IA} / Q_{IB}$ where the P's are the prices and the Q's the volumes (quantities) of the product. Volume comparisons are usually made indirectly.
Individual consumption expenditure by government	The actual and imputed final consumption expenditure incurred by general government on individual goods and services. Also referred to as *social transfers in kind*.
Individual consumption expenditure by households	The actual and imputed final consumption expenditure incurred by households on individual goods and services. It also includes expenditure on individual goods and services sold at prices that are not economically significant. By definition, all final consumption expenditures of households are for the benefit of individual households and are individual. Also referred to as *final consumption expenditure of households* and *household final consumption expenditure*.
Individual consumption expenditure by NPISHs	The actual and imputed final consumption expenditure incurred by NPISHs on individual goods and services. In practice, most final consumption expenditures of NPISHs are individual in nature and so, for simplicity, all final consumption expenditures of NPISHs are treated by convention as individual. Also referred to as *final consumption expenditure of NPISHs* and *social transfers in kind*.
Individual good or service	A consumption good or service acquired by a household and used to satisfy the needs and wants of members of that household.
Individual services	A term used to describe the services (and goods) provided to individual households by NPISHs and general government. Such services include housing, health, recreation and culture, education and social protection. They do not include the overall policy-making, planning, budgetary, co-ordinating responsibilities of government ministries overseeing individual services. Nor do they include government research and development for individual services. These activities cannot be identified with specific individual households and are considered to benefit households collectively. They are classified under collective services.
Input price approach	The approach used to obtain PPPs for non-market services. Because there are no economically significant prices with which to value the outputs of these services, national accountants follow the convention of estimating the expenditures on non-market services by summing the costs of the inputs required to produce them. PPPs for non-market services are calculated with input prices as these are the prices that are

	consistent with the prices underlying the estimated expenditures. In practice, prices (compensation employees) are only collected for labour which is by far the largest and most important input.
Institutional sector	The SNA and the ESA identify five institutional sectors: non-financial corporations, financial corporations, general government, households and NPISHs.
Inter-country validation	The validation that takes place after participating countries have completed their intra-country validation and submitted their survey prices to Eurostat or the OECD. It is an iterative process consisting of several rounds of questions and answers between Eurostat or the OECD and participating countries. It involves editing and verifying the average survey prices reported by participating countries for a basic heading and assessing the reliability of the PPPs they produce for the basic heading. The objective is to establish that the average survey prices are for comparable products, that the products have been accurately priced and that the allocation of representativity indicators is correct. In other words, to ascertain whether countries have interpreted the product specifications the same way and whether their price collectors have priced them without error. The Quaranta editing procedure is employed for this purpose. The procedure entails comparing the average survey prices recalculated in a common currency by the exchange rates as well as by the basic heading PPPs for the same product across countries and analysing across products and across countries the dispersion of the price ratios that the average survey prices generate between countries. Outliers among the average survey prices are detected by identifying the outliers among the corresponding price ratios. Countries verify the outliers found to ascertain whether or the not they are valid observations. If they are not, the country either corrects or suppresses them.
Intra-country validation	The validation that precedes inter-country validation. It is undertaken by participating countries prior to submitting their survey prices to Eurostat or the OECD. Each country edits and verifies its own prices without reference to the price data of other countries. Validation is carried out at the product level. The objective is to establish that price collectors within the country have priced items that match the product specifications and that the prices they have reported are accurate. This entails the country searching for outliers first among the individual prices that have been collected for each product it has chosen to survey and then among the average prices for these products. Subsequently, the country verifies the outliers found to ascertain whether or the not they are valid observations. If they are not, the country either corrects or suppresses them.
Intermediate consumption	The value of the goods and services, other than fixed assets, that are used or consumed as inputs by a process of production.
International comparison	One of two terms used in the manual as a contraction of *international price and volume comparison of GDP*. The other term is *comparison.*
International prices	A term used in association with additive aggregation methods. In the course of expressing the expenditures in a common currency and at a uniform price level, additive aggregation methods value the expenditures at international prices, where an international price is

