

# Operational Guidelines and Procedures for **MEASURING** the Real Size of the **WORLD ECONOMY**

2011 International Comparison Program (ICP)





# Operational Guidelines and Procedures for Measuring the Real Size of the World Economy



# Operational Guidelines and Procedures for Measuring the Real Size of the World Economy

*2011 International Comparison Program*

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## Foreword

The International Comparison Program (ICP) is a worldwide statistical initiative—the largest in geographical scope, in implementation time frame, and in institutional partnership. It estimates purchasing power parities (PPPs) for use as currency converters to compare the size and price levels of economies around the world. The previous round of the program, for reference year 2005, covered 146 economies. The ICP 2011 round leveraged the successful outcome of the ICP 2005 round and covered 199 economies from eight regions, seven of them geographical: Africa, Asia and the Pacific, Commonwealth of Independent States, Latin America, the Caribbean, Western Asia, and the Pacific Islands. The eighth region comprised the economies participating in the regular PPP program managed by the statistical office of the European Union (Eurostat) and the Organisation for Economic Co-operation and Development (OECD). In addition, two economies participated in bilateral comparisons. Numerous methodological improvements and operational guidelines were introduced in the 2011 round of the ICP for the advancement of the program.

The *Operational Guidelines and Procedures for Measuring the Real Size of the World Economy* is a compilation of ICP operational guidelines and material prepared by the ICP 2011 Global Office team, consultants, and international experts.

It describes the approach to and data requirements for the main price survey and special surveys, including the various guidelines produced and survey forms. It also covers the framework and requirements for national accounts activities for the ICP. In addition, this guide describes the procedures followed for data validation, computation of national annual averages, calculation of PPPs, aggregation, and linking.

This guide complements the ICP book *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)*, thereby enabling a complete and detailed view of the largest international statistical program in the world. Disclosure of the procedures underlying the ICP 2011 process heightens the transparency of the program and allows interested stakeholders and users of the results to delve into the ICP methods and operational aspects in order to better understand and interpret the results. The operational guidelines and materials highlighted in the chapters that follow will serve as guidance in further refining future ICP data collections, resulting in both methodological and operational improvements.

This guide, then, is a very constructive initiative, and on behalf of the World Bank Development Data Group I would like to thank

all those who contributed to this effort, including the ICP 2011 Global Office team, consultants, and international experts. We trust that users of the ICP 2011 results will find this guide valuable and that it will help them better understand and interpret the results. We hope that in

the future more regular data collection and compilation will support a more frequent PPP exercise at the global level.

Haishan Fu  
*Director*  
*Development Data Group, World Bank*

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The 2011 round of the International Comparison Program (ICP) was a complex exercise both conceptually and organizationally. Several methodological and operational improvements were introduced to improve the methods and operational aspects underlying the calculation of the purchasing power parities (PPPs) and related results.

The ICP 2011 Global Office team was committed to increasing the transparency surrounding the calculation of the results and all the operational aspects of the program. Thus it provided improved documentation, including the ICP book, *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)*; the ICP 2011 summary report, *Summary of Results and Findings of the 2011 International Comparison Program*; the ICP 2011 full report, *Purchasing Power Parities and the Real Size of World Economies: A Comprehensive Report of the 2011 International Comparison Program*; and this ICP operational guide, *Operational Guidelines and Procedures for Measuring the Real Size of the World Economy: 2011 International Comparison Program*.

This guide was prepared under the aegis of the World Bank's Development Data Group led by Haishan Fu, director, and Grant James Cameron, manager. The global manager of ICP 2011 was Michel Mouyelo-Katoula. The guide was written by the ICP 2011 Global Office team, including

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As a team, we are grateful for all of the dedicated efforts that have succeeded in making the ICP operational material and guidelines publicly available so that ICP knowledge continues to be cultivated and promoted.

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## Abbreviations

AIC	actual individual consumption
BOCC	basket of construction components (method)
CAR	country aggregation with redistribution (procedure)
CEP	consumption expenditure of the population
c.i.f.	cost, insurance, and freight
CIS	Commonwealth of Independent States
COFOG	Classification of the Functions of Government
COICOP	Classification of Individual Consumption According to Purpose
CPD	country product dummy (method)
CPD-W	country product dummy-weighted (method)
CPRD	country product representative dummy (method)
EU	European Union
Eurostat	Statistical Office of the European Union
FISIM	financial intermediation services indirectly measured
f.o.b.	free on board
GDP	gross domestic product
GEKS	Gini-Èltetö-Köves-Szulc (method)
GNI	gross national income
ICP	International Comparison Program (Project prior to 1989)
ILO	International Labour Organization
IMF	International Monetary Fund
ISCED	International Standard Classification of Education
ISCO	International Standard Classifications of Occupations
IT	information technology
MORES	Model Report on Expenditure Statistics
NBS	National Bureau of Statistics (China)
NCA	national coordinating agency
n.e.c.	not elsewhere classified
NPISH	nonprofit institution serving households
OECD	Organisation for Economic Co-operation and Development
OEEC	Organisation for European Economic Co-operation
PIM	perpetual inventory method
PISA	Programme for International Student Assessment
PLI	price level index

PPP	purchasing power parity
RCA	regional coordinating agency
SAR	special administrative region
SNA	System of National Accounts
SPD	structured product description
TAG	Technical Advisory Group (ICP)
TFP	total factor productivity
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNSC	United Nations Statistical Commission
UNSD	United Nations Statistics Division
UNSO	United Nations Statistics Office
VAT	value added tax
XR	exchange rate

# Introduction

The International Comparison Program (ICP) is a global statistical initiative that collects prices, national accounts expenditures, and related information from the world's economies in order to compare the purchasing powers of their currencies. Index number theory is applied to these data to compute purchasing power parities (PPPs) between currencies.

At the base of the ICP is the comparison of national prices of a well-defined basket of goods and services. The conceptual framework is provided by measurement of each economy's gross domestic product (GDP), as defined by the System of National Accounts (SNA). PPPs are the basis for comparing the relative sizes of economies by converting their GDPs and related measures into a common currency. This enables comparisons based on economic and statistical theory.

This volume, *Operational Guidelines and Procedures for Measuring the Real Size of the World Economy*, is a compilation of the operational materials prepared by the ICP Global Office staff and consultants for the 2011 round of the ICP. It describes the data requirements as well as the methods and survey forms used for data collection, provides guidelines and requirements for national accounts activities, and covers the methods used to validate the data collected, compute national annual averages, and calculate PPPs at the various steps of aggregation to the regional and global levels.

It uses material prepared under the ICP global and regional programs, as well as that from the Eurostat–Organisation for Economic Co-operation and Development (OECD) PPP Programme. It also relies on material from the ICP book *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)* (World Bank 2013).

The ICP has a rich history, beginning in 1968 when it covered 10 economies. The success of that effort led to a series of phases of the ICP, each including more economies and new methodologies based on lessons learned in previous rounds and the continuing development of statistical and economic theory. The ICP became a true global statistical initiative with ICP 2005 and is now the largest and most complex statistical program in the world. It involves the harmonization of methodologies, concepts, and methods for price data collection, data validation, and estimation. The resulting PPPs rest on a large body of statistical and economic theory requiring that choices be made from the different methods available.

Because the ICP is based on a comparison of "like with like" goods and services, economies are grouped into geographic regions characterized by similar economic structures. The Eurostat-OECD PPP comparison contains a broader mix of economies, including the Eurostat geographic region and the OECD

member economies. PPPs and real expenditures are first computed between economies within regions. These within-region PPPs are then calibrated to the global level—a process that greatly increases the complexity of the ICP.

A comprehensive review of the statistical and economic theory used in the 2005 round of the ICP appears in *Measuring the Real Size of the World Economy* (World Bank 2013). The statistical methods adopted for ICP 2011 built on lessons learned from ICP 2005, the requirement to deal with conditions posed by changing economic situations, and the inclusion of additional economies. The purpose of these *Operational Guidelines* is to explain the methods used at each successive stage of the ICP, beginning with breaking down GDP into different analytical categories, determining the specifications for the data collection effort, and documenting the subsequent statistical methods for validation and estimation.

These *Operational Guidelines* are intended for those involved in the different stages of preparing PPPs, especially statisticians working in national statistical offices and the regional and international organizations taking part in the program. The purpose is to help the staff of national statistical organizations and regional coordinating offices organize their work in a consistent and efficient manner.

They will also serve as a reference document for the benefit of users as well as those compiling the results because they document how the PPPs were produced. As with other kinds of economic statistics such as national accounts or national consumer price indexes, the underlying theory, concepts, methodology, and procedures are made available in a transparent manner to establish and maintain confidence in the quality, reliability, and integrity of the results. These *Operational Guidelines* will also facilitate the conduct of future rounds of the ICP, taking changes and improvements in methodology into account with updates and revisions.

## ORGANIZATION OF THIS REPORT

The report comprises 26 chapters divided into four parts. A brief summary of these parts follows.

### Part I, The ICP Framework

The conceptual framework of the ICP is GDP and its breakdown into basic headings. The concepts underlying GDP must be considered in collecting prices and estimating PPPs. These concepts include defining the final expenditure components of GDP, explaining the prices used to value them, introducing the classifications to be used for the different expenditure components, and describing the data sources and methods commonly used to break down the expenditures into the necessary detail. Chapter 1 defines the concept of a basic heading, its classification, and how the national level GDP expenditures are distributed to that final level. Chapter 2 is a complete review of the ICP classifications of basic headings that are first used to determine the products to be priced and become the first stage in the analysis and estimation of PPPs. PPPs are difficult to measure for some basic headings requiring alternative methods of data collection, as described in chapter 3.

### Part II, Approach and Data Requirements

This part begins with a review of the survey framework for basic headings on household consumption (chapter 4). A significant improvement over ICP 2005 was the development of a set of global core products that became embedded in the list of products specific to each region. The development and use of the global core list in developing the regional lists is described, and guidelines are provided on determining the number of products in each basic heading to be priced and their specifications, identifying outlets where pricing will take place, and choosing the data collection forms to be used. Guidelines are also provided on the classification of each product as either "important" or "less important but available," which subsequently are used to weight products when computing basic heading PPPs.

Chapters 5–12 present specific guidelines for data collection for housing, water, private health, fast-evolving technology items, private education, government, machinery and equipment, and construction. These are the most difficult categories for which pricing or other information is collected, requiring specific



pricing guidelines consistent with the system of national accounts. Although each region determined its own set of products to be priced for household consumption basic headings, the complexity of the remaining categories led to the development of global specifications. For example, a global classification of government occupations is provided for the collection of compensation data. Meanwhile, the estimation of PPPs for the government basic headings became more complex, involving the use of productivity adjustments based on capital and labor ratios. The data requirements for the productivity adjustments are described.

Part II concludes with chapter 13, which presents guidelines on the estimation of national annual average prices and on other measures used to estimate PPPs. For consistency with the conceptual framework of GDP, it is important that the prices underlying the national accounts expenditures and the prices collected for the ICP are consistent. In practice, this means that prices underlying the PPPs must be national annual average prices to ensure consistency with the national accounts values. This requires in turn that prices be obtained across time and across the spatial spectrum, usually to ensure that both urban and rural areas are represented. Guidelines are provided on using weighting factors to combine quarterly prices in order to calculate annual prices and to combine urban and rural prices in order to calculate national prices.

### **Part III, Data Validation**

Chapters 14–21 outline the steps taken for each of the data types just described to validate the information provided by each economy for completeness and comparability with that of other economies. The first stage of validation is at the economy level to correct data collection handling errors caused by incorrect units of measure and other recording errors. The most intensive data validation compares prices across economies to ensure all priced the same item. Chapter 14 describes the different measures of variation and how to resolve potential errors using the Quaranta and Dikhanov tables. Chapters 15–19 detail the steps taken to validate prices and related measures collected for

household consumption, housing, government employee compensation, machinery and equipment, and construction. The data validation tools and methods are specific to these different data types.

A new method implemented for ICP 2011 was the classification of products as "important" and "less important but available," which then became weights in the estimation of basic heading PPPs. Chapter 20 describes these measures and the steps taken to validate the classification. The validation is based on the assumption that important products are more frequently consumed and thus are less expensive.

Another enhancement of ICP 2011 was a more intensive review of national accounts expenditures and their distribution across the basic headings. These validation steps appear in chapter 21.<sup>1</sup> Chapter 22 presents the guidelines for use of the Paasche-Laspeyres spread and the variability of the direct/indirect Gini-Ëltetö-Köves-Szulc (GEKS) PPPs for the validation of within-region and world comparisons.

### **Part IV, PPP Computation and Linking**

This part provides the computations needed to first estimate PPPs at the basic heading level and then aggregate or average them to GDP for economies within regions and then across regions.

Chapter 23 describes the country product dummy (CPD) method, which is used to compute the PPPs of product prices for each basic heading within each region, as well as the weighted CPD (CPD-W), which incorporates the important and less important weights (3:1) into the estimation of basic heading PPPs. The outcome of this computation is a matrix of  $N$  economies and  $B$  basic heading PPPs within each region. This matrix, along with a similar matrix containing  $N$  economies and  $E$  basic heading expenditure weights, is used to aggregate or average basic heading PPPs to aggregates of GDP and then to GDP.

For some basic headings, it is not possible to estimate PPPs even though the economy may estimate GDP expenditures for them. Examples are basic headings such as narcotics or animal-drawn vehicles. The basic heading on dwelling

rental causes similar problems in economies where there is simply no rental market because most people are living in rent-free housing. Chapter 24 describes the method to impute PPPs for these basic headings. Chapter 25 describes the GEKS method of aggregation to GDP, again within regions.

At this stage, one has the PPPs and real expenditures for economies within each region. For example, one knows the PPP of Brazil to Colombia and of India to China, but not the PPP between Brazil and China. Chapter 26 describes the linking process to calibrate within-region basic heading PPPs to a global PPP and from there the aggregation to the global GDP using the country aggregation with redistribution (CAR) method.

## SUMMARY

The underlying principle guiding the methodology just presented is the comparability of products, prices, and the accompanying data. As a result, no other statistical initiative requires this level of cooperation among economies.

They must agree on the products to be priced, the specifications of those products, and the methods for validation and estimation. The outcome of this effort is the publication of PPPs, real expenditures, per capita measures, price level indexes, and other measures for GDP and 25 aggregates.

## NOTE

1. Chapter 10 in *Measuring the Real Size of the World Economy* (World Bank 2013) added a new dimension to data validation by introducing methods to validate PPPs through the various stages of aggregation.

## REFERENCE

World Bank. 2013. *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)*. [http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/10\\_ICPBook\\_Validation\\_F.pdf](http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/10_ICPBook_Validation_F.pdf).

# National Accounts Framework for the ICP

Splitting gross domestic product (GDP) expenditures for the International Comparison Program (ICP) is a major statistical exercise that requires a great deal of cooperation and coordination between price statisticians and national accountants. Even if a large part of the overall work program is directed at identifying the representative and comparable products to be priced and then collecting the prices required to produce purchasing power parities (PPPs), the national accounts remain a critical part of the overall ICP. PPPs are of no use unless other relevant data are available to use with them. For example, PPPs are combined with national accounts data to produce real expenditures expressed in a common currency, which can then be used to compare the relative sizes of economies. PPPs can also be combined with exchange rates to provide price level indexes (PLIs), which reveal the relative price levels in different economies. Economies can then be compared on the basis of whether they are "expensive" or "cheap" to live in or to visit.

It is clear that national accounts have a major impact on the overall outcomes of the ICP. Thus one of the aims of the ICP 2011 round was to improve the quality of the national accounts data. Any errors in the national accounts data would have a direct impact on the real expenditures derived by applying PPPs to the national accounts values.

During the ICP 2011 round, the national accounts experts in the participating economies

had a much larger role than in earlier rounds. All economies were asked to review their national accounts data for the ICP so that the regional coordinating agencies could assess the implications for their respective regions and then advise the economies in their region on the best way to improve their national accounts under the framework provided by the System of National Accounts (SNA).<sup>1</sup>

The objective of this chapter on the national accounts framework is to present (1) the categories of basic headings (BHs); (2) the ways in which to identify sources; (3) the five GDP splitting approaches; (4) the Model Report on Expenditure Statistics (MORES); and (5) the conditional step-by-step process that will indicate which process to use.

## CATEGORIES OF BASIC HEADINGS

In theory, a basic heading consists of a set of similar goods or services. In practice, there is a trade-off between the theoretical need for close similarity between the products within any single BH and the practical difficulty of estimating expenditures for detailed BHs. As a result, BH expenditures are calculated in most cases by splitting a higher-level expenditure using a number of indicators (such as splitting the household final consumption expenditure on food into the 16 BHs within food).

The process of estimating detailed expenditure values depends on the type of basic heading. The 155 BHs can be categorized according to three different criteria: (1) consistency between the existence of price data and expenditure values (this implies that no BHs would have a zero value if there are corresponding price data or reference PPPs); (2) important versus less important BHs; and (3) difficulties in estimating values because of the unavailability of source data—for example, underground or illegal activities, the informal sector, and nonprofit institutions serving households (NPISHs) may be difficult to estimate.

### **Consistency**

Falling in this category are the BHs for which price surveys are conducted by economies. If the relevant products are found in an economy, that economy will report the prices as well as the expenditures for the BHs. National accountants should avoid a situation in which prices are reported or will be reported by their colleagues from the price section but the national accountants report a zero or no value.

Also, to the extent possible, prices implicitly or explicitly included in the expenditures should be consistent with those collected through the ICP price surveys.

### **Importance**

The ICP Global Office reviewed the BH expenditures and PPPs from the ICP 2005 round and sought comments from experts, regional coordinating agencies, and selected economies on which BHs they deemed important—that is, important in the sense that expenditure values must be reported for these BHs. If no value is provided, the economy concerned must submit a proper explanation about why this BH is not included in its economy. For example, a landlocked economy would not have sea transport.

