

**Equipment goods**

**10**



## 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*<sup>1</sup>. 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.<sup>2</sup>

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.<sup>3</sup> 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

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> 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
<b>Preview and Planning</b>	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)
<b>Pre-survey and item list creation</b>	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)
<b>Price collection and reporting</b>	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)
<b>Inter-country validation</b>	08. Data cleaning and checking	Countries; EU consultants	Jul (t)
	09. Calculation of 1 <sup>st</sup> Quaranta table	EU consultants; Eurostat	Aug (t)
	10. Analysis of 1 <sup>st</sup> Quaranta table	Countries; EU consultants	Aug-Sep (t)
	11. Calculation of 2 <sup>nd</sup> Quaranta table	EC consultants; Eurostat	Oct (t)
	12. Analysis of 2 <sup>nd</sup> Quaranta table	Countries; EU consultants	Oct-Dec (t)
	13. Calculation of 3 <sup>rd</sup> Quaranta table	EU consultants; Eurostat	Jan (t+1)
	14. Analysis of 3 <sup>rd</sup> Quaranta table	Countries; EU consultants	Jan-Feb (t+1)
	15. Calculation of 4 <sup>th</sup> 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)	
<b>Evaluation</b>	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 months, 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<sup>4</sup>, 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.

<sup>4</sup> 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<sup>1</sup>

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) <sup>2</sup>	(1 to 4) <sup>2</sup>	1
20	Price from the internet	yes/no	yes/no	yes
<b>Terms and conditions</b>				
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
<b>Total unit price net of deductible taxes and discount</b>				171,000
<b>Representativity and comparability</b>				
Is item priced representative (yes) or unrepresentative (no)?				yes
Are the item priced and the item specified identical (1) or equivalent (2)?				2
<b>Comments</b>				
<i>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.</i>				
<b>Notes</b>				
<i>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.</i>				
<a href="http://www.mercedesbenz.com">www.mercedesbenz.com</a>				

<sup>1</sup> Price reporting forms can evolve from price survey to price survey. This example illustrates their basic format and content.

<sup>2</sup> 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.<sup>5</sup> 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.<sup>6</sup> 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<sup>7</sup> 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.

<sup>5</sup> 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.)

<sup>6</sup> The exporting country records them as negative GFCF and as exports. Because of this, a country can report a negative expenditure weight for one or more of its basic headings under GFCF.

<sup>7</sup> An Excel file for countries to report the details of the items they priced and the prices they collected. It 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<sup>1</sup>

Code	Basic heading	Number of products selected	Number of items specified	Minimum number of products to be priced <sup>2</sup>	Minimum number of items to be priced <sup>3</sup>
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	
	<b>Total</b>	<b>233</b>	<b>549</b>	<b>80</b>	<b>150</b>

<sup>1</sup> The pricing schedule is not fixed. It evolves from price survey to price survey.

<sup>2</sup> As required by the general rule. See Box 10.4.

<sup>3</sup> 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.<sup>8</sup>

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<sup>8</sup> 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.<sup>9</sup> The technical parameters listed in the

<sup>9</sup> 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*.

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.

**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
<b>Total</b>		<b>80</b>		<b>80</b>	<b>80</b>

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.

### 10.5.3 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<sup>10</sup> PPPs for GFCG in motor vehicles. The adjusted PPPs for motor cycles are used as proxies for the PPPs for GFCF in other road transport.

<sup>10</sup> 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).<sup>11</sup>

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.

<sup>11</sup> 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.<sup>12</sup> 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

<sup>12</sup> 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.

## 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 primarily 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.



**Box 10.5:** Standard report form equipment goods 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. 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).)

10.40 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.

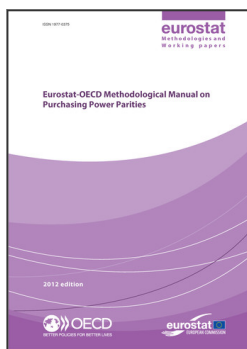
10.45 As explained in Section 10.6.1, participating countries report prices for equipment goods that exclude VAT. In a separate exercise, Eurostat collects from the countries on an annual basis the actual rates of non-deductible VAT for machinery and equipment broken down by two expenditure groups: *metal 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.





**From:**  
**Eurostat-OECD Methodological Manual on  
Purchasing Power Parities (2012 Edition)**

**Access the complete publication at:**  
<https://doi.org/10.1787/9789264189232-en>

**Please cite this chapter as:**

OECD/Eurostat (2012), "Equipment goods", in *Eurostat-OECD Methodological Manual on Purchasing Power Parities (2012 Edition)*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9789264189232-13-en>

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