	defined as the average of the national prices prevailing in participating countries. The average may be weighted or unweighted, PPP adjusted or unadjusted. It may be an average of prices or an average of price structures. In the GK method, for example, the average is defined as a quantity-weighted arithmetic average of the national prices adjusted by the global PPPs across all countries. Theoretically prices for products should be used to calculate the international prices, but in practice notional prices for basic headings are used instead.
ISCED	*International standard classification of education*. The classification used in the collection, compilation and presentation of national and international education statistics and indicators. It covers all organised and sustained learning activities for infants, children, youth and adults including those with special needs.
ISCO	*International standard classification of occupations*. Classifies occupations according to two main concepts: the kind of work done - that is, the job; and the ability to carry out the tasks and duties of the job - that is, the skill.
Item	*A good or service precisely defined for use in price observation*. Article 3(f) PPP Regulation. A good or service defined by an item specification and included on an item list. Countries select the items they price from among the items included on the item list. Also referred to as *product*.
Item list	See *basket*. Also referred to as *product list*.
Item specification	See *product specification*.
Laspeyres type PPP	A PPP for a basic heading or an aggregate between two countries, country B and country A, where the reference country is country A and the weights are those of country A. At the basic heading level, the PPP is defined as a quasi-weighted geometric average of the price relatives between country B and country A for the products representative of country A. At an aggregate level, the PPP is defined as the weighted arithmetic average of the PPPs between country B and country A for the basic headings covered by the aggregate with the expenditure shares of country A being used as weights
List price	See *offer price*.
Main aggregates	The level of aggregation immediately below GDP. There are seven main aggregates of which the most important are individual consumption expenditure by households, individual consumption expenditure by government, collective consumption expenditure by government and gross fixed capital formation.
Market price	The amount of money a willing buyer pays to acquire a good or service from a willing seller. The actual price for a transaction agreed on by the transactors. The net price inclusive of all discounts, surcharges and

	rebates applied to the transaction. From the seller's point of view the market price is the basic price; from the buyer's point of view the market price is the purchasers' price. Also referred to as *transaction price*.
Matched products or models method	The pricing of identical products or models across countries to ensure that the price differences observed are not affected by differences in quality. The object is to price to constant quality. Price differences for perfectly matched products are pure price differences. See also *specification pricing*.
Material well-being	The volume of goods and services that households consume to satisfy their individual needs. Also referred to as *economic welfare* or *economic well-being*.
Matrix consistency	See *additivity*.
Mistake	*A use of incorrect basic information or inappropriate application of the calculation procedure*. Article 3(o) PPP Regulation.
Multilateral comparison	A price or volume comparison of more than two countries simultaneously that is made with price and expenditure data from all countries covered and which produces consistent relations among all pairs of participating countries - that is, one that satisfies the transitivity requirement among other requirements.
NACE	*Nomenclature générale des activités économiques dans les Communautés européennes.* The acronym for the *General industrial classification of economic activities within the European Communities*. NACE allows enterprises and establishments to be classified according to economic activity based on the class of goods produced or services rendered.
National annual price	A price that has been averaged both over all localities of a country so as to take account of regional variations in prices and over the whole of the reference year so as to allow for seasonal variations in prices as well as general inflation and changes in price structures.
National expenditures	GDP expenditures that are valued at national price levels and expressed in national currencies. Also referred to as *nominal expenditures in national currencies*.
Net purchases abroad	Purchases by resident households outside the economic territory of the country less purchases by non-residential households in the economic territory of the country.
Nominal expenditures in national currencies	See *national expenditures*.
Nominal expenditures	National expenditures that have been converted to a common currency with exchange rates. Expenditures so converted remain valued at national price levels and reflect both volume and price differences between countries. Also referred to as *nominal values*.