In the validation process, all these BHs would be expected to display nonzero values unless otherwise justified.

### **Difficulty**

This category follows the same selection process as that just noted under "Importance" in terms of defining which BHs are deemed difficult

to treat. They are difficult in the sense that expenditure values cannot be estimated easily because (1) there is a paucity of data sources; (2) the SNA-recommended methods are complex; (3) most economies lack the capacity to do so; or (4) the BH is related to a comparison-resistant area.

In the estimation process, economies should pay specific attention to these BHs and submit metadata that are as detailed as possible to facilitate the validation process.

Using these three criteria (consistency, importance, and difficulty), the Global Office grouped the BHs into seven categories: consistency, importance, difficulty, ICP methods, production process, reference PPP BHs, and negative values (see annex A). The main objective of this categorization of BHs is to help users better understand the complexity of each one.

## **IDENTIFYING DATA SOURCES**

The data sources used in compiling national accounts differ significantly from one economy to another depending on the type of statistical system in place, the extent to which data are taken from administrative sources or from statistical surveys, and the methods underlying the accounts.

There are several data sources that could be used to obtain detailed information for the main ICP Classification aggregates. For most of the BHs under individual consumption expenditure by households, household expenditure surveys can be used as the main sources. As an example, for the rice basic heading, GDP expenditures could be estimated by means of household expenditure surveys, retail censuses or surveys, agriculture censuses or surveys, food balances (Food and Agriculture Organization), product tax data (such as value added tax), population data (census or labor force survey), credit card transaction data, scanner data, and consumer price index (CPI) weights. For the gross fixed capital formation basic headings, such as motor vehicles, trailers, and semitrailers, the recommended sources are agriculture censuses or surveys, general economic censuses or surveys, capital expenditure surveys, income tax data (personal or business),

**Table 1.1** Potential Data Sources by Main Aggregates, ICP 2011

Main aggregate	Number of potential data sources	Type of data source
Individual consumption expenditure by households	9	Household expenditure surveys
Individual consumption expenditure by NPISHs	1	Special surveys
Individual consumption expenditure by government	5	Government finance statistics Household expenditure surveys
Collective consumption expenditure by government	1	Government finance statistics
Gross fixed capital formation	6	General economic surveys Import statistics
Changes in inventories and net acquisitions of valuables	4	General economic surveys
Balance of exports and imports	3	Balance of payments

Source: ICP, <http://icp.worldbank.org>.

Note: NPISHs = nonprofit institutions serving households.

and customs or trade statistics. For export and import of goods and services, the three main sources that could be used are customs or trade statistics, surveys of international travelers, and balance of payments data.

Table 1.1 summarizes the sources of information (such as surveys, national statistics) by main aggregates. Annex B provides suggested sources of data for each basic heading.

It is difficult to describe the specific procedures one follows to estimate GDP for 2011 based on data from earlier years because they vary considerably from economy to economy. However, some general principles are described in annex C. The drivers have been grouped into six subgroups of indicators: demography, supply, health, inflation, GDP, and government finance statistics. They are not intended to be prescriptive; rather, they should be used as a starting point and adapted to fit each economy's specific needs. Their key characteristics, however, are that some 2011 data are available for use in the process and that a reasonably stable historical relationship exists between any indicator series and the corresponding national accounts data set.

Finally, in order to cross-check the expenditure values of some BHs, the last column in the table in annex C indicates the possible correlation between selected BHs. For example, the BH maintenance and repair of the dwelling (110431.1) will likely correlate with the actual and imputed rentals for housing (110411.1) in

the same way in which expenditures on fuels and lubricants for personal transport equipment (110722.1) are expected to align with those on motor cars (110711.1).

## FIVE APPROACHES TO SPLITTING GDP

The Global Office has divided the methods that can be used to obtain BH values into five approaches (table 1.2):

1. Direct estimation
2. Extrapolating from a recent year or from 2005
3. Borrowing a per capita quantity or volume from an economy in the same cluster related to a particular BH
4. Borrowing a structure related to a class, subgroup, or group from an economy in the same cluster related to a particular higher-level heading
5. Using expert opinion to split a category's volume or quantity (class, subgroup, or group) into its component BHs.

Approach 1 (direct estimation) is the preferred method. The perfect case is that every one of the 155 BHs is estimated directly, and GDP is obtained as the sum of these BHs. The direct approach is used when the basic heading expenditure can be estimated using data directly related to the reference year. In practice, a common approach is to take direct

**Table 1.2** Five Approaches to Splitting GDP, ICP 2011

Approach	Description
1. Direct estimation	The preferred method if data sources exist
2. Extrapolation	Update an earlier expenditure breakdown using assumptions on population growth, price changes, and so forth.
3. "Borrowing" a per capita quantity or volume	Requires clustering economies for each BH or group of BHs Multiply the per capita quantity or volume by the population of the "borrowing economy" and the price level index between the two economies.
4. "Borrowing" a structure	Adjust the "borrowed" structure by a vector of the price level indexes between the two economies.
5. Using expert opinion	Consult retailers, manufacturers, marketing experts, chambers of commerce, and other sources.

Source: ICP, <http://icp.worldbank.org/>.

estimates at the most detailed level possible and then split them further into their component BHs. The methods used in this splitting process can vary from those based on some data (even though the data may not be directly related to the sources used in compiling the national accounts) to indirect methods such as those in approaches 2–5.

Because they are indirect, approaches 2–5 are the second-best methods, but they are preferable to a simplistic method such as allocating the expenditure for a class evenly across the BHs in that class. Approaches 3 and 4 require dividing all the economies within a region into clusters for each BH or each category of BHs. Annex D provides additional information on GDP splitting approaches.

### Direct Method of Estimating BH Data (Approach 1)

It is preferred that BHs be directly estimated to the greatest extent possible. To assist in this process, the Global Office developed a reporting model, MORES, that economies can use in their estimation (see next section).

### Indirect Methods of Estimating BH Data (Approaches 2–5)

Some of the economies participating in the ICP 2011 round may experience certain difficulties in providing estimates of final expenditure for all the BHs required for their regional expenditure classification. In the case that an economy is able to provide expenditures only at the group or class level of the classification, the indirect methods of estimating BH data are suggested,

rather than arbitrarily splitting BH expenditures. This is because the ICP method requires expenditure values for all the BHs used for each regional comparison. But this approach would be problematic because the regional coordinating agencies have less information than the statisticians working in the economies concerned. Therefore, participating economies should assign values to all BHs even if this is possible only in a rather arbitrary and subjective fashion. Some possibilities, in order of preference, are splitting approaches 2–5.

#### *Approach 2: Extrapolation from a Recent Year or from 2005*

If an expenditure breakdown is available for an earlier year—such as when the economy participated in ICP 2005—the relevant detailed expenditures could be at least partially updated using specific assumptions on population growth, price evolutions, and so forth.

For many of the components of household final consumption expenditure that are similar to those in an economy's CPI, the CPI weights can be used to estimate the expenditure values for the relevant headings in the GDP classification. The issue is obtaining the BH values by using the CPI weights (price updated) to split higher-level values, which still have to be estimated directly.

#### *Approach 3: Borrowing a Per Capita Quantity or Volume from an Economy in the Same Cluster Related to a Particular BH*

This approach requires clustering economies for each BH or group of BHs. The per capita quantity or volume borrowed from a same-cluster

economy needs to be multiplied by the population of the borrowing economy and a price factor representing the price level index between the two economies.

***Approach 4: Borrowing a Structure Related to a Class, Subgroup, or Group from an Economy in the Same Cluster Related to a Particular Higher-Level Heading***

This approach, too, requires clustering economies for each BH or group of BHs. The structure borrowed from a same-cluster economy needs to be adjusted by a vector of price factors representing the price level indexes between the two economies for the relevant higher-level heading.

***Approach 5: Using Expert Opinion to Split a Category's Volume or Quantity (Class, Subgroup, or Group) into Its Component BHs***

Expenditures estimated for a higher level of a classification should not be arbitrarily divided among the BHs. This is an unsatisfactory solution, and an informed guess by an economy's national accountants, even if it is rough, is preferable to a simplistic split into even amounts. However, if none of the four other approaches can be implemented, the notional volume or quantity estimated for a higher level of the classification could be divided among the BHs using expert opinion. This might involve consulting retailers, manufacturers, marketing experts, chambers of commerce, and other government departments. Each resulting BH notional volume or quantity must be multiplied by a price factor that expresses the price level of the BH in relation to the other BHs under the same higher level of the classification. This approach would provide BH expenditure indicators that are calibrated to the total expenditure value of the higher aggregate.

## THE MORES MODEL

After extensive consultations and pilot studies, the ICP Global Office developed the MORES model. The main objective of the model is to support economies in their efforts to provide a detailed metadata report showing how expenditures are

estimated for each basic heading. Specifically, it helps economies to compile (1) detailed expenditure values for each BH in the ICP Classification; (2) information on the splitting approach; and (3) information on the indicators used or to be used to estimate the expenditure values.

The Excel version of the MORES model depicted in this section is grouped into sets of three tabs per year for two years: latest year available and 2011. "Latest year available" refers to the latest year that had finalized, detailed data of national accounts. This year can differ by country, ranging mostly from 2008 to 2010. The first three tabs refer to national accounts information for the latest year available. Tabs 4, 5, and 6 relate to 2011 information. Tab 7 shows the parameters used in previous tabs.

Tabs 1 and 4 of the Excel file are identical and include the initial expenditure values (column 3), estimated expenditure values (column 4), and discrepancies between those two values (column 5). The form is designed so that the user inserts the values at the BH levels, and the aggregated levels are then calculated automatically. First, the BH values are entered in column (3) in the shaded cells as "initial" values. Second, the user goes to tab 2 or tab 5 to compute the "estimated" BH values, which are automatically transferred to column (4). A detailed guideline for the "estimated" values is presented later in this chapter. Third, the form automatically calculates the "discrepancies" and fills in column (5).

Once this procedure is carried out and all three columns are filled in, details for major aggregates above the BH level should be checked against the national accounts estimates for the corresponding year. Any discrepancies should be corrected or explained at the BH level of this form, so that the reported aggregated value in MORES matches the economy's official national accounts data.

This reporting form is a supplemental tool for any economies who experience difficulties in estimating expenditures for any BHs.

As just noted, to fill in column (4) of tabs 1 and 4 the user must enter tabs 2 and 5 of the Excel file. These forms help to estimate expenditures by using different sources and approaches, whereas in tabs 1 and 4 the BH values must be

### Tabs 1 and 4: Expenditure Values

GDP classification		Initial expenditure value	Estimated expenditure value	Discrepancies
Code	Heading			
100000	Gross domestic product			
110000	Individual consumption expenditure by households			
110100	Food and nonalcoholic beverages			
110110	Food			
110111	Bread and cereals			
110111.1	Rice			
[...]	[...]			

### Tabs 2 and 5: Estimation of BH Expenditures

MORES template		#	Indicator name	Source name	Year	Value	Unit
Code	Name						
110111.1	Rice						
Splitting approach							
2	Extrapolation						
Estimated expenditure for					110111.1	Value	

entered directly. The user is expected to enter other indicators from national survey data (e.g., the value from year before, population change, change in the consumer price index, etc.) in order to estimate BH expenditures.

The user should then go back to tab 1 or tab 4 to confirm that columns (3) and (4) are filled in, and if all are done correctly, column (5) will compute the discrepancies between the two expenditure values for each BH level and other



## Tabs 3 and 6: Final Expenditure Values

GDP classification		Final expenditure value
Code	Heading	
1 100000	2 Gross domestic product	3
110000	Individual consumption expenditure by households	
110100	Food and nonalcoholic beverages	
110110	Food	
110111	Bread and cereals	
110111.1	Rice	
[...]	[...]	

**Table 1.3** Completing the MORES Model in Six Steps, ICP 2011

Tab 1	Complete column (3) of tab 1 with whatever aggregate estimates are available.										
	<table border="1"> <thead> <tr> <th>GDP classification codes</th> <th>Classification heading names</th> <th>Initial expenditure values (GDP and main uses)</th> <th>Basic heading values estimated using the proposed five approaches</th> <th>Discrepancies (3)–(4)</th> </tr> <tr> <th>(1)</th> <th>(2)</th> <th>(3)</th> <th>(4)</th> <th>(5)</th> </tr> </thead> </table>	GDP classification codes	Classification heading names	Initial expenditure values (GDP and main uses)	Basic heading values estimated using the proposed five approaches	Discrepancies (3)–(4)	(1)	(2)	(3)	(4)	(5)
GDP classification codes	Classification heading names	Initial expenditure values (GDP and main uses)	Basic heading values estimated using the proposed five approaches	Discrepancies (3)–(4)							
(1)	(2)	(3)	(4)	(5)							
Tab 2	Apply five approaches in tab 2 to estimate BH values.										
From tab 2 to 1	Column (4) of tab 1 receives estimated expenditure values from tab 2.										
Tab 1	In tab 1, the discrepancies between columns (3) and (4) appear under column (5).										
Tab 1 and/or 2	To resolve discrepancies in column (5), tab 1, adjustments should be made in tab 2 and/or in tab 1, column (3).										
Tab 3	In tab 3, read results if discrepancies solved.										

Source: ICP, <http://icp.worldbank.org/>.

aggregates, including GDP. If the user sees a large value, she or he would return to the processes just described and fix the discrepancies.

Tabs 3 and 6 return expenditure values for the latest year available and for 2011 only if the discrepancy between the initial GDP and estimated GDP is under a certain percentage (3–5 percent). If the user notices that these tabs are

not filled in, she or he would have to return to the earlier processes to fix the values. With its multiple checking points, the MORES ensures that the national accounts data are the most accurate possible.

To fill out the MORES efficiently, the Global Office recommends taking the follow-up steps described in table 1.3.

Tab 1 of the MORES model is used to obtain the BH data. Once all BH values have been entered, it automatically provides the values for the higher-level aggregates.

Tab 2 compiles some of the most important information collected during the ICP exercise while allowing BH values to be estimated. It provides a standard form in which economies can describe the sources of the BH estimates and how data were adjusted to update them to the reference year or corrected for coverage shortcomings or differences in definitions. This sheet is designed to document the process used to estimate expenditures. In many cases, the same adjustment method will be used for blocks of BHs within a class. The form can also be used as a repository of the different sources used to estimate each BH expenditure value.

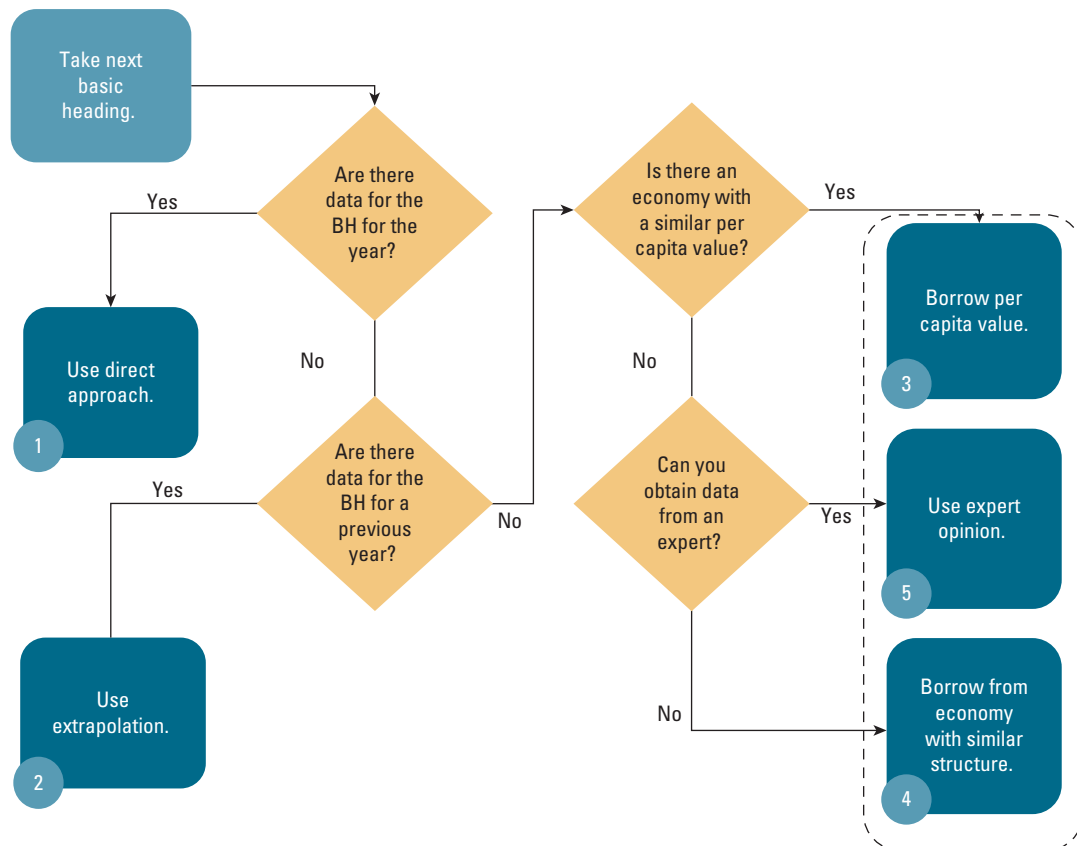
Tab 3 reveals whether the discrepancies were resolved.

## CONDITIONAL STEP-BY-STEP PROCESS

The conditional step-by-step process aims to guide users through the process of deciding which approach to use for splitting GDP depending on (1) data accessibility for the most recent year and previous years; (2) data availability for any particular economy or group of economies with similar GDP per capita; and (3) the possibility of obtaining data from an expert.

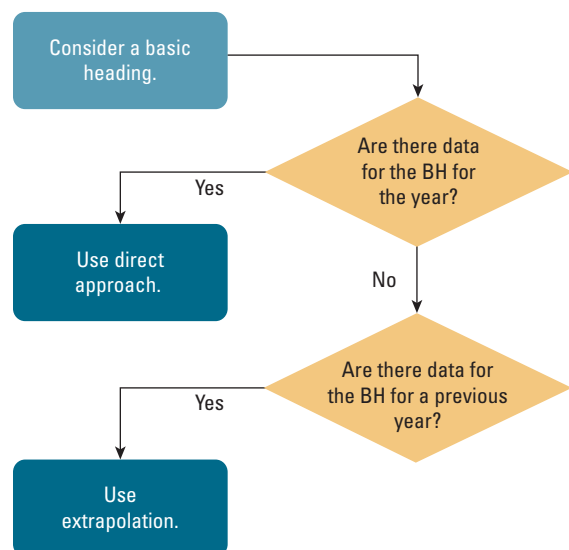
Figures 1.1 and 1.2 summarize the conditional step-by-step processes, showing the approaches and forms that should be used in each step either for the latest available year or for 2011. In figure 1.1, the Global Office–recommended sequence for the latest available year is indicated by the circled numbers. In selecting the best approach to use, national accountants should follow the order of the

**Figure 1.1** Conditional Step-by-Step Process for Choosing a GDP Splitting Approach for the Latest Available Year, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

**Figure 1.2** Conditional Step-by-Step Process for Choosing a GDP Splitting Approach for ICP 2011 or Any Upcoming ICP Benchmark Year



Source: ICP, <http://icp.worldbank.org/>.

conditional step-by-step process. First, if data are available for a particular BH, then the direct approach should be used. Second, if data from the latest available year cannot be accessed but some data from a previous year are accessible, then the extrapolation method should be used. Finally, if no data are available, then approach 3 (borrowing per capita values from similar economies that have similar per capita values), approach 4 (borrowing the structure from similar economies), or approach 5 (using an expert's opinion) should be used. All three of these approaches require input from the regional coordinating agencies.

It is very important that national accountants revise systematically all the information related to the latest available year because if no data are available for the current ICP benchmark year, data from the latest available year will be used for the GDP extrapolation.

**Annex A**  
**Categories of Basic Headings, ICP 2011**

Code		1. Consistency	2. Importance	3. Difficulty	4. ICP methods	5. Production process	6. Reference PPP BHs	7. Negative values
<b>110000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>							
110111.1	Rice	X						
110111.2	Other cereals, flour, and other cereal products	X	X					
110111.3	Bread	X	X					
110111.4	Other bakery products	X	X					
110111.5	Pasta products	X						
110112.1	Beef and veal	X	X					
110112.2	Pork	X						
110112.3	Lamb, mutton, and goat	X	X					
110112.4	Poultry	X	X					
110112.5	Other meats and meat preparations	X	X					
110113.1	Fresh, chilled, or frozen fish and seafood	X	X					
110113.2	Preserved or processed fish and seafood	X	X					
110114.1	Fresh milk	X						
110114.2	Preserved milk and other milk products	X	X					
110114.3	Cheese	X	X					
110114.4	Eggs and egg-based products	X	X					
110115.1	Butter and margarine	X						
110115.2	Other edible oils and fats	X	X					
110116.1	Fresh or chilled fruit	X	X					
110116.2	Frozen, preserved, or processed fruit and fruit-based products	X						
110117.1	Fresh or chilled vegetables other than potatoes	X	X					
110117.2	Fresh or chilled potatoes	X						
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products	X						
110118.1	Sugar	X	X					
110118.2	Jams, marmalades, and honey	X						
110118.3	Confectionery, chocolate, and ice cream	X	X					
110119.1	Food products n.e.c.	X						
110121.1	Coffee, tea, and cocoa	X	X					
110122.1	Mineral waters, soft drinks, fruit and vegetable juices	X	X					
110211.1	Spirits	X	X					
110212.1	Wine	X	X					
110213.1	Beer	X	X					
110221.1	Tobacco	X	X					
110231.1	Narcotics	X		X				
110311.1	Clothing materials, other articles of clothing, and clothing accessories	X	X					

**Annex A (Continued)**

Code		1. Consistency	2. Importance	3. Difficulty	4. ICP methods	5. Production process	6. Reference PPP BHs	7. Negative values
110312.1	Garments	X	X					
110314.1	Cleaning, repair, and hire of clothing	X						
110321.1	Shoes and other footwear	X	X					
110322.1	Repair and hire of footwear	X						
110411.1	Actual and imputed rentals for housing	X	X	X				
110431.1	Maintenance and repair of the dwelling	X	X					
110441.1	Water supply	X	X					
110442.1	Miscellaneous services relating to the dwelling		X				X	
110451.1	Electricity	X	X					
110452.1	Gas	X	X					
110453.1	Other fuels	X	X					
110511.1	Furniture and furnishings	X	X					
110512.1	Carpets and other floor coverings	X	X					
110513.1	Repair of furniture, furnishings, and floor coverings	X						
110521.1	Household textiles	X	X					
110531.1	Major household appliances whether electric or not	X	X					
110532.1	Small electric household appliances	X	X					
110533.1	Repair of household appliances	X						
110541.1	Glassware, tableware, and utensils	X	X					
110551.1	Major tools and equipment	X	X					
110552.1	Small tools and miscellaneous accessories	X	X					
110561.1	Nondurable household goods	X	X					
110562.1	Domestic services	X	X					
110562.2	Household services						X	
110611.1	Pharmaceutical products	X	X					
110612.1	Other medical products	X						
110613.1	Therapeutic appliances and equipment	X	X					
110621.1	Medical services	X	X					
110622.1	Dental services	X	X					
110623.1	Paramedical services	X	X					
110631.1	Hospital services		X				X	
110711.1	Motor cars	X	X					
110712.1	Motorcycles	X	X					
110713.1	Bicycles	X						
110714.1	Animal-drawn vehicles	X		X				
110722.1	Fuels and lubricants for personal transport equipment	X	X					
110723.1	Maintenance and repair of personal transport equipment	X	X					

*table continues next page*

**Annex A (Continued)**

Code		1. Consistency	2. Importance	3. Difficulty	4. ICP methods	5. Production process	6. Reference PPP BHs	7. Negative values
110724.1	Other services in respect of personal transport equipment	X						
110731.1	Passenger transport by railway	X	X					
110732.1	Passenger transport by road	X	X					
110733.1	Passenger transport by air	X	X					
110734.1	Passenger transport by sea and inland waterway	X						
110735.1	Combined passenger transport			X			X	
110736.1	Other purchased transport services						X	
110811.1	Postal services	X	X					
110821.1	Telephone and telefax equipment	X	X					
110831.1	Telephone and telefax services	X	X					
110911.1	Audiovisual, photographic, and information processing equipment	X	X					
110914.1	Recording media	X	X					
110915.1	Repair of audiovisual, photographic, and information processing equipment	X						
110921.1	Major durables for outdoor and indoor recreation	X	X					
110923.1	Maintenance of other major durables for recreation and culture	X	X					
110931.1	Other recreational items and equipment	X	X					
110933.1	Garden and pets	X	X					
110935.1	Veterinary and other services for pets	X	X					
110941.1	Recreational and sporting services	X	X					
110942.1	Cultural services	X	X					
110943.1	Games of chance		X	X			X	
110951.1	Newspapers, books, and stationery	X	X					
110961.1	Package holidays		X				X	
111011.1	Education	X	X	X	X			
111111.1	Catering services	X	X					
111121.1	Accommodation services	X	X					
111211.1	Hairdressing and grooming establishments	X	X					
111212.1	Appliances, articles, and products for personal care	X	X					
111221.1	Prostitution			X			X	
111231.1	Jewelry, clocks, and watches	X	X					
111232.1	Other personal effects	X						
111241.1	Social protection		X				X	
111251.1	Insurance		X				X	
111261.1	Financial intermediation services indirectly measured (FISIM)		X	X	X		X	
111262.1	Other financial services	X	X					
111271.1	Other services n.e.c.	X	X					

**Annex A (Continued)**

Code		1. Consistency	2. Importance	3. Difficulty	4. ICP methods	5. Production process	6. Reference PPP BHs	7. Negative values
111311.1	Purchases by residential households in the rest of the world			X			X	
111311.2	Purchases by nonresidential households in the economic territory of the country			X			X	X
<b>120000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>							
120111.1	Individual consumption expenditure by NPISHs		X	X			X	
<b>130000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>							
130111.1	Housing	X	X	X	X			
130211.1	Pharmaceutical products	X	X					
130211.2	Other medical products	X	X					
130211.3	Therapeutic appliances and equipment	X	X					
130212.1	Outpatient medical services	X	X		X			
130212.2	Outpatient dental services	X	X		X			
130212.3	Outpatient paramedical services	X	X		X			
130212.4	Hospital services	X	X		X			
130221.1	Compensation of employees	X	X	X	X	X		
130222.1	Intermediate consumption		X	X		X	X	
130223.1	Gross operating surplus			X		X	X	
130224.1	Net taxes on production			X		X	X	
130225.1	Receipts from sales			X		X	X	X
130311.1	Recreation and culture		X				X	
130411.1	Education benefits and reimbursements		X	X			X	
130421.1	Compensation of employees	X	X	X	X	X		
130422.1	Intermediate consumption		X	X		X	X	
130423.1	Gross operating surplus			X		X	X	
130424.1	Net taxes on production			X		X	X	
130425.1	Receipts from sales			X		X	X	X
130511.1	Social protection			X			X	
<b>140000.0</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>							
140111.1	Compensation of employees	X	X	X	X	X		
140112.1	Intermediate consumption		X	X		X	X	
140113.1	Gross operating surplus			X		X	X	
140114.1	Net taxes on production			X		X	X	
140115.1	Receipts from sales			X		X	X	X
<b>150000.0</b>	<b>GROSS FIXED CAPITAL FORMATION</b>							
150111.1	Fabricated metal products, except machinery and equipment	X	X	X	X			
150112.1	General-purpose machinery	X	X	X	X			
150113.1	Special-purpose machinery	X	X	X	X			

*table continues next page*

**Annex A** (Continued)

Code		1. Consistency	2. Importance	3. Difficulty	4. ICP methods	5. Production process	6. Reference PPP BHs	7. Negative values
150114.1	Electrical and optical equipment	X	X	X	X			
150115.1	Other manufactured goods n.e.c.	X	X	X	X			
150121.1	Motor vehicles, trailers, and semitrailers	X	X	X	X			
150121.2	Other road transport	X	X	X	X			
150122.1	Other transport equipment		X	X			X	
150211.1	Residential buildings	X	X	X	X			
150221.1	Nonresidential buildings	X	X	X	X			
150231.1	Civil engineering works	X	X	X	X			
150311.1	Other products	X		X	X			
<b>160000.0</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>							
160111.1	Opening value of inventories			X			X	X
160111.2	Closing value of inventories			X			X	
160211.1	Acquisitions of valuables			X			X	
160211.2	Disposals of valuables			X			X	X
<b>170000.0</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>							
170111.1	Exports of goods and services		X				X	
170111.2	Imports of goods and services		X				X	X

Source: ICP, <http://icp.worldbank.org/>.

Note: BH = basic heading; n.e.c. = not elsewhere classified; NPISHs = nonprofit institutions serving households.





**Annex B**  
**Potential Data Sources, ICP 2011**

Code	Basic heading	Household expenditure survey	Retail census/survey	Agriculture census/survey	Food balances (FAO)	Services industries census/survey	General economic census/survey
<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>							
110111.1	Rice	X	X	X	X		
110111.2	Other cereals, flour, and other cereal products	X	X	X	X		
110111.3	Bread	X	X	X	X		
110111.4	Other bakery products	X	X	X	X		
110111.5	Pasta products	X	X	X	X		
110112.1	Beef and veal	X	X	X	X		
110112.2	Pork	X	X	X	X		
110112.3	Lamb, mutton, and goat	X	X	X	X		
110112.4	Poultry	X	X	X	X		
110112.5	Other meats and meat preparations	X	X	X	X		
110113.1	Fresh, chilled, or frozen fish and seafood	X	X		X		
110113.2	Preserved or processed fish and seafood	X	X		X		
110114.1	Fresh milk	X	X	X	X		
110114.2	Preserved milk and other milk products	X	X		X		
110114.3	Cheese	X	X	X	X		
110114.4	Eggs and egg-based products	X	X	X	X		
110115.1	Butter and margarine	X	X		X		
110115.2	Other edible oils and fats	X	X		X		
110116.1	Fresh or chilled fruit	X	X		X		
110116.2	Frozen, preserved, or processed fruits and fruit-based products	X	X		X		
110117.1	Fresh or chilled vegetables other than potatoes	X	X		X		
110117.2	Fresh or chilled potatoes	X	X		X		
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products	X	X		X		
110118.1	Sugar	X	X	X	X		
110118.2	Jams, marmalades, and honey	X	X		X		
110118.3	Confectionery, chocolate, and ice cream	X	X		X		
110119.1	Food products n.e.c.	X	X		X		
110121.1	Coffee, tea, and cocoa	X	X		X		
110122.1	Mineral waters, soft drinks, fruit and vegetable juices	X	X		X		
110211.1	Spirits	X	X				
110212.1	Wine	X	X				



**Annex B (Continued)**

Code	Basic heading	Household expenditure survey	Retail census/survey	Agriculture census/survey	Food balances (FAO)	Services industries census/survey	General economic census/survey
110213.1	Beer	X	X				
110221.1	Tobacco	X	X				
110231.1	Narcotics						
110311.1	Clothing materials, other articles of clothing, and clothing accessories	X	X				
110312.1	Garments	X	X				
110314.1	Cleaning, repair, and hire of clothing	X	X				
110321.1	Shoes and other footwear	X	X				
110322.1	Repair and hire of footwear	X					
110411.1	Actual and imputed rentals for housing						
110431.1	Maintenance and repair of the dwelling	X					
110441.1	Water supply	X					
110442.1	Miscellaneous services relating to the dwelling	X					
110451.1	Electricity	X				X	
110452.1	Gas	X				X	
110453.1	Other fuels	X				X	
110511.1	Furniture and furnishings	X	X				
110512.1	Carpets and other floor coverings	X	X				
110513.1	Repair of furniture, furnishings, and floor coverings	X				X	
110521.1	Household textiles	X	X				
110531.1	Major household appliances whether electric or not	X	X				
110532.1	Small electric household appliances	X	X				
110533.1	Repair of household appliances	X				X	
110541.1	Glassware, tableware, and utensils	X	X				
110551.1	Major tools and equipment	X	X				
110552.1	Small tools and miscellaneous accessories	X	X				
110561.1	Nondurable household goods	X	X				
110562.1	Domestic services	X				X	
110562.2	Household services	X				X	
110611.1	Pharmaceutical products	X	X				
110612.1	Other medical products	X	X				
110613.1	Therapeutic appliances and equipment	X	X				
110621.1	Medical services	X				X	
110622.1	Dental services	X				X	



**Annex B (Continued)**

Code	Basic heading	Household expenditure survey	Retail census/survey	Agriculture census/survey	Food balances (FAO)	Services industries census/survey	General economic census/survey
110623.1	Paramedical services	X				X	
110631.1	Hospital services	X				X	
110711.1	Motor cars	X	X				
110712.1	Motorcycles	X	X				
110713.1	Bicycles	X	X				
110714.1	Animal-drawn vehicles	X	X				
110722.1	Fuels and lubricants for personal transport equipment	X	X				
110723.1	Maintenance and repair of personal transport equipment	X				X	
110724.1	Other services in respect of personal transport equipment	X				X	
110731.1	Passenger transport by railway	X				X	
110732.1	Passenger transport by road	X				X	
110733.1	Passenger transport by air	X				X	
110734.1	Passenger transport by sea and inland waterway	X				X	
110735.1	Combined passenger transport	X				X	
110736.1	Other purchased transport services	X				X	
110811.1	Postal services	X				X	
110821.1	Telephone and telefax equipment	X					
110831.1	Telephone and telefax services	X				X	
110911.1	Audiovisual, photographic, and information processing equipment	X	X				
110914.1	Recording media	X	X				
110915.1	Repair of audiovisual, photographic, and information processing equipment	X				X	
110921.1	Major durables for outdoor and indoor recreation	X	X				
110923.1	Maintenance of other major durables for recreation and culture	X	X				
110931.1	Other recreational items and equipment	X	X				
110933.1	Garden and pets	X	X				
110935.1	Veterinary and other services for pets	X				X	
110941.1	Recreational and sporting services	X				X	
110942.1	Cultural services	X				X	
110943.1	Games of chance	X					
110951.1	Newspapers, books, and stationery	X	X				
110961.1	Package holidays	X				X	
111011.1	Education	X				X	
111111.1	Catering services	X				X	



**Annex B (Continued)**

Code	Basic heading	Household expenditure survey	Retail census/survey	Agriculture census/survey	Food balances (FAO)	Services industries census/survey	General economic census/survey
11121.1	Accommodation services	X				X	
111211.1	Hairdressing and grooming establishments	X				X	
111212.1	Appliances, articles, and products for personal care	X	X				
111221.1	Prostitution						
111231.1	Jewelry, clocks, and watches	X	X				
111232.1	Other personal effects	X	X				
111241.1	Social protection						
111251.1	Insurance	X				X	
111261.1	Financial intermediation services indirectly measured (FISIM)						X
111262.1	Other financial services	X				X	
111271.1	Other services n.e.c.	X				X	
111311.1	Purchases by residential households in the rest of the world						
111311.2	Purchases by nonresidential households in the economic territory in the country						
<b>120000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>						
120111.1	Individual consumption expenditure by NPISHs						
<b>130000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>						
130111.1	Housing						
130211.1	Pharmaceutical products	X				X	
130211.2	Other medical products	X				X	
130211.3	Therapeutic appliances and equipment	X				X	
130212.1	Outpatient medical services	X				X	
130212.2	Outpatient dental services	X				X	
130212.3	Outpatient paramedical services	X				X	
130212.4	Hospital services	X				X	
130221.1	Compensation of employees						
130222.1	Intermediate consumption						
130223.1	Gross operating surplus						
130224.1	Net taxes on production						
130225.1	Receipts from sales						
130311.1	Recreation and culture	X				X	
130411.1	Education benefits and reimbursements	X				X	
130421.1	Compensation of employees						
130422.1	Intermediate consumption						





Annex B (Continued)

Code	Basic heading	Household expenditure survey	Retail census/survey	Agriculture census/survey	Food balances (FAO)	Services industries census/survey	General economic census/survey
130423.1	Gross operating surplus						
130424.1	Net taxes on production						
130425.1	Receipts from sales						
130511.1	Social protection						
<b>140000.0</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>						
140111.1	Compensation of employees						
140112.1	Intermediate consumption						
140113.1	Gross operating surplus						
140114.1	Net taxes on production						
140115.1	Receipts from sales						
<b>150000.0</b>	<b>GROSS FIXED CAPITAL FORMATION</b>						
150111.1	Fabricated metal products, except machinery and equipment			X			X
150112.1	General-purpose machinery			X			X
150113.1	Special-purpose machinery			X			X
150114.1	Electrical and optical equipment			X			X
150115.1	Other manufactured goods n.e.c.			X			X
150121.1	Motor vehicles, trailers, and semitrailers			X			X
150121.2	Other road transport			X			X
150122.1	Other transport equipment			X			X
150211.1	Residential buildings			X			X
150221.1	Nonresidential buildings			X			X
150231.1	Civil engineering works			X			X
150311.1	Other products			X			X
<b>160000.0</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>						
160111.1	Opening value of inventories			X			X
160111.2	Closing value of inventories			X			X
160211.1	Acquisitions of valuables			X			X
160211.2	Disposals of valuables			X			X
<b>170000.0</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>						
170111.1	Exports of goods and services						
170111.2	Imports of goods and services						

Source: ICP, <http://icp.worldbank.org/>.