Nominal values	See *nominal expenditures.*
Non-deductible VAT	The value added tax payable by purchasers that is not deductible from their own VAT liability, if any. See also *VAT* and *deductible VAT*.
Non-durable good	A good that can only be used once or that has a lifetime of considerably less than one year. See also *semi-durable good* and *durable good*.
Non-market service	A service that is provided to households free or at a price that is not economically significant by NPISHs and/or by general government.
Non-observed economy	Activities that are hidden because they are illegal or because they are legal but carried out clandestinely or because they are undertaken by households for their own use. Also activities that are missed because of deficiencies in the statistical system. Such deficiencies include out-of-date survey registers, surveys having too high reporting thresholds or high rates of non-response, poor survey editing procedures, no surveying of informal activities such as street trading, etc.
Non-profit institutions	Legal or social entities created for the purpose of producing goods and services whose status does not permit them to be a source of income, profit or other financial gain for the units that establish, control or finance them.
NPISH	*Non-profit institution serving households.* Non-profit institutions which are not predominantly financed and controlled by government, whose main resources are voluntary contributions by households and which provide goods or services to households free or at prices that are not economically significant.
Numéraire	A term used for the currency unit selected to be the common currency in which PPPs and real and nominal expenditures are expressed. The numéraire may be an actual currency unit such as the euro and the US dollar or an artificial currency unit such as the PPS and the OECD dollar.
Observation	An individual price, or one of a number of individual prices, collected for an item at an outlet.
OECD dollar	The artificial currency unit in which the PPPs and real expenditures for the OECD are expressed – namely, *US dollars at average OECD price levels*. US dollars at average OECD price levels are US dollars that have the same purchasing power over the whole of the OECD. Their purchasing power is a weighted average of the purchasing power of the national currencies of OECD Member Countries. As such they reflect the average price level in the OECD or, more precisely, the weighted average of the price levels of OECD Member Countries. OECD dollars are defined by equating the total real expenditure of the OECD on a specific basic heading, aggregation level or analytical category to the total nominal expenditure of the OECD on the same basic heading,

	aggregation level or analytical category.
Offer prices	The prices that sellers display as the prices at which they are prepared to sell their products. The prices of products as quoted in the seller's price list, catalogue, internet site, advertisements, etc. They are not necessarily transaction prices. Depending on the country and/or the product, they may or may not include delivery and installation costs, VAT and other indirect taxes on products, discounts, surcharges and rebates, invoiced service charges and voluntary gratuities. Also referred to as *list prices*.
Other subsidies on production	See *subsidies on production*.
Other taxes on production	See *taxes on production*.
Outlet	A shop, market, service establishment, internet site, mail order service or other place from where goods and/or services can be purchased and from where the purchasers' or list prices of the products sold can be obtained.
Outlier	A term that is generally used to describe any extreme value in a set of survey data. Can also mean an extreme value that has been verified as being correct.
Overlap product	A product that appears on the product lists of two or more separate groups of countries for the purpose of combining the groups in a single multilateral comparison. The use of overlap products is an alternative to linking groups of countries through bridge countries. Also referred to as a *core product*.
Owner-occupied housing	Dwellings owned by the households that live in them. Owner-occupiers use the dwellings to produce housing services for themselves. The imputed rents of these housing services should be valued at the estimated rent that a tenant pays for a dwelling of the same size and quality in a comparable location with similar neighbourhood amenities. When markets for rented accommodation are virtually non-existent or unrepresentative, the value of imputed rents has to be derived by some other objective procedure such as the *user-cost method*.
Paasche - Laspeyres spread	The ratio of the Paasche type index to the Laspeyres type index in a binary comparison. Usually the Paasche index is lower than the Laspeyres index. In other words, the Paasche – Laspeyres spread should be less than one.
Paasche type PPP	A PPP for a basic heading or an aggregate between two countries, country B and country A, where the reference country is country A and the weights are those of country B. At the basic heading level, the PPP is defined as a quasi-weighted geometric average of the price relatives between country B and country A for the products representative of country B. At an aggregate level, the PPP is defined as the weighted harmonic average of the PPPs between country B and country A for the basic headings covered by the aggregate with the expenditure shares of country B being used as weights.