Note: FAO = Food and Agriculture Organization; VAT = value added tax; n.e.c. = not elsewhere classified; NPISHs = nonprofit institutions serving households.



## Annex C

### GDP Splitting Drivers, ICP 2011

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
<b>110000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>														
110111.1	Rice	X					X	X				X			
110111.2	Other cereals, flour, and other cereal products	X					X	X				X			
110111.3	Bread	X					X	X				X			
110111.4	Other bakery products	X					X	X				X			
110111.5	Pasta products	X					X	X				X			
110112.1	Beef and veal	X					X	X	X			X			
110112.2	Pork								X						
110112.3	Lamb, mutton, and goat								X						
110112.4	Poultry								X						
110112.5	Other meats and meat preparations	X					X	X				X			
110113.1	Fresh, chilled, or frozen fish and seafood	X					X	X				X			
110113.2	Preserved or processed fish and seafood	X					X	X				X			
110114.1	Fresh milk	X					X	X				X			
110114.2	Preserved milk and other milk products	X					X	X				X			
110114.3	Cheese	X					X	X				X			
110114.4	Eggs and egg-based products	X					X	X				X			
110115.1	Butter and margarine	X					X	X				X			
110115.2	Other edible oils and fats	X					X	X				X			
110116.1	Fresh or chilled fruit	X					X	X				X			
110116.2	Frozen, preserved, or processed fruit and fruit-based products	X					X	X				X			
110117.1	Fresh or chilled vegetables other than potatoes	X					X	X				X			
110117.2	Fresh or chilled potatoes	X					X	X				X			
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products	X					X	X				X			
110118.1	Sugar	X					X	X				X			
110118.2	Jams, marmalades, and honey	X					X	X				X			
110118.3	Confectionery, chocolate, and ice cream	X					X	X				X			
110119.1	Food products n.e.c.	X					X	X				X			

Annex C (Continued)

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
110121.1	Coffee, tea, and cocoa	X					X	X			X				
110122.1	Mineral waters, soft drinks, and fruit and vegetable juices	X					X	X			X				
110211.1	Spirits	X					X	X			X				
110212.1	Wine	X					X	X			X				
110213.1	Beer	X					X	X			X				
110221.1	Tobacco	X					X	X			X				
110231.1	Narcotics	X					X	X			X				
110311.1	Clothing materials, other articles of clothing, and clothing accessories	X					X	X			X				
110312.1	Garments	X					X	X			X				
110314.1	Cleaning, repair, and hire of clothing	X					X	X			X				110312.1—Garments
110321.1	Shoes and other footwear	X					X	X			X				
110322.1	Repair and hire of footwear	X					X	X			X				110322.1—Repair and hire of footwear
110411.1	Actual and imputed rentals for housing				X						X				
110431.1	Maintenance and repair of the dwelling				X										110411.1—Actual and imputed rentals for housing
110441.1	Water supply	X					X				X	X			
110442.1	Miscellaneous services relating to the dwelling				X										110411.1—Actual and imputed rentals for housing
110451.1	Electricity	X					X				X	X			
110452.1	Gas	X					X				X	X			
110453.1	Other fuels	X					X				X	X			
110511.1	Furniture and furnishings				X		X				X				
110512.1	Carpets and other floor coverings				X		X				X				
110513.1	Repair of furniture, furnishings, and floor coverings				X		X				X				110511.1—Furniture and furnishings
110521.1	Household textiles				X						X				110411.1—Actual and imputed rentals for housing

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Annex C (Continued)

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
110531.1	Major household appliances whether electric or not				X							X			110411.1—Actual and imputed rentals for housing
110532.1	Small electric household appliances				X							X			110411.1—Actual and imputed rentals for housing
110533.1	Repair of household appliances				X							X			110531.1–110532.1
110541.1	Glassware, tableware, and utensils				X							X			110411.1—Actual and imputed rentals for housing
110551.1	Major tools and equipment				X							X			110411.1—Actual and imputed rentals for housing
110552.1	Small tools and miscellaneous accessories				X							X			110411.1—Actual and imputed rentals for housing
110561.1	Nondurable household goods				X							X			110411.1—Actual and imputed rentals for housing
110562.1	Domestic services				X							X			110411.1—Actual and imputed rentals for housing
110562.2	Household services				X							X			110411.1—Actual and imputed rentals for housing
110611.1	Pharmaceutical products	X					X	X				X			
110612.1	Other medical products	X					X	X				X			
110613.1	Therapeutic appliances and equipment	X					X	X				X			
110621.1	Medical services	X					X	X		X		X			
110622.1	Dental services	X					X	X		X		X			
110623.1	Paramedical services	X					X	X		X		X			
110631.1	Hospital services	X					X	X	X	X		X			
110711.1	Motor cars				X		X	X				X	X		
110712.1	Motorcycles	X					X	X				X			
110713.1	Bicycles	X					X	X				X			
110714.1	Animal-drawn vehicles						X	X	X				X		

Annex C (Continued)

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
110722.1	Fuels and lubricants for personal transport equipment						X					X	X		110711.1—Motor cars 110712.1—Motorcycles
110723.1	Maintenance and repair of personal transport equipment						X					X			110711.1—Motor cars 110712.1—Motorcycles
110724.1	Other services in respect of personal transport equipment				X	X	X					X	X		
110731.1	Passenger transport by railway	X					X					X			
110732.1	Passenger transport by road	X					X					X	X		
110733.1	Passenger transport by air	X					X					X	X		
110734.1	Passenger transport by sea and inland waterway	X					X					X	X		
110735.1	Combined passenger transport	X					X					X	X		
110736.1	Other purchased transport services	X					X					X	X		
110811.1	Postal services	X					X					X	X		
110821.1	Telephone and telefax equipment	X					X	X				X	X		
110831.1	Telephone and telefax services	X					X					X	X		
110911.1	Audiovisual, photographic, and information processing equipment	X					X					X	X		
110914.1	Recording media	X					X	X				X			
110915.1	Repair of audiovisual, photographic, and information processing equipment	X					X					X			110911.1—Audiovisual, photographic, and information processing equipment
110921.1	Major durables for outdoor and indoor recreation	X					X	X				X			
110923.1	Maintenance of other major durables for recreation and culture						X					X			110923.1—Maintenance of other major durables for recreation and culture
110931.1	Other recreational items and equipment	X					X					X			

table continues next page

Annex C (Continued)

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
110933.1	Garden and pets				X	X					X				
110935.1	Veterinary and other services for pets				X	X		X			X				
110941.1	Recreational and sporting services	X				X					X				
110942.1	Cultural services	X				X					X				
110943.1	Games of chance	X				X					X				
110951.1	Newspapers, books, and stationery	X				X					X				
110961.1	Package holidays				X	X					X				
111011.1	Education		X		X	X					X				
111111.1	Catering services	X				X					X				
111121.1	Accommodation services	X				X					X				
111211.1	Hairdressing and grooming establishments			X							X				
111212.1	Appliances, articles, and products for personal care	X				X					X				
111221.1	Prostitution			X							X				
111231.1	Jewelry, clocks, and watches	X				X					X				
111232.1	Other personal effects n.e.c.	X				X					X				
111241.1	Social protection	X				X					X				
111251.1	Insurance	X				X					X				
111261.1	Financial intermediation services indirectly measured (FISIM)					X							X		
111262.1	Other financial services					X							X		
111271.1	Other services	X				X							X		
111311.1	Purchases by residential households in the rest of the world			X									X		
111311.2	Purchases by nonresidential households in the economic territory of the country					X							X		
<b>120000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>														
120111.1	Individual consumption expenditure by NPISHs														110000.0— Individual consumption expenditure by households



Annex C (Continued)

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
<b>130000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>														
130111.1	Housing				X							X	X	110411.1—Actual and imputed rentals for housing	
130211.1	Pharmaceutical products				X							X	X	110611.1—Pharmaceutical products	
130211.2	Other medical products				X							X	X	110612.1—Other medical products	
130211.3	Therapeutic appliances and equipment				X							X	X	110613.1—Therapeutic appliances and equipment	
130212.1	Outpatient medical services				X					X		X	X	110621.1—Medical services	
130212.2	Outpatient dental services				X					X		X	X	110622.1—Dental services	
130212.3	Outpatient paramedical services				X					X		X	X	110623.1—Paramedical services	
130212.4	Hospital services				X					X		X	X	110631.1—Hospital services	
130221.1	Compensation of employees			X		X						X	X		
130222.1	Intermediate consumption											X	X		
130223.1	Gross operating surplus											X	X		
130224.1	Net taxes on production											X	X		
130225.1	Receipts from sales											X	X		
130311.1	Recreation and culture											X	X		
130411.1	Education benefits and reimbursements											X	X		
130421.1	Compensation of employees					X						X	X		
130422.1	Intermediate consumption											X	X		
130423.1	Gross operating surplus											X	X		
130424.1	Net taxes on production											X	X		
130425.1	Receipts from sales											X	X		
130511.1	Social protection											X	X		

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Annex C (Continued)

		Demography					Supply			Health		Inflation	GDP	GFS	Between-BH correlation
		Population	School population	Adult population	Number of households	Civil service population	Production	Imports	Slaughtered livestock	Hospital beds	Number of doctors per inhabitant	Price changes	GDP growth	Government budget	Other BH expenditure
<b>140000.0</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>														
140111.1	Compensation of employees					X							X	X	
140112.1	Intermediate consumption												X	X	
140113.1	Gross operating surplus												X	X	
140114.1	Net taxes on production												X	X	
140115.1	Receipts from sales												X	X	
<b>150000.0</b>	<b>GROSS FIXED CAPITAL FORMATION</b>														
150111.1	Fabricated metal products, except machinery and equipment						X	X				X	X		
150112.1	General-purpose machinery						X	X				X	X		
150113.1	Special-purpose machinery						X	X				X	X		
150114.1	Electrical and optical equipment						X	X				X	X		
150115.1	Other manufactured goods n.e.c.						X	X				X	X		
150121.1	Motor vehicles, trailers, and semitrailers						X	X				X	X		
150121.2	Other road transport						X	X				X	X		
150122.1	Other transport equipment						X	X				X	X		
150211.1	Residential buildings						X	X				X	X		
150221.1	Nonresidential buildings						X	X				X	X		
150231.1	Civil engineering works						X	X				X	X		
150311.1	Other products						X	X				X	X		
<b>160000.0</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>														
160111.1	Opening value of inventories												X		
160111.2	Closing value of inventories												X		
160211.1	Acquisitions of valuables												X		
160211.2	Disposals of valuables												X		
<b>170000.0</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>														
170111.1	Exports of goods and services												X		
170111.2	Imports of goods and services							X					X		

Source: ICP, <http://icp.worldbank.org/>.

Note: GDP = gross domestic product; GFS = government finance statistics; BH = basic heading; n.e.c. = not elsewhere classified; NPISHs = nonprofit institutions serving households.

## Annex D

### GDP Splitting Approaches by Basic Heading, ICP 2011

Code	Basic heading	Latest year			Year 2011	
		Direct estimation	Extrapolation	Expert opinion	Extrapolation	Direct estimation
<b>110000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>					
110111.1	Rice	X			X	
110111.2	Other cereals, flour, and other cereal products	X			X	
110111.3	Bread	X			X	
110111.4	Other bakery products	X			X	
110111.5	Pasta products	X			X	
110112.1	Beef and veal	X			X	
110112.2	Pork	X			X	
110112.3	Lamb, mutton, and goat	X			X	
110112.4	Poultry	X			X	
110112.5	Other meats and meat preparations	X			X	
110113.1	Fresh, chilled, or frozen fish and seafood	X			X	
110113.2	Preserved or processed fish and seafood	X			X	
110114.1	Fresh milk	X			X	
110114.2	Preserved milk and other milk products	X			X	
110114.3	Cheese	X			X	
110114.4	Eggs and egg-based products	X			X	
110115.1	Butter and margarine	X			X	
110115.3	Other edible oils and fats	X			X	
110116.1	Fresh or chilled fruit	X			X	
110116.2	Frozen, preserved, or processed fruits and fruit-based products	X			X	
110117.1	Fresh or chilled vegetables other than potatoes	X			X	
110117.2	Fresh or chilled potatoes	X			X	
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products	X			X	
110118.1	Sugar	X			X	
110118.2	Jams, marmalades, and honey	X			X	
110118.3	Confectionery, chocolate, and ice cream	X			X	
110119.1	Food products n.e.c.	X			X	
110121.1	Coffee, tea, and cocoa	X			X	
110122.1	Mineral waters, soft drinks, fruit and vegetable juices	X			X	
110211.1	Spirits	X			X	
110212.1	Wine	X			X	
110213.1	Beer	X			X	
110221.1	Tobacco	X			X	
110231.1	Narcotics			X	X	
110311.1	Clothing materials, other articles of clothing, and clothing accessories	X			X	

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**Annex D (Continued)**

Code	Basic heading	Latest year			Year 2011	
		Direct estimation	Extrapolation	Expert opinion	Extrapolation	Direct estimation
110312.1	Garments	X			X	
110314.1	Cleaning, repair, and hire of clothing	X			X	
110321.1	Shoes and other footwear	X			X	
110322.1	Repair and hire of footwear	X			X	
110411.1	Actual and imputed rentals for housing		X		X	
110431.1	Maintenance and repair of the dwelling	X			X	
110441.1	Water supply	X			X	X
110442.1	Miscellaneous services relating to the dwelling	X			X	
110451.1	Electricity	X			X	X
110452.1	Gas	X			X	X
110453.1	Other fuels	X			X	
110511.1	Furniture and furnishings	X			X	
110512.1	Carpets and other floor coverings	X			X	
110513.1	Repair of furniture, furnishings, and floor coverings	X			X	
110521.1	Household textiles	X			X	
110531.1	Major household appliances whether electric or not	X			X	
110532.1	Small electric household appliances	X			X	
110533.1	Repair of household appliances	X			X	
110541.1	Glassware, tableware, and utensils	X			X	
110551.1	Major tools and equipment	X			X	
110552.1	Small tools and miscellaneous accessories	X			X	
110561.1	Nondurable household goods	X			X	
110562.1	Domestic services	X			X	
110562.2	Household services	X			X	
110611.1	Pharmaceutical products	X			X	
110612.1	Other medical products	X			X	
110613.1	Therapeutic appliances and equipment	X			X	
110621.1	Medical services	X			X	
110622.1	Dental services	X			X	
110623.1	Paramedical services	X			X	
110631.1	Hospital services	X			X	
110711.1	Motor cars	X			X	
110712.1	Motorcycles	X			X	
110713.1	Bicycles	X			X	
110714.1	Animal-drawn vehicles	X			X	
110722.1	Fuels and lubricants for personal transport equipment	X			X	
110723.1	Maintenance and repair of personal transport equipment	X			X	

Annex D (Continued)

Code	Basic heading	Latest year			Year 2011	
		Direct estimation	Extrapolation	Expert opinion	Extrapolation	Direct estimation
110724.1	Other services in respect of personal transport equipment	X			X	
110731.1	Passenger transport by railway	X			X	
110732.1	Passenger transport by road	X			X	
110733.1	Passenger transport by air	X			X	
110734.1	Passenger transport by sea and inland waterway	X			X	
110735.1	Combined passenger transport	X			X	
110736.1	Other purchased transport services	X			X	
110811.1	Postal services	X			X	
110821.1	Telephone and telefax equipment	X			X	
110831.1	Telephone and telefax services	X			X	
110911.1	Audiovisual, photography, and information processing equipment	X			X	
110914.1	Recording media	X			X	
110915.1	Repair of audiovisual, photographic, and information processing equipment	X			X	
110921.1	Major durables for outdoor and indoor recreation	X			X	
110923.1	Maintenance of other major durables for recreation and culture	X			X	
110931.1	Other recreational items and equipment	X			X	
110933.1	Garden and pets	X			X	
110935.1	Veterinary and other services for pets	X			X	
110941.1	Recreational and sporting services	X			X	
110942.1	Cultural services	X			X	
110943.1	Games of chance	X			X	
110951.1	Newspapers, books, and stationery	X			X	
110961.1	Package holidays	X			X	
111011.1	Education	X			X	
111111.1	Catering services	X			X	
111121.1	Accommodation services	X			X	
111211.1	Hairdressing and grooming establishments	X			X	
111212.1	Appliances, articles, and products for personal care	X			X	
111221.1	Prostitution			X	X	
111231.1	Jewelry, clocks, and watches	X			X	
111232.1	Other personal effects	X			X	
111241.1	Social protection	X			X	
111251.1	Insurance	X			X	
111261.1	Financial intermediation services indirectly measured (FISIM)		X		X	
111262.1	Other financial services	X			X	
111271.1	Other services n.e.c.	X			X	
111311.1	Purchases by residential households in the rest of the world	X			X	

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Annex D (Continued)

Code	Basic heading	Latest year			Year 2011	
		Direct estimation	Extrapolation	Expert opinion	Extrapolation	Direct estimation
111311.2	Purchases by nonresidential households in the economic territory of the country	X			X	
<b>120000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>					
120111.1	Individual consumption expenditures by NPISHs			X	X	
<b>130000.0</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>					
130111.1	Housing		X		X	
130211.1	Pharmaceutical products	X			X	
130211.2	Other medical products	X			X	
130211.3	Therapeutic appliances and equipment	X			X	
130212.1	Outpatient medical services	X			X	
130212.2	Outpatient dental services	X			X	
130212.3	Outpatient paramedical services	X			X	
130212.4	Hospital services	X			X	
130221.1	Compensation of employees	X			X	X
130222.1	Intermediate consumption	X			X	X
130223.1	Gross operating surplus	X			X	X
130224.1	Net taxes on production	X			X	X
130225.1	Receipts from sales	X			X	X
130311.1	Recreation and culture	X			X	
130411.1	Education benefits and reimbursements	X			X	
130421.1	Compensation of employees	X			X	
130422.1	Intermediate consumption	X			X	
130423.1	Gross operating surplus	X			X	
130424.1	Net taxes on production	X			X	
130425.1	Receipts from sales	X			X	
130511.1	Social protection	X			X	
<b>140000.0</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>					
140111.1	Compensation of employees	X			X	X
140112.1	Intermediate consumption	X			X	X
140113.1	Gross operating surplus	X			X	X
140114.1	Net taxes on production	X			X	X
140115.1	Receipts from sales	X			X	X
<b>150000.0</b>	<b>GROSS FIXED CAPITAL FORMATION</b>					
1501111	Fabricated metal products, except machinery and equipment	X			X	
150112.1	General-purpose machinery	X			X	
150113.1	Special-purpose machinery	X			X	
150114.1	Electrical and optical equipment	X			X	
150115.1	Other manufactured goods n.e.c.	X			X	

## Annex D (Continued)

Code	Basic heading	Latest year			Year 2011	
		Direct estimation	Extrapolation	Expert opinion	Extrapolation	Direct estimation
150121.1	Motor vehicles, trailers, and semitrailers	X			X	
150121.2	Other road transport	X			X	
150122.1	Other transport equipment	X			X	
150211.1	Residential buildings	X			X	
150221.1	Nonresidential buildings		X		X	
150231.1	Civil engineering works		X		X	
150311.1	Other products		X		X	
<b>16000.0</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>					
160111.1	Opening value of inventories		X		X	
160111.2	Closing value of inventories		X		X	
160211.1	Acquisitions of valuables		X		X	
160211.2	Disposals of valuables		X		X	
<b>17000.0</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>					
170111.1	Exports of goods and services	X			X	X
170111.2	Imports of goods and services	X			X	X

Source: ICP, <http://icp.worldbank.org/>.

Note: n.e.c. = not elsewhere classified; NPISHs = nonprofit institutions serving households.

## NOTE

1. The SNA describes a comprehensive, integrated set of economic accounts, balance sheets, and other tables depicting the economic processes taking place within an economy and the associated stocks. The most

up-to-date system is the 2008 SNA. However, the 1993 SNA conceptual framework was used for the ICP 2011 round because for that round the vast majority of economies were still using the 1993 SNA methodology for compiling their national accounts.





# ICP Classifications

As the world's largest international statistical comparison program, it is essential that the International Comparison Program (ICP) adopt firm classifications and standardized codes for data collection, processing, and calculating its results. In doing so, the ICP ensures that its classifications adhere to already established international classifications and coding systems. In 2003 the ICP adopted the ICP Classification of Final Expenditure on GDP (gross domestic product) for its 2005 round. The practical experience in the 2005 round led to development of the ICP Operational Classification in 2012.

This chapter describes the relationship between the ICP classifications and mapping as well as other international and regional classifications, the background and use of the ICP Operational Classification, and the other internationally standardized codes used by the ICP.

## ICP EXPENDITURE CLASSIFICATION

As a worldwide statistical initiative, the ICP adopts widely known international classifications in line with its various activities. The ICP Classification of Final Expenditure on GDP follows the Classifications of Expenditure According to Purpose prepared by the United Nations as well as the Classification of Products

by Activity (CPA) prepared by Eurostat, the statistical office of the European Union. The Classifications of Expenditure According to Purpose comprise four subclassifications approved by the United Nations Statistical Commission in 1999. The ICP Classification adopted three of those four subclassifications: Classification of Individual Consumption According to Purpose (COICOP), Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI), and Classification of the Functions of Government (COFOG). For the classification of gross fixed capital formation, the ICP follows the Classification of Products by Activity prepared by Eurostat.

Annex A, ICP Classification and Mapping with International Classifications, shows how each of the ICP basic headings is mapped to the classifications just listed. It also indicates whether a basic heading is classified as a good or a service. Such an indication will allow users to calculate purchasing power parities (PPPs) and related statistics for goods and services according to their needs.

In addition to adhering to United Nations (UN) and Eurostat classifications, the ICP Classification maps with regional classifications because the program is organized on a regional basis. The seven geographical regions participating in the 2011 round of the ICP were Africa, Asia and the Pacific,

Commonwealth of Independent States (CIS), Latin America, the Caribbean, Western Asia, and the Pacific Islands. The eighth region comprised the economies participating in the Eurostat–Organisation for Economic Co-operation and Development (OECD) PPP Programme. In the 2005 round of the ICP, Africa followed its own classification comprising 220 basic headings, while the global comparison followed the ICP Classification of 155 basic headings, which the remaining regions followed as well. Because the Eurostat-OECD PPP Programme is independent, it follows its own classification of 222 basic headings. The OECD was responsible for revising the UN classifications in 1995 in consultation with Eurostat, resulting in high correspondence between the ICP Classification and the Eurostat-OECD classification. However, some differences remain because the ICP modified some of the UN classifications when adopting them to better suit the program. As a result, some basic headings have been merged, whereas others have been split, depending on the needs.

Annex B, Mapping of ICP and Regional Classifications, presents how each region's classification, if it has a separate one, corresponds with the ICP Classification.

## ICP OPERATIONAL CLASSIFICATIONS

Every effort was made during the ICP 2005 round to capture the items essential to a detailed comparison of economies' economic activities. The result was a classification composed of 155 basic headings. However, it is also important that the ICP reflect each economy's and region's current circumstances and provide the most realistic data for users. Therefore, ongoing efforts were devoted to creating more practical ICP classifications, known as the ICP Operational Classification.

During the 2005 round, it was found that differences existed between (1) regional and global reference PPP basic headings, (2) reporting classifications across regions in terms of availability and quality, and (3) interpretation and use of individual and actual classifications

across regions. In terms of national accounts, issues included: (1) lack of expenditures for some basic headings; (2) inaccurate reporting of expenditures for some basic headings; and (3) inconsistencies in the treatment of basic headings across regions. On the price side, the problems included: (1) lack of price surveys; (2) a priori and a posteriori use of reference PPP basic headings (see chapter 1 for a description of reference PPP basic headings); and (3) the differences in reference PPP basic headings across regions and at the global level that caused inconsistent data collection across economies and regions. Therefore, the data were inconsistent, and under some headings not enough data were provided to compute the final PPPs. Consequently, it was necessary to merge some of these headings, and so 129 basic headings were used in the 2005 round for the final calculation.

In light of this experience, a new classification, the ICP Operational Classification, was created for the ICP 2011 round to ensure a more consistent and transparent data collection and calculation process. This more practical classification has 142 basic headings. From this classification, another classification, the ICP Actual Operational Classification, was created, with 130 basic headings to allow the computation of PPPs and other statistics for actual individual consumption in the final results of the ICP.

The following aspects of prices and national accounts were considered in creating the ICP Actual Operational Classification: (1) price availability; (2) reference PPP basic headings; (3) basic headings with importance weights in national accounts (see chapter 1 for an explanation of importance); (4) difficult basic headings for national accounts; and (5) the five categories of problematic basic headings: allocable basic headings, balancing items basic headings, government production basic headings, sensitive basic headings, and other problematic basic headings.

Introduction of the ICP Operational Classification does not mean that headings were omitted from the original ICP Classification, but rather that some headings were merged with other relevant headings.

Annex C, Mapping of ICP Classification, ICP Operational Classification, and ICP Actual Operational Classification, shows the mapping of these three classifications.

## OTHER INTERNATIONAL CODES AND CLASSIFICATIONS

The use of other internationally standardized codes for economy, currency, and units of measurement were essential when economies submitted their data to the regional coordinating agencies and the Global Office for processing. In addition, headings and product codes related to the Government Occupations and Private Education classifications required special attention to maintain consistency during data collection.

Annex D, ICP Economy and Currency Codes, provides both the two-letter and three-letter country codes prepared by the International Organization for Standardization (ISO) as well as that of the World Bank, which the ICP currently uses. The ICP codes are widely adopted by the participating economies and regions for data submission and reporting purposes.

Annex E, ICP Government Occupations, shows how ICP 2005, ICP 2011, and the International Standard Classification of Occupations (ISCO) are mapped together. Three basic headings entitled compensation of

employees under government aggregates are used to compute PPPs based on the salaries of government employees. In the 2005 round, the ICP collected information on 44 occupations that followed ISCO-88, which was developed by the International Labour Organization (ILO) and endorsed in 1988. The ISCO code has undergone significant revisions, and the updated version was approved in 2008 (ISCO-08). Thus the 2011 round of the ICP followed the revised version of the ISCO code and covered 37 occupations as listed in annex E. In addition, ICP 2011 required compensation data for employees at four levels of experience—0 years, 5 years, 10 years, and 20 years—resulting in 148 occupations ( $37 \times 4$ ).

Annex F, ICP Private Education Items, shows ICP 2011 and the International Standard Classification of Education (ISCED) items. The global core list of ICP 2011 included seven products under the basic heading private education. With the exception of "other education programs," the ICP classification of education follows ISCED 1997, developed by United Nations Educational, Scientific, and Cultural Organization (UNESCO). ISCED underwent a revision, and recommendations were submitted to UNESCO's General Conference for approval in October 2011. A revised version, ISCED 2011, was formally adopted, and in 2014 this new classification was used for the first time to collect data.

## Annex A

### ICP Classification and Mapping with International Classifications

ICP Code	Heading	Type	Classification 1	Code 1
100000	<b>GROSS DOMESTIC PRODUCT</b>			
110000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>		COICOP	01–12
110100	FOOD AND NONALCOHOLIC BEVERAGES		COICOP	01
110110	FOOD		COICOP	01.1
110111	<i>Bread and cereals</i>		COICOP	01.1.1
110111.1	Rice	Goods/ND		
110111.2	Other cereals, flour, and other products	Goods/ND		
110111.3	Bread	Goods/ND		
110111.4	Other bakery products	Goods/ND		
110111.5	Pasta products	Goods/ND		
110112	<i>Meat</i>		COICOP	01.1.2
110112.1	Beef and veal	Goods/ND		
110112.2	Pork	Goods/ND		
110112.3	Lamb, mutton, and goat	Goods/ND		
110112.4	Poultry	Goods/ND		
110112.5	Other meats and meat preparations	Goods/ND		
110113	<i>Fish and seafood</i>		COICOP	01.1.3
110113.1	Fresh, chilled, or frozen fish and seafood	Goods/ND		
110113.2	Preserved or processed fish and seafood	Goods/ND		
110114	<i>Milk, cheese, and eggs</i>		COICOP	01.1.4
110114.1	Fresh milk	Goods/ND		
110114.2	Preserved milk and other milk products	Goods/ND		
110114.3	Cheese	Goods/ND		
110114.4	Eggs and egg-based products	Goods/ND		
110115	<i>Oils and fats</i>		COICOP	01.1.5
110115.1	Butter and margarine	Goods/ND		
110115.3	Other edible oils and fats	Goods/ND		
110116	<i>Fruit</i>		COICOP	01.1.6
110116.1	Fresh or chilled fruit	Goods/ND		
110116.2	Frozen, preserved, or processed fruit and fruit-based products	Goods/ND		
110117	<i>Vegetables</i>		COICOP	01.1.7
110117.1	Fresh or chilled vegetables other than potatoes	Goods/ND		
110117.2	Fresh or chilled potatoes	Goods/ND		
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products	Goods/ND		
110118	<i>Sugar, jam, honey, chocolate, and confectionery</i>		COICOP	01.1.8
110118.1	Sugar	Goods/ND		
110118.2	Jams, marmalades, and honey	Goods/ND		
110118.3	Confectionery, chocolate, and ice cream	Goods/ND		
110119	<i>Food products n.e.c.</i>		COICOP	01.1.9

Heading 1	Classification 2	Code 2	Heading 2
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Individual consumption expenditure of households

Food and nonalcoholic beverages

Food

Bread and cereals (ND)

Meat (ND)

Fish and seafood (ND)

Milk, cheese, and eggs (ND)

Oils and fats (ND)

Fruit (ND)

Vegetables (ND)

Sugar, jam, honey, chocolate, and confectionery (ND)

Food products n.e.c. (ND)

*table continues next page*

**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
110119.1	Food products n.e.c.	Goods/ND		
110120	NONALCOHOLIC BEVERAGES		COICOP	01.2
110121	<i>Coffee, tea, and cocoa</i>		COICOP	01.2.1
110121.1	Coffee, tea, and cocoa	Goods/ND		
110122	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>		COICOP	01.2.2
110122.1	Mineral waters, soft drinks, fruit and vegetable juices	Goods/ND		
110200	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS		COICOP	02
110210	ALCOHOLIC BEVERAGES		COICOP	02.1
110211	<i>Spirits</i>		COICOP	02.1.1
110211.1	Spirits	Goods/ND		
110212	<i>Wine</i>		COICOP	02.1.2
110212.1	Wine	Goods/ND		
110213	<i>Beer</i>		COICOP	02.1.3
110213.1	Beer	Goods/ND		
110220	TOBACCO		COICOP	02.2
110221	<i>Tobacco</i>		COICOP	02.2.0
110221.1	Tobacco	Goods/ND		
110230	NARCOTICS		COICOP	02.3
110231	<i>Narcotics</i>		COICOP	02.3.0
110231.1	Narcotics	Goods/ND		
110300	CLOTHING AND FOOTWEAR		COICOP	03
110310	CLOTHING		COICOP	03.1
110311	<i>Clothing materials, other articles of clothing, and clothing accessories</i>		COICOP	03.1.1
110311.1	Clothing materials, other articles of clothing, and clothing accessories	Goods/SD		
110312	<i>Garments</i>		COICOP	03.1.2; 03.1.3
110312.1	Garments	Goods/SD	COICOP	
110314	<i>Cleaning, repair, and hire of clothing</i>		COICOP	03.1.4
110314.1	Cleaning, repair, and hire of clothing	Services/S		
110320	FOOTWEAR		COICOP	03.2
110321	<i>Shoes and other footwear</i>		COICOP	03.2.1
110321.1	Shoes and other footwear	Goods/SD		
110322	<i>Repair and hire of footwear</i>		COICOP	03.2.2
110322.1	Repair and hire of footwear	Services/S		
110400	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS		COICOP	04
110410	ACTUAL AND IMPUTED RENTALS FOR HOUSING		COICOP	04.1
110411	<i>Actual and imputed rentals for housing</i>		COICOP	04.1.1
110411.1	Actual and imputed rentals for housing	Services/S	COICOP	04.1.2; 04.2; 04.2.1; 04.2.2
110430	MAINTENANCE AND REPAIR OF THE DWELLING		COICOP	04.3

Heading 1	Classification 2	Code 2	Heading 2
Nonalcoholic beverages			
Coffee, tea, and cocoa (ND)			
Mineral waters, soft drinks, fruit and vegetable juices (ND)			
Alcoholic beverages, tobacco, and narcotics			
Alcoholic beverages			
Spirits (ND)			
Wine (ND)			
Beer (ND)			
Tobacco			
Tobacco (ND)			
Narcotics			
Narcotics (ND)			
Clothing and footwear			
Clothing			
Clothing materials (SD)			
Garments (SD); other articles of clothing and clothing accessories (SD)			
Cleaning, repair, and hire of clothing (S)			
Footwear			
Shoes and other footwear (SD)			
Repair and hire of footwear (S)			
Housing, water, electricity, gas, and other fuels			
Actual rentals for housing			
Actual rentals paid by tenants (S)			
Other actual rentals (S); imputed rentals for housing; imputed rentals of owner-occupiers (S); other imputed rentals (S)			
Maintenance and repair of the dwelling			