Parity	See *PPP*.
Penn effect	The overstatement of the economic size of high-income countries and the understatement of the economic size of low-income countries that results when exchange rate converted GDPs are used to establish the relative sizes of economies. The Penn effect arises because price levels are usually higher in high-income countries than they are in low income countries and exchange rates do not take account of price level differences between countries when used to convert their GDPs to a common currency.
PISA	*Programme for International Student Assessment*. The programme is managed by the OECD. Tests are administered to 15 year olds in schools and cover three topics: mathematics, reading and science. Typically between 4,500 and 10,000 students sit the tests per country. The tests are held every three years and there have been four assessments to date: 2000 (43 countries), 2003 (41 countries), 2006 (57 countries), and 2009 (65 countries of which 43 participate in the Eurostat–OECD PPP Programme). PISA provides assessments that are corrected for the economic, social and cultural status (ESCS) of students thereby making possible a better evaluation of the quality of the teaching. The quality adjustments made at the primary and secondary levels of education for the Eurostat-OECD output method are based on ESCS corrected PISA scores.
PPP	*Purchasing power parity* or *parity*. *Spatial deflators and currency converters that eliminate the effects of the differences in price levels between Member States (countries), thus allowing volume comparisons of GDP components and comparisons of price levels*. Article 3(a) PPP Regulation. PPPs are calculated in three stages: first for individual products, then for groups of products or basic headings and, finally, for groups of basic headings or aggregates. PPPs for individual products are ratios of national prices in national currencies for the same good or service. The PPPs for basic headings are unweighted averages of the PPPs for individual products. The PPPs for aggregates are weighted averages of the PPPs for basic headings. The weights used are the expenditures on the basic headings. PPPs at all stages are price relatives. They show how many units of currency A need to be spent in country A to obtain the same volume of a product or a basic heading or an aggregate that X units of currency B purchases in country B. In the case of a single product, the same volume means identical volume. But in the case of the complex assortment of goods and services that make up an aggregate such as GDP, the same volume does not mean an identical basket of goods and services. The composition of the basket will vary between countries according to their economic, social and cultural differences, but each basket will provide equivalent satisfaction or utility.
PPP Regulation	Regulation (EC) No 1445/2007 of the European Parliament and of the Council of 11 December 2007 establishing common rules for the provision of basic information on Purchasing Power Parities and their calculation and dissemination.
PPP similarity index	See *price similarity index*.

PPS	*Purchasing power standard. The artificial common reference currency unit used in the European Union to express the volume of economic aggregates for the purpose of spatial comparisons in such a way that price level differences between Member States are eliminated*. Article 3(b) PPP Regulation. The artificial currency unit in which the PPPs and real expenditures for the European Union are expressed – namely, *euros at average EU price levels*. Euros at average EU price levels are euros that have the same purchasing power over the whole of the European Union. Their purchasing power is a weighted average of the purchasing power of the national currencies of EU Member States. As such they reflect the average price level in the European Union or, more precisely, the weighted average of the price levels of EU Member States. PPS are defined by equating the total real expenditure of the European Union on a specific basic heading, aggregation level or analytical category to the total nominal expenditure of the European Union on the same basic heading, aggregation level or analytical category.
Pre-survey	The preparatory survey carried out by participating countries prior to a price survey. The objective is for each country to investigate its national market to ascertain the availability, comparability and representativity of the products specified in a pre-survey questionnaire. It involves visiting outlets, including those that will be visited during the actual price collection, to obtain information on the products specified, on their replacements and on possible alternatives from sales personnel and through observation. It also involves consulting the internet, trade and consumer magazines, catalogues and brochures, importers and experts. Country responses to the pre-survey questionnaire are used to draw up the product list for the price survey.
Price approach	See *direct price comparison*.
Price error	A price error occurs when price collectors price products that match the product specification but record the price incorrectly or they record the price correctly and error is introduced afterwards in the process of reporting and transmitting the price. Price error can also arise because the quantity priced is recorded wrongly (or error is introduced later during processing). Hence, when the price collected is standardised and adjusted to a reference quantity, it will not be correct.
PLI	*Price level index*. PLIs are the ratios of PPPs to exchange rates. They provide a measure of the differences in price levels between countries by indicating for a given aggregation level or analytical category the number of units of the common currency needed to buy the same volume of the aggregation level or analytical category in each country. At the level of GDP they provide a measure of the differences in the general price levels of countries. Also referred to as *comparative price level index*.
Prices	*The purchaser prices paid by final consumers*. Article 3(c) PPP Regulation
Price relative	The ratio of the price of an individual product in one country to the price of the same product in some other country. It shows how many units of currency A need to be spent in country A to obtain the same quantity