*table continues next page*

**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
110431	<i>Maintenance and repair of the dwelling</i>		COICOP	04.3.1; 04.3.2
110431.1	Maintenance and repair of the dwelling	Services/S		
110440	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING		COICOP	04.4
110441	<i>Water supply</i>		COICOP	04.4.1; 04.4.3
110441.1	Water supply	Goods/ND		
110442	<i>Miscellaneous services relating to the dwelling</i>		COICOP	04.4.2; 04.4.4
110442.1	Miscellaneous services relating to the dwelling	Services/S	COICOP	
110450	ELECTRICITY, GAS, AND OTHER FUELS		COICOP	04.5
110451	<i>Electricity</i>		COICOP	04.5.1
110451.1	Electricity	Goods/ND		
110452	<i>Gas</i>		COICOP	04.5.2
110452.1	Gas	Goods/ND		
110453	<i>Other fuels</i>		COICOP	04.5.3
110453.1	Other fuels	Goods/ND	COICOP	04.5.4; 04.5.5
110500	FURNISHING, HOUSEHOLD EQUIPMENT, AND ROUTINE MAINTENANCE OF THE HOUSE		COICOP	05
110510	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS		COICOP	05.1
110511	<i>Furniture and furnishings</i>		COICOP	05.1.1
110511.1	Furniture and furnishings	Goods/D		
110512	<i>Carpets and other floor coverings</i>		COICOP	05.1.2
110512.1	Carpets and other floor coverings	Goods/D		
110513	<i>Repair of furniture, furnishings, and floor coverings</i>		COICOP	05.1.3
110513.1	Repair of furniture, furnishings, and floor coverings	Services/S		
110520	HOUSEHOLD TEXTILES		COICOP	05.2
110521	<i>Household textiles</i>		COICOP	05.2.0
110521.1	Household textiles	Goods/SD		
110530	HOUSEHOLD APPLIANCES		COICOP	05.3
110531	<i>Major household appliances whether electric or not</i>		COICOP	05.3.1
110531.1	Major household appliances whether electric or not	Goods/D		
110532	<i>Small electric household appliances</i>		COICOP	05.3.2
110532.1	Small electric household appliances	Goods/SD		
110533	<i>Repair of household appliances</i>		COICOP	05.3.3
110533.1	Repair of household appliances	Services/S		
110540	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS		COICOP	05.4
110541	<i>Glassware, tableware, and household utensils</i>		COICOP	05.4.0
110541.1	Glassware, tableware, and household utensils	Goods/SD		
110550	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN		COICOP	05.5
110551	<i>Major tools and equipment</i>		COICOP	05.5.1



Heading 1	Classification 2	Code 2	Heading 2
Materials for the maintenance and repair of the dwelling (ND); services for the maintenance and repair of the dwelling (S)			
Water supply and miscellaneous services relating to the dwelling			
Water supply (ND); sewage collection (S)			
Refuse collection (S); other services relating to the dwelling n.e.c. (S)			
Electricity, gas, and other fuels			
Electricity (ND)			
Gas (ND)			
Liquid fuels (ND)			
Solid fuels (ND); heat energy (ND)			
Furnishings, household equipment, and routine household maintenance			
Furniture and furnishings, carpets and other floor coverings			
Furniture and furnishings (D)			
Carpets and other floor coverings (D)			
Repair of furniture, furnishings, and floor coverings (S)			
Household textiles			
Household textiles (SD)			
Household appliances			
Major household appliances whether electric or not (D)			
Small electric household appliances (SD)			
Repair of household appliances (S)			
Glassware, tableware, and household utensils			
Glassware, tableware, and household utensils (SD)			
Tools and equipment for house and garden			
Major tools and equipment (D)			

*table continues next page*

**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
110551.1	Major tools and equipment	Goods/D		
110552	<i>Small tools and miscellaneous accessories</i>		COICOP	05.5.2
110552.1	Small tools and miscellaneous accessories	Goods/SD		
110560	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE		COICOP	05.6
110561	<i>Nondurable household goods</i>		COICOP	05.6.1
110561.1	Nondurable household goods	Goods/ND		
110562	<i>Domestic services and household services</i>		COICOP	05.6.2
110562.1	Domestic services	Services/S		
110562.2	Household services	Services/S		
110600	HEALTH		COICOP	06
110610	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT		COICOP	06.1
110611	<i>Pharmaceutical products</i>		COICOP	06.1.1
110611.1	Pharmaceutical products	Goods/ND		
110612	<i>Other medical products</i>		COICOP	06.1.2
110612.1	Other medical products	Goods/ND		
110613	<i>Therapeutic appliances and equipment</i>		COICOP	06.1.3
110613.1	Therapeutic appliances and equipment	Goods/D		
110620	OUTPATIENT SERVICES		COICOP	06.2
110621	<i>Medical services</i>		COICOP	06.2.1
110621.1	Medical services	Services/S		
110622	<i>Dental services</i>		COICOP	06.2.2
110622.1	Dental services	Services/S		
110623	<i>Paramedical services</i>		COICOP	06.2.3
110623.1	Paramedical services	Services/S		
110630	HOSPITAL SERVICES		COICOP	06.3
110631	<i>Hospital services</i>		COICOP	06.3.0
110631.1	Hospital services	Services/S		
110700	TRANSPORT		COICOP	07
110710	PURCHASE OF VEHICLES		COICOP	07.1
110711	<i>Motor cars</i>		COICOP	07.1.1
110711.1	Motor cars	Goods/D		
110712	<i>Motorcycles</i>		COICOP	07.1.2
110712.1	Motor cycles	Goods/D		
110713	<i>Bicycles</i>		COICOP	07.1.3
110713.1	Bicycles	Goods/D		
110714	<i>Animal-drawn vehicles</i>		COICOP	07.1.4
110714.1	Animal-drawn vehicles	Goods/D		
110720	OPERATION OF PERSONAL TRANSPORT EQUIPMENT		COICOP	07.2
110722	<i>Fuels and lubricants for personal transport equipment</i>		COICOP	07.2.1; 07.2.2
110722.1	Fuels and lubricants for personal transport equipment	Goods/ND	COICOP	

Heading 1	Classification 2	Code 2	Heading 2
			Small tools and miscellaneous accessories (SD)
			Goods and services for routine household maintenance
			Nondurable household goods (ND)
			Domestic services and household services (S)
			Health
			Medical products, appliances, and equipment
			Pharmaceutical products (ND)
			Other medical products (ND)
			Therapeutic appliances and equipment (D)
			Outpatient services
			Medical services (S)
			Dental services (S)
			Paramedical services (S)
			Hospital services
			Hospital services (S)
			Transport
			Purchase of vehicles
			Motor cars (D)
			Motorcycles (D)
			Bicycles (D)
			Animal-drawn vehicles (D)
			Operation of personal transport equipment
			Spare parts and accessories for personal transport equipment (SD); fuels and lubricants for personal transport equipment (ND)

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**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
110723	<i>Maintenance and repair of personal transport equipment</i>			
110723.1	Maintenance and repair of personal transport equipment	Services/S	COICOP	07.2.3
110724	<i>Other services in respect of personal transport equipment</i>		COICOP	07.2.4
110724.1	Other services in respect of personal transport equipment	Services/S		
110730	TRANSPORT SERVICES		COICOP	07.3
110731	<i>Passenger transport by railway</i>		COICOP	07.3.1
110731.1	Passenger transport by railway	Services/S		
110732	<i>Passenger transport by road</i>		COICOP	07.3.2
110732.1	Passenger transport by road	Services/S		
110733	<i>Passenger transport by air</i>		COICOP	07.3.3
110733.1	Passenger transport by air	Services/S		
110734	<i>Passenger transport by sea and inland waterway</i>		COICOP	07.3.4
110734.1	Passenger transport by sea and inland waterway	Services/S		
110735	<i>Combined passenger transport</i>		COICOP	07.3.5
110735.1	Combined passenger transport	Services/S	COICOP	
110736	<i>Other purchased transport services</i>		COICOP	07.3.6
110736.1	Other purchased transport services	Services/S		
110800	COMMUNICATION		COICOP	08
110810	POSTAL SERVICES		COICOP	08.1
110811	<i>Postal services</i>		COICOP	08.1.0
110811.1	Postal services	Services/S		
110820	TELEPHONE AND TELEFAX EQUIPMENT		COICOP	08.2
110821	<i>Telephone and telefax equipment</i>		COICOP	08.2.0
110821.1	Telephone and telefax equipment	Goods/D		
110830	TELEPHONE AND TELEFAX SERVICES		COICOP	08.3
110831	<i>Telephone and telefax services</i>		COICOP	08.3.0
110831.1	Telephone and telefax services	Services/S		
110900	RECREATION AND CULTURE		COICOP	09
110910	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT		COICOP	09.1
110911	<i>Audiovisual, photographic, and information processing equipment</i>		COICOP	09.1.1; 09.1.2; 09.1.3
110911.1	Audiovisual, photographic, and information processing equipment	Goods/D	COICOP	
110914	<i>Recording media</i>		COICOP	09.1.4
110914.1	Recording media	Goods/SD		
110915	<i>Repair of audiovisual, photographic, and information processing equipment</i>		COICOP	09.1.5
110915.1	Repair of audiovisual, photographic, and information processing equipment	Services/S		

Heading 1	Classification 2	Code 2	Heading 2
Maintenance and repair of personal transport equipment (S)			
Other services in respect of personal transport equipment (S)			
Transport services			
Passenger transport by railway (S)			
Passenger transport by road (S)			
Passenger transport by air (S)			
Passenger transport by sea and inland waterway (S)			
Combined passenger transport (S)			
Other purchased transport services (S)			
Communication			
Postal services			
Postal services (S)			
Telephone and telefax equipment			
Telephone and telefax equipment (D)			
Telephone and telefax services			
Telephone and telefax services (S)			
Recreation and culture			
Audiovisual, photographic, and information processing equipment			
Equipment for the reception, recording, and reproduction of sound and pictures (D); photographic and cinematographic equipment and optical instruments (D); information processing equipment (D)			
Recording media (SD)			
Repair of audiovisual, photographic, and information processing equipment (S)			

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**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
110920	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE		COICOP	09.2
110921	<i>Major durables for outdoor and indoor recreation</i>		COICOP	09.2.1; 09.2.2
110921.1	Major durables for outdoor and indoor recreation	Goods/D	COICOP	
110923	<i>Maintenance and repair of other major durables for recreation and culture</i>		COICOP	09.2.3
110923.1	Maintenance and repair of other major durables for recreation and culture	Services/S		
110930	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS		COICOP	09.3
110931	<i>Other recreational items and equipment</i>		COICOP	
110931.1	Other recreational items and equipment	Goods/SD	COICOP	09.3.1; 09.3.2
110933	<i>Garden and pets</i>		COICOP	09.3.3
110933.1	Garden and pets	Goods/ND		
110935	<i>Veterinary and other services for pets</i>		COICOP	09.3.4; 09.3.5
110935.1	Veterinary and other services for pets	Services/S	COICOP	
110940	RECREATIONAL AND CULTURAL SERVICES		COICOP	09.4
110941	<i>Recreational and sporting services</i>		COICOP	09.4.1
110941.1	Recreational and sporting services	Services/S		
110942	<i>Cultural services</i>		COICOP	09.4.2
110942.1	Cultural services	Services/S		
110943	<i>Games of chance</i>		COICOP	09.4.3
110943.1	Games of chance	Services/S		
110950	NEWSPAPERS, BOOKS, AND STATIONERY		COICOP	09.5
110951	<i>Newspapers, books, and stationery</i>		COICOP	09.5.1
110951.1	Newspapers, books, and stationery	Goods/ND	COICOP	09.5.2; 09.5.3; 09.5.4
110960	PACKAGE HOLIDAYS		COICOP	09.6
110961	<i>Package holidays</i>		COICOP	09.6.0
110961.1	Package holidays	Services/S		
111000	EDUCATION		COICOP	10
111010	EDUCATION		COICOP	10.1
111011	<i>Education</i>		COICOP	10.1.0
111011.1	Education	Services/S	COICOP	10.2; 10.2.0; 10.3; 10.3.0; 10.4; 10.4.0; 10.5; 10.5.0
111100	RESTAURANTS AND HOTELS		COICOP	11
111110	CATERING SERVICES		COICOP	11.1
111111	<i>Catering services</i>		COICOP	11.1.1; 11.1.2
111111.1	Catering services	Services/S	COICOP	

Heading 1	Classification 2	Code 2	Heading 2
Other major durables for recreation and culture			
Major durables for outdoor recreation (D); musical instruments and major durables for indoor recreation (D)			
Maintenance and repair of other major durables for recreation and culture (S)			
Other recreational items and equipment, gardens and pets			
Games, toys, and hobbies (SD); equipment for sport, camping, and open-air recreation (SD)			
Gardens, plants, and flowers (ND)			
Pets and related products (ND); veterinary and other services for pets (S)			
Recreational and cultural services			
Recreational and sporting services (S)			
Cultural services (S)			
Games of chance (S)			
Newspapers, books, and stationery			
Books (SD)			
Newspapers and periodicals (ND); miscellaneous printed matter (ND); stationery and drawing materials (ND)			
Package holidays			
Package holidays (S)			
Education			
Preprimary and primary education			
Preprimary and primary education (S)			
Secondary education; secondary education (S); postsecondary nontertiary education; postsecondary nontertiary education (S); tertiary education; tertiary education (S); education not definable by level; education not definable by level (S)			
Restaurants and hotels			
Catering services			
Restaurants, cafés, and the like (S); canteens (S)			

*table continues next page*

**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
111120	ACCOMMODATION SERVICES		COICOP	11.2
111121	<i>Accommodation services</i>		COICOP	11.2.0
111121.1	Accommodation services	Services/S		
111200	MISCELLANEOUS GOODS AND SERVICES		COICOP	12
111210	PERSONAL CARE		COICOP	12.1
111211	<i>Hairdressing salons and personal grooming establishments</i>		COICOP	12.1.1
111211.1	Hairdressing salons and personal grooming establishments	Services/S	COICOP	
111212	<i>Appliances, articles, and products for personal care</i>		COICOP	12.1.2; 12.1.3
111212.1	Appliances, articles, and products for personal care	Goods/ND	COICOP	
111220	PROSTITUTION		COICOP	12.2
111221	<i>Prostitution</i>		COICOP	12.2.0
111221.1	Prostitution	Services/S		
111230	PERSONAL EFFECTS		COICOP	12.3
111231	<i>Jewelry, clocks, and watches</i>		COICOP	12.3.1
111231.1	Jewelry, clocks, and watches	Goods/D		
111232	<i>Other personal effects</i>		COICOP	12.3.2
111232.1	Other personal effects	Goods/SD		
111240	SOCIAL PROTECTION		COICOP	12.4
111241	<i>Social protection</i>		COICOP	12.4.0
111241.1	Social protection	Services/S		
111250	INSURANCE		COICOP	12.5
111251	<i>Insurance</i>		COICOP	12.5.1
111251.1	Insurance	Services/S	COICOP	12.5.2; 12.5.3; 12.5.4; 12.5.5
111260	FINANCIAL SERVICES		COICOP	12.6
111261	<i>Financial intermediation services indirectly measured (FISIM)</i>		COICOP	12.6.1
111261.1	Financial intermediation services indirectly measured (FISIM)	Services/S		
111262	<i>Other financial services</i>		COICOP	12.6.2
111262.1	Other financial services	Services/S		
111270	OTHER SERVICES		COICOP	12.7
111271	<i>Other services n.e.c</i>		COICOP	12.7.0
111271.1	Other services n.e.c	Services/S		
111300	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY			
111310	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY			
111311	<i>Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory</i>			
111311.1	Final consumption expenditure of resident households in the rest of the world			
111311.2	Final consumption expenditure of nonresident households in the economic territory			
120000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>			
120100	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS			
120110	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS			



Heading 1	Classification 2	Code 2	Heading 2
Accommodation services			
Accommodation services (S)			
Miscellaneous goods and services			
Personal care			
Hairdressing salons and personal grooming establishments (S)			
Electric appliances for personal care (SD); other appliances, articles, and products for personal care (ND)			
Prostitution			
Prostitution (S)			
Personal effects n.e.c.			
Jewelry, clocks, and watches (D)			
Other personal effects (SD)			
Social protection			
Social protection (S)			
Insurance			
Life insurance (S)			
Insurance connected with the dwelling (S); insurance connected with health (S); insurance connected with transport (S); other insurance (S)			
Financial services n.e.c.			
FISIM (S)			
Other financial services n.e.c. (S)			
Other services n.e.c.			
Other services n.e.c. (S)			

*table continues next page*

Annex A (Continued)