	and quality – that is, the same volume - of the product that X units of currency B purchase in country B.
Price similarity index	The similarity of the structure of prices between any pair of countries is measured by the correlation coefficient that is obtained by regressing the internal price structure of one country against the corresponding internal price structure of the other country. Internal price structures can be expressed as a vector of the ratios of product prices to the price of a reference product. In practice, the correlation coefficient is obtained by regressing the basic heading PPPs. The basic heading PPPs are interpreted as notional prices.
Productivity adjustment	An adjustment made to the prices paid by non-market producers for labour, capital and intermediate inputs so that they correspond to a common level of multi-factor productivity. In practice, an adjustment made to the prices (compensation of employees) paid by non-market producers for labour so that they represent the same level of labour productivity. Productivity adjustments are not made in Eurostat and OECD comparisons.
Product	A good or service that is the result of production. Products are exchanged and used for various purposes: as inputs in the production of other goods and services, as final consumption or for investment. Also referred to as *goods and services* or *commodities* or *items*.
Product error	A product error occurs when price collectors price products that do not match the product specification and neglect to report having done so. This can be because they are not aware of the mismatch, such as when the product specification is too loose, or because they price a substitute product as required by the pricing guidelines but do not mention this on the price reporting form.
Product list	See *basket*. Also referred to as *item list*.
Product specification	A description or list of the physical and economic characteristics that can be used to identify a product selected for pricing. Its purpose is to ensure that countries price comparable items. A product specification can be either brand and model specific - that is, a specification in which a particular brand and model, or a cluster of comparable brands (and possibly models), is stipulated - or generic - that is, a specification where only the relevant price determining and technical characteristics are given and no brand, or cluster of brands, is designated. Also referred to as an *item specification*. See as well *SPD*.
Production boundary	Includes: (a) the production of all individual or collective goods or services that are supplied, or intended to be supplied, to units other than their producers (including the production of goods or services used up in the process of producing such goods or services); (b) the own-account production of all goods that are retained by their producers for their own final consumption or gross capital formation; (c) the own-account production of housing services by owner-occupiers and of domestic and personal services produced by employing paid domestic staff.

Purchaser's price	The amount paid by the purchaser in order to take delivery of a unit of a good or service at the time and place required by the purchaser. It excludes any VAT (or similar deductible tax on products) which the purchaser can deduct from his own VAT liability in respect of VAT invoiced to his customers. It includes supplier's retail and wholesale margins, separately invoiced transport and insurance charges and any VAT (or similar deductible tax on products) which the purchaser cannot deduct from his own VAT liability. In the case of equipment goods it will also include installation costs if applicable. Purchasers' prices are the prices most relevant for decision-making by buyers.
Quality adjustment	An adjustment to the prices of a product whose characteristics are broadly similar but not the same in all countries pricing it. The aim of the adjustment is to remove from the price differences observed between countries that part of the difference which is due to the difference in the characteristics of the product priced. The adjustment is made so that the price differences between countries reflect only pure price differences. With the exception of housing and education, quality adjustments are not made in Eurostat and OECD comparisons.
Quantity approach	See *direct volume comparison*.
Quantity similarity index	The similarity of the structure of quantities between any pair of countries is measured by the correlation coefficient that is obtained by regressing the internal quantity structure of one country against the corresponding internal quantity structure of the other country. Internal quantity structures can be expressed as a vector of the ratios of product quantities to the quantity of a reference product. In practice, the correlation coefficient is obtained by regressing the basic heading real expenditures. The basic heading real expenditures are interpreted as notional quantities.
Quaranta editing procedure	The inter-country validation procedure proposed by Vincenzo Quaranta that is used by Eurostat and the OECD to edit the average survey prices reported by participating countries for a basic heading. For each basic heading covered by a price survey, the procedure screens the average survey prices for possible errors and evaluates the reliability of the price ratios they provide. It does this by comparing the average survey prices for the same product across countries (the average survey prices having been expressed in the same currency unit for this purpose) and by analysing the dispersion of the price ratios across countries and across products (the price ratios having been standardised for this purpose). It is thus both an editing tool and an analytical tool. As an editing tool it identifies outliers among the average survey prices that need to be returned to participating countries for verification. As an analytical tool it provides a range of variation coefficients – at the product, country and basic heading levels - that can be used to assess the reliability of completed price surveys and assist the planning of future price surveys. Since 2005, the procedure has also been used to edit prices collected for ICP regional and global comparisons.
Quaranta table	The inter-country validation table generated by the Quaranta editing procedure.