ICP Code	Heading	Type	Classification 1	Code 1
120111	<i>Individual consumption expenditure by NPISHs</i>		COPNI	
120111.1	Individual consumption expenditure by NPISHs	Services/IS		
130000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>		COFOG	
130100	HOUSING		COFOG	10.6
130110	HOUSING		COFOG	10.6.0
130111	<i>Housing</i>		COFOG	
130111.1	Housing	Services/IS	COFOG	
130200	HEALTH		COFOG	07
130210	HEALTH BENEFITS AND REIMBURSEMENTS		COFOG	
130211	<i>Medical products, appliances, and equipment</i>		COFOG	07.1
130211.1	Pharmaceutical products	Services/IS	COFOG	07.1.1
130211.2	Other medical products	Services/IS	COFOG	07.1.2
130211.3	Therapeutic appliances and equipment	Services/IS	COFOG	07.1.3
130212	<i>Health services</i>		COFOG	07.2
			COFOG	07.2.1
130212.1	Outpatient medical services	Services/IS	COFOG	07.2.2
130212.2	Outpatient dental services	Services/IS	COFOG	07.2.3
130212.3	Outpatient paramedical services	Services/IS	COFOG	07.2.4
130212.4	Hospital services	Services/IS		07.3
130220	PRODUCTION OF HEALTH SERVICES		SNA	
130221	<i>Compensation of employees</i>			
130221.1	Compensation of employees	Services/IS		
130222	<i>Intermediate consumption</i>			
130222.1	Intermediate consumption	Services/IS		
130223	<i>Gross operating surplus</i>			
130223.1	Gross operating surplus	Services/IS		
130224	<i>Net taxes on production</i>			
130224.1	Net taxes on production	Services/IS		
130225	<i>Receipts from sales</i>			
130225.1	Receipts from sales	Services/IS		
130300	RECREATION AND CULTURE		COFOG	08
130310	RECREATION AND CULTURE		COFOG	08.1
130311	<i>Recreation and culture</i>		COFOG	08.1.0
130311.1	Recreation and culture	Services/IS	COFOG	08.2; 08.2.0
130400	EDUCATION		COFOG	09
130410	EDUCATION BENEFITS AND REIMBURSEMENTS			
130411	<i>Education benefits and reimbursements</i>			
130411.1	Education benefits and reimbursements	Services/IS	SEE EDUCATION TAB	
130420	PRODUCTION OF EDUCATION SERVICES		SNA	
130421	<i>Compensation of employees</i>			



**Annex A (Continued)**

ICP Code	Heading	Type	Classification 1	Code 1
130421.1	Compensation of employees	Services/IS		
130422	<i>Intermediate consumption</i>			
130422.1	Intermediate consumption	Services/IS		
130423	<i>Gross operating surplus</i>			
130423.1	Gross operating surplus	Services/IS		
130424	<i>Net taxes on production</i>			
130424.1	Net taxes on production	Services/IS		
130425	<i>Receipts from sales</i>			
130425.1	Receipts from sales	Services/IS		
130500	SOCIAL PROTECTION		COFOG	10
130510	SOCIAL PROTECTION			
130511	<i>Social protection</i>			
130511.1	Social protection	Services/IS		
140000	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>		COFOG	01, 02, 03, 04, 05, 06, 07, 08, 09, and 10
140100	COLLECTIVE SERVICES			
140110	COLLECTIVE SERVICES		SNA	
140111	<i>Compensation of employees</i>			
140111.1	Compensation of employees	Services/CS		
140112	<i>Intermediate consumption</i>			
140112.1	Intermediate consumption	Services/CS		
140113	<i>Gross operating surplus</i>			
140113.1	Gross operating surplus	Services/CS		
140114	<i>Net taxes on production</i>			
140114.1	Net taxes on production	Services/CS		
140115	<i>Receipts from sales</i>			
140115.1	Receipts from sales	Services/CS		
150000	<b>GROSS FIXED CAPITAL FORMATION</b>			
150100	MACHINERY AND EQUIPMENT			
150110	METAL PRODUCTS AND EQUIPMENT			
150111	<i>Fabricated metal products, except machinery and equipment</i>		CPA 2002	Division 28
150111.1	Fabricated metal products, except machinery and equipment	IG		
150112	<i>General-purpose machinery</i>		CPA 2002	29.11 to 29.24
150112.1	General-purpose machinery	IG		
150113	<i>Special-purpose machinery</i>		CPA 2002	29.31 to 29.72
150113.1	Special-purpose machinery	IG		

Heading 1	Classification 2	Code 2	Heading 2
Social protection	COICOP	14.5 14.5.0	Social protection Social protection (S)
FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT	CPA 2008	Division 25	FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT
Machinery for the production and use of mechanical power, except aircraft, vehicle, and cycle engines; other general-purpose machinery	CPA 2008	28.11 to 28.29	General-purpose machinery; other general-purpose machinery
Agricultural and forestry machinery; machine tools; other special-purpose machinery; weapons and ammunition; domestic appliances n.e.c.	CPA 2008	28.30 to 28.99	Agricultural and forestry machinery; metal-forming machinery and machine tools; other special-purpose machinery

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**Annex A** (Continued)

ICP Code	Heading	Type	Classification 1	Code 1
150114	<i>Electrical and optical equipment</i>		CPA 2002	Divisions 30, 31, 32, and 33
150114.1	Electrical and optical equipment	IG		
150115	<i>Other manufactured goods n.e.c.</i>		CPA 2002	Division 36
150115.1	Other manufactured goods n.e.c.	IG		
150120	TRANSPORT EQUIPMENT			
150121	<i>Road transport equipment</i>		CPA 2002	34.10 to 34.30 and 35.41 to 35.50
150121.1	Motor vehicles, trailers, and semitrailers	IG		
150121.2	Other road transport	IG		
150122	<i>Other transport equipment</i>		CPA 2002	35.11 to 35.30
150122.1	Other transport equipment	IG		
150200	CONSTRUCTION			
150210	RESIDENTIAL BUILDINGS			
150211	<i>Residential buildings</i>		CPA 2002	Division 45
150211.1	Residential buildings	IG		
150220	NONRESIDENTIAL BUILDINGS			
150221	<i>Nonresidential buildings</i>		CPA 2002	Division 45
150221.1	Nonresidential buildings	IG		
150230	CIVIL ENGINEERING WORKS			
150231	<i>Civil engineering works</i>		CPA 2002	Division 45
150231.1	Civil engineering works	IG		
150300	OTHER PRODUCTS			
150310	OTHER PRODUCTS			
150311	<i>Other products</i>		CPA 2002	Divisions 01, 02, and 05; 72.20; CPA n.e.c.
150311.1	Other products	IG		
160000	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>			
160100	CHANGES IN INVENTORIES			

Heading 1	Classification 2	Code 2	Heading 2
OFFICE MACHINERY AND COMPUTERS; ELECTRICAL MACHINERY AND APPARATUS N.E.C.; RADIO, TELEVISION, AND COMMUNICATION EQUIPMENT AND APPARATUS; MEDICAL, PRECISION, AND OPTICAL INSTRUMENTS; WATCHES AND CLOCKS	CPA 2008	Divisions 26 and 27	COMPUTER, ELECTRONIC, AND OPTICAL PRODUCTS; ELECTRICAL EQUIPMENT
FURNITURE; OTHER MANUFACTURED GOODS N.E.C.	CPA 2008	Divisions 31 and 32	FURNITURE; OTHER MANUFACTURED GOODS
Motor vehicles; bodies (coachwork) for motor vehicles and trailers and semitrailers; parts and accessories for motor vehicles and their engines; motorcycles; other transport equipment n.e.c.	CPA 2008	29.10 to 29.30 and 30.91 to 30.99	Motor vehicles; bodies (coachwork) for motor vehicles and trailers and semitrailers; parts and accessories for motor vehicles and their engines; motorcycles; bicycles and invalid carriages; other transport equipment n.e.c.
Ships and boats; railway and tramway locomotives and rolling stock; aircraft and spacecraft	CPA 2008	30.11 to 30.40	Ships and boats; railway locomotives and rolling stock; air and spacecraft and related machinery; military fighting vehicles
CONSTRUCTION WORK	CPA 2008	Division 41	CONSTRUCTIONS AND CONSTRUCTION WORKS
CONSTRUCTION WORK	CPA 2008	Division 41	CONSTRUCTIONS AND CONSTRUCTION WORKS
CONSTRUCTION WORK	CPA 2008	Division 42	CONSTRUCTIONS AND CONSTRUCTION WORKS FOR CIVIL ENGINEERING
PRODUCTS OF AGRICULTURE, HUNTING, AND RELATED SERVICES; PRODUCTS OF FORESTRY, LOGGING, AND RELATED SERVICES; FISH AND OTHER FISHING PRODUCTS, SERVICES INCIDENTAL TO FISHING; SOFTWARE CONSULTANCY AND SUPPLY SERVICES	CPA 2008	Divisions 01, 02, and 03; 62.02	PRODUCTS OF AGRICULTURE, HUNTING, AND RELATED SERVICES; PRODUCTS OF FORESTRY, LOGGING, AND RELATED SERVICES; FISH AND OTHER FISHING PRODUCTS, AQUACULTURE PRODUCTS, SUPPORT SERVICES TO FISHING; COMPUTER CONSULTANCY SERVICES

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## Annex A (Continued)

ICP Code	Heading	Type	Classification 1	Code 1
160110	CHANGES IN INVENTORIES			
160111	<i>Changes in inventories</i>			
160111.1	Opening value of inventories			
160111.2	Closing value of inventories			
160200	ACQUISITIONS LESS DISPOSALS OF VALUABLES			
160210	ACQUISITIONS LESS DISPOSALS OF VALUABLES			
160211	<i>Acquisitions less disposals of valuables</i>			
160211.1	Acquisitions of valuables			
160211.2	Disposals of valuables			
170000	<b>BALANCE OF EXPORTS AND IMPORTS</b>			
170100	BALANCE OF EXPORTS AND IMPORTS			
170110	BALANCE OF EXPORTS AND IMPORTS			
170111	<i>Balance of exports and imports</i>			
170111.1	Exports of goods and services			
170111.2	Imports of goods and services			

Source: ICP, <http://icp.worldbank.org>.

Note: COICOP = Classification of Individual Consumption According to Purpose; COPNI = Classification of the Purposes of Non-profit Institutions Serving Households; COFOG = Classification of the Functions of Government (United Nations); CPA = Classification of Products by Activity (Eurostat); goods/ND = nondurable goods; goods/SD = semidurable goods; goods/D = durable goods; services/S = consumer services; services/IS = individual services; services/CS = collective services; IG = investment good; NPISHs = nonprofit institutions serving households; SNA = System of National Accounts; n.e.c. = not elsewhere classified.

Individual consumption expenditure by NPISHs (120000) in the ICP Classification contains only one basic heading, whereas COPNI classifies expenditures of NPISHs according to the purpose they serve. However, in practice, one basic heading in the ICP will serve its needs because most economies are not able to break down NPISH expenditures in detail owing to limited information or ambiguity of purposes.

Individual consumption expenditure by government (130000) and collective consumption expenditure by government (140000) cover various areas of the economy defined by COFOG. ICP basic headings follow System of National Accounts definitions rather than classifying basic headings according to the sectors. The only exceptions are health products and services under individual consumption expenditure by government.





## Annex B

### Mapping of ICP and Regional Classifications

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
0	0	1	1	100000	<b>GROSS DOMESTIC PRODUCT</b>
1	1	11	11	110000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>
101	1.01	11.01	11.01	110100	FOOD AND NONALCOHOLIC BEVERAGES
1011	1.01.1	11.01.1	11.01.1	110110	FOOD
101101	1.01.1.01	11.01.11	11.01.11	110111	<i>Bread and cereals</i>
1011011	1.01.1.01.1	11.01.11.1	11.01.11.1	110111.1	Rice
1011012	1.01.1.01.2	11.01.11.2	11.01.11.2	110111.2	Maize, maize meal, barley, other cereals, and flour
1011013	1.01.1.01.3	11.01.11.3	11.01.11.3	110111.3	Bread
1011014	1.01.1.01.4	11.01.11.4	11.01.11.4	110111.4	Other bakery products
1011015	1.01.1.01.5	11.01.11.5	11.01.11.5	110111.5	Pasta products
101102	1.01.1.02	11.01.12	11.01.12	110112	<i>Meat</i>
1011021	1.01.1.02.1	11.01.12.1	11.01.12.1	110112.1	Beef and veal
1011022	1.01.1.02.2	11.01.12.2	11.01.12.2	110112.2	Pork
1011023	1.01.1.02.3	11.01.12.3	11.01.12.3	110112.3	Lamb, mutton, and goat
1011024	1.01.1.02.4	11.01.12.4	11.01.12.4	110112.4	Poultry
1011025	1.01.1.02.5	11.01.12.5	11.01.12.5	110112.5	Other meats and edible offal
1011026	1.01.1.02.6	11.01.12.6	11.01.12.6	110112.5	Dried, preserved meats and other meat preparations
101103	1.01.1.03	11.01.13	11.01.13	110113	<i>Fish and seafood</i>
1011031	1.01.1.03.1	11.01.13.1	11.01.13.1	110113.1	Fresh, chilled, or frozen fish and seafood
1011032	1.01.1.03.2	11.01.13.2	11.01.13.2	110113.2	Preserved or processed fish and seafood
101104	1.01.1.04	11.01.14	11.01.14	110114	<i>Milk, cheese, and eggs</i>
1011041	1.01.1.04.1	11.01.14.1	11.01.14.1	110114.1	Fresh milk
1011042	1.01.1.04.2	11.01.14.2	11.01.14.2	110114.2	Preserved milk and other milk products
1011043	1.01.1.04.3	11.01.14.3	11.01.14.3	110114.3	Cheese
1011044	1.01.1.04.4	11.01.14.4	11.01.14.4	110114.4	Eggs and egg-based products
101105	1.01.1.05	11.01.15	11.01.15	110115	<i>Oils and fats</i>

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
<b>PRODUIT INTERIEUR BRUT</b>	<b>GROSS DOMESTIC PRODUCT</b>	<b>GROSS DOMESTIC PRODUCT</b>	<b>GROSS DOMESTIC PRODUCT</b>	
<b>DÉPENSES DE CONSUMMATION INDIVIDUELLE DES MÉNAGES</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>	
PRODUITS ALIMENTAIRES ET BOISSONS NON ALCOOLISÉES	FOOD AND NONALCOHOLIC BEVERAGES	FOOD AND NONALCOHOLIC BEVERAGES	FOOD AND NONALCOHOLIC BEVERAGES	
PRODUITS ALIMENTAIRES	FOOD	FOOD	FOOD	
<i>Pains et céréales</i>	<i>Bread and cereals</i>	<i>Bread and cereals</i>	<i>Bread and cereals</i>	
Riz	Rice	Rice	Rice	
Maïs, repas de maïs, orge et toutes autres farines	Other cereals	Other cereals, flour, and other cereal products	Other cereals, flour, and other products	N
Pain	Bread	Bread	Bread	
Autres produits de la boulangerie	Other bakery products	Other bakery products	Other bakery products	
Pâtes alimentaires	Pasta products	Pasta products	Pasta products	
<i>Viande</i>	<i>Meat</i>	<i>Meat</i>	<i>Meat</i>	
Viande bovine	Beef and veal	Beef and veal	Beef and veal	
Viande de porc	Pork	Pork	Pork	
Viande d'agneau, mouton et chèvre	Lamb, mutton, and goat	Lamb, mutton, and goat	Lamb, mutton, and goat	
Volaille	Poultry	Poultry	Poultry	
Autres viandes comestibles et abats comestibles	Other meats and edible offal	Other meats and edible offal	Other meats and meat preparations	M
Viande séchée, conserve de viande et autres préparations à base de viande	Delicatessen and other meat preparations	Delicatessen and other meat preparations		
<i>Poissons et fruits de mer</i>	<i>Fish and seafood</i>	<i>Fish and seafood</i>	<i>Fish and seafood</i>	
Poissons et fruits de mer frais, congelés ou surgelés	Fresh, chilled, or frozen fish and seafood	Fresh, chilled, or frozen fish and seafood	Fresh, chilled, or frozen fish and seafood	
Conserves ou produits de la transformation de poissons et de fruits de mer	Preserved or processed fish and seafood	Preserved or processed fish and seafood	Preserved or processed fish and seafood	
<i>Lait, fromages et oeufs</i>	<i>Milk, cheese, and eggs</i>	<i>Milk, cheese, and eggs</i>	<i>Milk, cheese, and eggs</i>	
Lait frais	Fresh milk	Fresh milk	Fresh milk	
Lait en conserve et autres produits laitiers	Preserved milk and other milk products	Preserved milk and other milk products	Preserved milk and other milk products	
Fromage	Cheese	Cheese	Cheese	
Œufs et produits à base d'œufs	Eggs and egg-based products	Eggs and egg-based products	Eggs and egg-based products	
<i>Huiles et graisses</i>	<i>Oils and fats</i>	<i>Oils and fats</i>	<i>Oils and fats</i>	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
1011051	1.01.1.05.1	11.01.15.1	11.01.15.1	110115.1	Butter and butter products
1011052	1.01.1.05.2	11.01.15.2	11.01.15.2	110115.1	Margarine
1011053	1.01.1.05.3	11.01.15.3	11.01.15.3	110115.2	Other edible oils and fats
101106	1.01.1.06	11.01.16	11.01.16	110116	<i>Fruit</i>
1011061	1.01.1.06.1	11.01.16.1	11.01.16.1	110116.1	Fresh or chilled fruits
1011062	1.01.1.06.2	11.01.16.2	11.01.16.2	110116.2	Frozen, preserved, or processed fruit and fruit-based products
101107	1.01.1.07	11.01.17	11.01.17	110117	<i>Vegetables</i>
1011071	1.01.1.07.1	11.01.17.1	11.01.17.1	110117.1	Fresh or chilled vegetables other than potatoes
1011072	1.01.1.07.2	11.01.17.2	11.01.17.2	110117.2	Fresh or chilled potatoes, manioc, and other tubers
1011073	1.01.1.07.3	11.01.17.3	11.01.17.3	110117.3	Frozen, preserved, or processed vegetables and vegetable-based products
101108	1.01.1.08	11.01.18	11.01.18	110118	<i>Sugar, jam, honey, chocolate, and confectionery</i>
1011081	1.01.1.08.1	11.01.18.1	11.01.18.1	110118.1	Raw and refined sugar
1011082	1.01.1.08.2	11.01.18.2	11.01.18.2	110118.2	Jams, marmalades, and honey
1011083	1.01.1.08.3	11.01.18.3	11.01.18.3	110118.3	Confectionery, chocolate
1011084	1.01.1.08.4	11.01.18.4	11.01.18.4	110118.4	Edible ices and ice cream and sorbet
101109	1.01.1.09	11.01.19	11.01.19	110119	<i>Food products n.e.c.</i>
1011091	1.01.1.09.1	11.01.19	11.01.19	110119.1	Food products n.e.c.
1012	1.01.2	11.01.2	11.01.2	110120	NONALCOHOLIC BEVERAGES
101201	1.01.2.01	11.01.21	11.01.21	110121	<i>Coffee, tea, and cocoa</i>
1012011	1.01.2.01.1	11.01.21	11.01.21	110121.1	Coffee, tea, and cocoa
101202	1.01.2.02	11.01.22	11.01.22	110122	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>
1012021	1.01.2.02.1	11.01.22.1	11.01.22.1	110122.1	Mineral or spring waters
1012022	1.01.2.02.2	11.01.22.2	11.01.22.2	110122.1	Soft drinks and concentrates
1012023	1.01.2.02.3	11.01.22.3	11.01.22.3	110122.1	Fruit and vegetable juices
102	1.02	11.02	11.02	110200	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS
1021	1.02.1	11.02.1	11.02.1	110210	ALCOHOLIC BEVERAGES
102101	1.02.1.01	11.02.11	11.02.11	110211	<i>Spirits</i>
1021011	1.02.1.01.1	11.02.11	11.02.11	110211.1	Spirits
102102	1.02.1.02	11.02.12	11.02.12	110212	<i>Wine</i>