Real expenditures	National expenditures that have been converted to a common currency and valued at a uniform price level with PPPs. Expenditures so converted reflect only volume differences between countries. Also referred to as *real values*.
Real values	See *real expenditures*.
Rebate	A discount paid to the purchaser after the transaction has occurred.
Reference country	The country, or group of countries such as the European Union or the OECD, for which the value of the PPP is set at 1.00 and the value of the price level index and of the volume index is set at 100.
Reference quantity	The quantity to which the prices collected for a product have to be rebased to ensure that they refer to the same quantity when being compared.
Reference year	*A calendar year to which the annual results refer*. Article 3(p) PPP Regulation.
Reference PPPs	PPPs that are use for basic headings for which no prices are collected. They are based on prices collected for other basic headings. Reference PPPs serve as proxies for the missing PPPs.
Relative price levels	These are defined as the ratios of specific PPPs to the corresponding overall PPP for GDP. They indicate whether the price level for a given aggregation level or analytical category is higher or lower relative to the general price level in the country. They facilitate the comparison of price structures across countries. To be meaningful relative price levels should be based on PPPs that have been calculated using an aggregation method that is additive.
Representative items	*Those (items) which are, or are considered to be, in terms of relative total expenditure within a basic heading, among the most important items purchased in national markets*. Article 3(k) PPP Regulation. Also referred to as *representative products* or *asterisk products*.
Representative products	Also referred to as *representative items* or *asterisk products*
Representativity	A concept that relates to individual products within the same basic heading and to the product list for a basic heading. *Representativity of a product within a basic heading* is defined in terms of a specific country. A product is either representative or unrepresentative of the price level in country A for a given basic heading irrespective of the relative importance of the basic heading with respect to other basic headings. It is representative if, in country A, the price level of the product is close to the average for all products within the basic heading. Usually, though not necessarily, the purchases of the product will account for a significant proportion of the total purchases of

all products covered by the basic heading. If not, the product will at least be sold in sufficient quantities for its price level to be typical for the basic heading.

Representativity of the product list for a basic heading is defined in terms of all countries participating in the comparison. The product list should be equally representative – or equi-representative - of all participating countries. In general, representative products have lower price levels than unrepresentative products. Therefore, if the product list for the basic heading is not equally representative of all participating countries, the price levels for the basic heading will be overestimated for countries pricing a smaller number of representative products and underestimated for countries pricing a larger number of representative products. This does not mean that all countries should have the same number of representative products for each basic heading providing this is taken into account when calculating PPPs for the basic heading. But it does mean that each country should be able to price that number of representative products which is commensurate with the heterogeneity of products covered by the basic heading and its expenditure on the basic heading.

Representativity indicators

Markers or other indicators identifying those items that Member States (countries) have selected as representative. Article 3(l) PPP Regulation.

Countries are expected to price their representative products and a selection of unrepresentative products - that is, products representative of other countries. When reporting prices, countries are required to identify which of the products they have priced are representative. They do this by assigning representativity indicators. Asterisks are used as representativity indicators in Eurostat and OECD comparisons. See also *asterisk* and *asterisk product*.

Resident population

The average number of people present in the economic territory of a country during the reference year.

Retropolation

The backward extrapolation of times series.

Rolling survey approach

The approach that allows PPPs to be calculated annually when, for cost reasons, price collection is cyclical and spread over a number of consecutive years. In other words, not all products in the basket being surveyed are priced every year. Prices for products that are not priced are rolled over from the year when they were last priced after being adjusted for any price change that has occurred in the meantime. PPPs for any given year are calculated with the prices that have been collected during the year and the prices that have been rolled over from consecutive years. Eurostat uses the approach for consumer goods and services and for construction. Price collection is spread over three years for consumer goods and services and over two years for construction.

Seasonal products

Products for which both prices and the quantities sold vary significantly throughout the year. Typically, the patterns of variation are repeated from one year to the next. Seasonal products vary from country to country.

Semi-durable good

A good that differs from a non-durable good in that it can be used repeatedly or continuously over a period longer than a year and that differs from a durable good in that its expected lifetime of use, though

	longer than a year, is often significantly shorter and that its purchasers' price is substantially less. See also *non-durable good* and *durable good*.
Services	Outputs produced to order and which cannot be traded separately from their production. Ownership rights cannot be established over services and by the time their production is completed they must have been provided to the consumers. An exception to this rule is a group of industries, generally classified as service industries, some of whose outputs have characteristics of goods. These industries are those concerned with the provision, storage, communication and dissemination of information, advice and entertainment in the broadest sense of those terms. The products of these industries, where ownership rights can be established, may be classified either as goods or services depending on the medium by which these outputs are supplied.
SNA	*System of national accounts*. A coherent, consistent and integrated set of macroeconomic accounts, balance sheets and tables based on a set of internationally agreed concepts, definitions, classifications and accounting rules.
Social transfers in kind	Individual goods and services provided as transfers in kind to individual households by government units (including social security funds) and NPISHs. The goods and services can be purchased on the market or produced as non-market output by government units or NPISHs. See also *individual consumption expenditure by government* and *individual consumption expenditure by NPISHs*.
Spatial adjustment factors	*Factors used to adjust average prices obtained from one or more pricing locations within the economic territory of a Member State (country) to national average prices*. Article 3(j) PPP Regulation.
Specification pricing	The pricing methodology whereby a list of precisely-defined products is selected in consultation with the countries participating in the comparison with a view to having comparable products priced in each country. Products are fully defined in terms of all characteristics which influence their transaction prices. The objective is to price to constant quality in order to produce price relatives that reflect pure price differences.
SPD	*Structured product description*. SPDs are designed to standardise the product specifications for different types of products so that all product specifications for a particular type of product are defined in the same way and specify the same parameters. Standardising product specifications helps to improve their precision making it easier for price collectors to determine whether or not product in an outlet matches the product specified. Also, by identifying the parameters that need to be specified for different products, SPDs provide a framework within which countries can present their proposals for new products. See also *product specification*.
Subsidies on production	Subsidies on goods and services produced as outputs by resident enterprises that become payable as a result of the production of these goods or services - that is, subsidies payable per unit of good or service produced - plus subsidies that resident enterprises may receive as a

	consequence of engaging in production - for example, subsidies to reduce pollution or to increase employment. The former are called *subsidies on products*. The latter are called *other subsidies on production*.
Subsidies on products	See *subsidies on production*.
Surcharge	An addition to the list price of a good or service. Generally of a short duration reflecting unusual cost or supply pressures affecting the seller.
Symmetric index	An index that treats the two countries being compared symmetrically by giving equal importance to the price and expenditure data of both countries. The price and expenditure data for both countries enter into the index number formula in a balanced or symmetric way.
Taxes on production	Taxes on the goods and services produced as outputs by resident enterprises that become payable as a result of the production of these goods or services - that is, taxes payable per unit of good or service produced such as excise duties and non-deductible VAT - plus taxes that resident enterprises may pay as a consequence of engaging in production - taxes such as payroll taxes and taxes on motor vehicles. The former are called *taxes on products*. The latter are called *other taxes on production*.
Taxes on products	See *taxes on production*.
Temporal adjustment factors	*Factors used to adjust average prices obtained at the time of survey to annual average prices*. Article 3(i) PPP Regulation.
Transaction	The buying and selling of a product on terms mutually agreed by the buyer and seller.
Transaction price	See *market price*.
Transitivity	*The property whereby the direct PPP between any two Member States (countries) yields the same result as an indirect comparison via any other Member State (country)*. Article 3(n) PPP Regulation. For example, in the case of the three countries A, B and C, the ratio of the PPP between A and B and the PPP between C and B is equal to the PPP between countries A and C as follows: $PPP_{A/C} = PPP_{A/B} / PPP_{C/B}$. Also referred to as *circularity*.
Unique price	A uniform price. A price which is the same in all outlets at which the product is sold. Unique prices can usually be collected centrally or by visiting a single outlet.
Unique product	A product that is only manufactured once to the specification of an individual customer.

Unit value	The total value of the purchases/sales for a set of homogeneous products divided by the sum of the quantities purchased/sold. It is a quantity weighted average of the different prices at which the products are purchased/sold. Unit values are often calculated for sets of products that are similar, though not perfectly homogeneous, provided that they are all measured in the same quantity units – for example, motor vehicles. Thus differences in unit values over time (or between countries) may be due to changes (or differences) in the mix of products purchased/sold rather than to changes (or differences) in prices. This is referred to as the *unit value mix problem*.
User-cost method	The method of estimating the value of imputed rentals by summing the relevant cost items: intermediate consumption (current maintenance and repairs, insurance), consumption of fixed capital, other taxes on production and net operating surplus (nominal rate of return on the capital invested in the dwelling and land).
Validation	The editing and verification of survey data. Scrutinizing survey data for possible error; investigating the possible errors identified to establish whether they are actual errors or valid observations; correcting or removing the possible errors found to be actual errors.
Valuables	Produced assets that are not used primarily for production or consumption, that are expected to appreciate or at least not decline in real value, that do not deteriorate over time in normal conditions, and that are acquired and held primarily as stores of values.
VAT	*Value added tax*. A tax on products collected in stages by enterprises. It is a wide-ranging tax usually designed to cover most or all goods and services. Producers are obliged to pay to government only the difference between the VAT on their sales and the VAT on their purchases for intermediate consumption or capital formation. VAT is not usually levied on exports. See also *deductible VAT* and *non-deductible VAT*.
Verification	The second step of validation: investigating the possible errors detected during the editing of survey prices to establish whether or not they are actual errors and, if they are actual errors, correcting of suppressing them. In many cases, verification will require revisiting the outlets where the prices were collected to see whether what was priced matches the product description and whether the correct price and quantity were recorded. Price observations that are found to be incorrect should be either eliminated or replaced by the correct observation.
Volume index	A weighted average of the relative levels in the quantities of a specified set of goods and services between two countries. The quantities have to be homogeneous while the relative levels for the different goods and services must be weighted by their economic importance as measured by their values in one or other or both countries.
Volume similarity index	See *quantity similarity index*.
Weighted CPD method	A variant of the CPD method in which representative products receive a

	higher weight in the calculation than non-representative products. For example, representative products could have the weight of 2 or 3 and unrepresentative products a weight of 1. The choice of weights is arbitrary as it is with the EKS. However, the weights of 1 for a representative product and 0 for an unrepresentative product used in the EKS cannot be used in a weighted CDP because the assignment of 0 to prices of unrepresentative products will remove them from the calculation.
Well-known brand	The term in a product specification that indicates that the product specified has a brand value without specifying any particular brand or brands. Well-known brands can be international brands or national brands. Well-known International brands may not necessarily have the same brand value in all participating countries. Hence, for those kinds of products for which brand value is important, products such as clothing, footwear, furniture, household durables and consumer electronics, Eurostat and participating countries have classified well-known international brands into three segments - high, medium and low - that reflect the brand value perceptions in participating countries. Countries locate the segment in which to include a well-known national brand by identifying a well-known international brand with an equivalent brand value and putting the national brands in the same segment. Product specifications covering well-known brands also specify the segment from which the well-known brand or brands are to be taken.