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
Beurre et produits dérivés	Butter	Butter	Butter and margarine	M
Margarine	Margarine	Margarine		
Autres huiles de table et graisses	Other edible oils and fats	Other edible oils and fats	Other edible oils and fats	
<i>Fruits</i>	<i>Fruit</i>	<i>Fruit</i>	<i>Fruit</i>	
Fruit frais ou réfrigérés	Fresh or chilled fruit	Fresh or chilled fruit	Fresh or chilled fruit	
Fruits congelés, conserves de fruits ou produits à base de fruits	Frozen, preserved, or processed fruit and fruit-based products	Frozen, preserved, or processed fruit and fruit-based products	Frozen, preserved, or processed fruit and fruit-based products	
<i>Légumes</i>	<i>Vegetables</i>	<i>Vegetables</i>	<i>Vegetables</i>	
Légumes frais ou réfrigérés autres que les pommes de terre	Fresh or chilled vegetables other than potatoes	Fresh or chilled vegetables other than potatoes	Fresh or chilled vegetables other than potatoes	
Pommes de terre fraîches ou réfrigérées, manioc et autres tubercules	Fresh or chilled potatoes	Fresh or chilled potatoes	Fresh or chilled potatoes	N
Légumes réfrigérés, légumes en conserves et produits à base de légumes	Frozen, preserved, or processed vegetables and vegetable-based products	Frozen, preserved, or processed vegetables and vegetable-based products	Frozen, preserved, or processed vegetables and vegetable-based products	
<i>Sucre, confitures, miel, chocolat et confiseries</i>	<i>Sugar, jam, honey, chocolate, and confectionery</i>	<i>Sugar, jam, honey, chocolate, and confectionery</i>	<i>Sugar, jam, honey, chocolate, and confectionery</i>	
Sucre brut et raffiné	Sugar	Sugar	Sugar	N
Confitures, marmalades et miel	Jams, marmalades, and honey	Jams, marmalades, and honey	Jams, marmalades, and honey	
Confiserie, chocolat	Confectionery, chocolate, and other cocoa preparations	Confectionery, chocolate, and other cocoa preparations	Confectionery, chocolate, and ice cream	M
Glaces alimentaires et crèmes glacées y compris sorbets	Edible ice, ice cream, and sorbet	Edible ice, ice cream, and sorbet		
<i>Produits alimentaires n.c.a.</i>	<i>Food products n.e.c.</i>	<i>Food products n.e.c.</i>	<i>Food products n.e.c.</i>	
Produits alimentaires n.c.a.	Food products n.e.c.	Food products n.e.c.	Food products n.e.c.	
BOISSONS NON ALCOOLISÉES	NONALCOHOLIC BEVERAGES	NONALCOHOLIC BEVERAGES	NONALCOHOLIC BEVERAGES	
<i>Café, thé, cacao</i>	<i>Coffee, tea, and cocoa</i>	<i>Coffee, tea, and cocoa</i>	<i>Coffee, tea, and cocoa</i>	
Café, thé, cacao	Coffee, tea, and cocoa	Coffee, tea, and cocoa	Coffee, tea, and cocoa	
<i>Eaux minérales, boissons gazeuses et jus de fruits et de légumes</i>	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>	
Eaux minérales ou de source	Mineral waters	Mineral waters	Mineral waters, soft drinks, fruit and vegetable juices	M
Boissons gazeuses et concentrés	Soft drinks and concentrates	Soft drinks and concentrates		
Jus de fruit et jus de légumes	Fruit and vegetable juices	Fruit and vegetable juices		
BOISSONS ALCOOLISÉES, TABAC ET STUPÉFIANTS	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS	
BOISSONS ALCOOLISÉES	ALCOHOLIC BEVERAGES	ALCOHOLIC BEVERAGES	ALCOHOLIC BEVERAGES	
<i>Spiritueux</i>	<i>Spirits</i>	<i>Spirits</i>	<i>Spirits</i>	
Spiritueux	Spirits	Spirits	Spirits	
<i>Vin</i>	<i>Wine</i>	<i>Wine</i>	<i>Wine</i>	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
1021021	1.02.1.02.1	11.02.12	11.02.12	110212.1	Wine
102103	1.02.1.03	11.02.13	11.02.13	110213	<i>Beer</i>
1021031	1.02.1.03.1	11.02.13	11.02.13	110213.1	Beer
1022	1.02.2	11.02.2	11.02.2	110220	TOBACCO
102201	1.02.2.01	11.02.2	11.02.2	110221	<i>Tobacco</i>
1022011	1.02.2.01.1	11.02.2	11.02.2	110221.1	Tobacco
1023	1.02.3	11.02.3	11.02.3	110230	NARCOTICS
102301	1.02.3.01	11.02.3	11.02.3	110231	<i>Narcotics</i>
1023011	1.02.3.01.1	11.02.3	11.02.3	110231.1	Narcotics
103	1.03	11.03	11.03	110300	CLOTHING AND FOOTWEAR
1031	1.03.1	11.03.1	11.03.1	110310	CLOTHING
103101	1.03.1.01	11.03.11	11.03.11	110311	<i>Clothing materials</i>
1031011	1.03.1.01.1	11.03.11	11.03.11	110311.1	Clothing materials, other articles of clothing, and clothing accessories
103102	1.03.1.02	11.03.12	11.03.12	110312	<i>Garments</i>
1031021	1.03.1.02.1	11.03.12.1	11.03.12.1	110312.1	Men's clothing as defined above, including tailoring charges
1031022	1.03.1.02.2	11.03.12.2	11.03.12.2	110312.1	Women's clothing as defined above, including tailoring charges
1031023	1.03.1.02.3	11.03.12.3	11.03.12.3	110312.1	Children's and infant's clothing, including tailoring charges
103103	1.03.1.03	11.03.13	11.03.13		<i>Other articles of clothing and clothing accessories</i>
1031031	1.03.1.03.1	11.03.13	11.03.13		Other articles of clothing and clothing accessories
103104	1.03.1.04	11.03.14	11.03.14	110314	<i>Cleaning, repair, and hire of clothing</i>
1031041	1.03.1.04.1	11.03.14	11.03.14	110314.1	Cleaning, repair, and hire of clothing
1032	1.03.2	11.03.2	11.03.2	110320	FOOTWEAR
103201	1.03.2.01	11.03.21	11.03.21	110321	<i>Shoes and other footwear</i>
1032011	1.03.2.01.1	11.03.21.1	11.03.21.1	110321.1	Men's footwear
1032012	1.03.2.01.2	11.03.21.2	11.03.21.2	110321.1	Women's footwear as defined above
1032013	1.03.2.01.3	11.03.21.3	11.03.21.3	110321.1	Children's and infant's footwear, excludes baby booties made of fabric
103202	1.03.2.02	11.03.22	11.03.22	110322	<i>Repair and hire of footwear</i>
1032021	1.03.2.02.1	11.03.22	11.03.22	110322.1	Repair and hire of footwear

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
Vin	Wine	Wine	Wine	
<i>Bière</i>	<i>Beer</i>	<i>Beer</i>	<i>Beer</i>	
Bière	Beer	Beer	Beer	
Tabac	TOBACCO	TOBACCO	TOBACCO	
<i>Tabac</i>	<i>Tobacco</i>	<i>Tobacco</i>	<i>Tobacco</i>	
Tabac	Tobacco	Tobacco	Tobacco	
Stupéfiants	NARCOTICS	NARCOTICS	NARCOTICS	
<i>Stupéfiants</i>	<i>Narcotics</i>	<i>Narcotics</i>	<i>Narcotics</i>	
Stupéfiants	Narcotics	Narcotics	Narcotics	
ARTICLES D'HABILLEMENT ET ARTICLES CHAUSSANTS	CLOTHING AND FOOTWEAR	CLOTHING AND FOOTWEAR	CLOTHING AND FOOTWEAR	
ARTICLES D'HABILLEMENT	CLOTHING	CLOTHING	CLOTHING	
<i>Tissus d'habillement</i>	<i>Clothing materials</i>	<i>Clothing materials</i>	<i>Clothing materials, other articles of clothing, and clothing accessories</i>	
Tissus d'habillement	Clothing materials	Clothing materials	Clothing materials, other articles of clothing, and clothing accessories	
<i>Vêtements</i>	<i>Garments</i>	<i>Garments</i>	<i>Garments</i>	
Habillement pour hommes y compris les frais de couture	Men's clothing	Men's clothing	Garments	M
Habillement pour femmes y compris les frais de couture	Women's clothing	Women's clothing		
Vêtements pour enfants et bébés y compris frais de couture	Children's and infant's clothing	Children's and infant's clothing		
<i>Autres articles et accessoires vestimentaires</i>	<i>Other articles of clothing and clothing accessories</i>	<i>Other articles of clothing and clothing accessories</i>		
Autres articles et accessoires vestimentaires	Other articles of clothing and clothing accessories	Other articles of clothing and clothing accessories		
<i>Nettoyage, réparation et location de vêtements</i>	<i>Cleaning, repair, and hire of clothing</i>	<i>Cleaning, repair, and hire of clothing</i>	<i>Cleaning, repair, and hire of clothing</i>	
Nettoyage, réparation et location de vêtements	Cleaning, repair, and hire of clothing	Cleaning, repair, and hire of clothing	Cleaning, repair, and hire of clothing	
ARTICLES CHAUSSANTS	FOOTWEAR	FOOTWEAR	FOOTWEAR	
<i>Chaussures et autres articles chaussants</i>	<i>Shoes and other footwear</i>	<i>Shoes and other footwear</i>	<i>Shoes and other footwear</i>	
Chaussures pour hommes	Men's footwear	Men's footwear	Shoes and other footwear	M
Chaussures pour dames	Women's footwear	Women's footwear		
Chaussures pour enfants et bébés	Children's and infant's footwear	Children's and infant's footwear		
<i>Réparation et location de chaussures</i>	<i>Repair and hire of footwear</i>	<i>Repair and hire of footwear</i>	<i>Repair and hire of footwear</i>	
Réparation et location de chaussures	Repair and hire of footwear	Repair and hire of footwear	Repair and hire of footwear	

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
104	1.04	11.04	11.04	110400	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS
1041	1.04.1	11.04.1	11.04.1	110410	ACTUAL RENTALS FOR HOUSING
104101	1.04.1.01	11.04.11	11.04.11	110411	<i>Actual rentals for housing</i>
1041011	1.04.1.01.1	11.04.11	11.04.11	110411.1	Actual rentals for housing
1042	1.04.2	11.04.2	11.04.2		IMPUTED RENTALS FOR HOUSING
104201	1.04.2.01	11.04.21	11.04.21		<i>Imputed rentals for housing</i>
1042011	1.04.2.01.1	11.04.21	11.04.21		Imputed rentals for housing
1043	1.04.3	11.04.3	11.04.3	110430	MAINTENANCE AND REPAIR OF THE DWELLING
104301	1.04.3.01	11.04.31	11.04.31	110431	<i>Maintenance and repair of the dwelling</i>
1043011	1.04.3.01.1	11.04.31	11.04.31	110431.1	Maintenance and repair of the dwelling
		11.04.32	11.04.32		
		11.04.32	11.04.32		
1044	1.04.4	11.04.4	11.04.4	110440	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING
104401	1.04.4.01	11.04.41	11.04.41	110441	<i>Water supply</i>
1044011	1.04.4.01.1	11.04.41	11.04.41	110441.1	Water supply
104402	1.04.4.02	11.04.42	11.04.42	110442	<i>Miscellaneous services relating to the dwelling</i>
1044021	1.04.4.02.1	11.04.42	11.04.42	110442.1	Sanitary and sewage services and other services
1045	1.04.5	11.04.5	11.04.5	110450	ELECTRICITY, GAS, AND OTHER FUELS
104501	1.04.5.01	11.04.51	11.04.51	110451	<i>Electricity</i>
1045011	1.04.5.01.1	11.04.51	11.04.51	110451.1	Electricity
104502	1.04.5.02	11.04.52	11.04.52	110452	<i>Gas</i>
1045021	1.04.5.02.1	11.04.52	11.04.52	110452.1	Gas
104503	1.04.5.03	11.04.53	11.04.53	110453	<i>Other fuels</i>
1045031	1.04.5.03.1	11.04.53	11.04.53	110453.1	Other fuels
		11.04.54	11.04.54		



AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
LOGEMENT, EAU, ÉLECTRICITÉ, GAZ ET AUTRES COMBUSTIBLES	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS	
LOYERS D'HABITATION EFFECTIFS	ACTUAL RENTALS FOR HOUSING	ACTUAL RENTALS FOR HOUSING	ACTUAL AND IMPUTED RENTALS FOR HOUSING	M
<i>Loyers d'habitation effectifs</i>	<i>Actual rentals paid by tenants</i>	<i>Actual rentals for housing</i>	<i>Actual and imputed rentals for housing</i>	
Loyers d'habitation effectifs	Actual rentals paid by tenants	Actual rentals for housing	Actual and imputed rentals for housing	
LOYERS D'HABITATION IMPUTÉS	IMPUTED RENTALS FOR HOUSING	IMPUTED RENTALS FOR HOUSING		M
<i>Loyers d'habitation imputés</i>	<i>Imputed rentals of owner- occupiers</i>	<i>Imputed rentals for housing</i>		
Loyers d'habitation imputés	Imputed rentals of owner- occupiers	Imputed rentals for housing		M
ENTRETIEN ET RÉPARATION DU LOGEMENT	MAINTENANCE AND REPAIR OF THE DWELLING	MAINTENANCE AND REPAIR OF THE DWELLING	MAINTENANCE AND REPAIR OF THE DWELLING	
<i>Entretien et réparation du logement</i>	<i>Materials for the maintenance and repair of the dwelling</i>	<i>Materials for the maintenance and repair of the dwelling</i>	<i>Maintenance and repair of the dwelling</i>	
Entretien et réparation du logement	Materials for the maintenance and repair of the dwelling	Materials for the maintenance and repair of the dwelling	Maintenance and repair of the dwelling	
	Services for the maintenance and repair of the dwelling	Services for the maintenance and repair of the dwelling		
	Services for the maintenance and repair of the dwelling	Services for the maintenance and repair of the dwelling		
APPROVISIONNEMENT EN EAU ET AUTRES SERVICES RELATIFS AU LOGEMENT	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING	
<i>Approvisionnement en eau</i>	<i>Water supply</i>	<i>Water supply</i>	<i>Water supply</i>	
Approvisionnement en eau	Water supply	Water supply	Water supply	
<i>Autres services relatifs au logement</i>	<i>Miscellaneous services relating to the dwelling</i>	<i>Miscellaneous services relating to the dwelling</i>	<i>Miscellaneous services relating to the dwelling</i>	
Services sanitaires, assainissements et autres services	Miscellaneous services relating to the dwelling	Miscellaneous services relating to the dwelling	Miscellaneous services relating to the dwelling	N
ÉLECTRICITÉ, GAZ ET AUTRES COMBUSTIBLES	ELECTRICITY, GAS, AND OTHER FUELS	ELECTRICITY, GAS, AND OTHER FUELS	ELECTRICITY, GAS, AND OTHER FUELS	
<i>Électricité</i>	<i>Electricity</i>	<i>Electricity</i>	<i>Electricity</i>	
Électricité	Electricity	Electricity	Electricity	
<i>Gaz</i>	<i>Gas</i>	<i>Gas</i>	<i>Gas</i>	
Gaz	Gas	Gas	Gas	
<i>Autres combustibles</i>	<i>Liquid fuels</i>	<i>Liquid fuels</i>	<i>Other fuels</i>	
Autres combustibles	Liquid fuels	Liquid fuels	Other fuels	
	<i>Solid fuels</i>	<i>Solid fuels</i>		

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
		11.04.54	11.04.54		
		11.04.55	11.04.55		
		11.04.55	11.04.55		
105	1.05	11.05	11.05	110500	FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE HOUSEHOLD MAINTENANCE
1051	1.05.1	11.05.1	11.05.1	110510	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS
105101	1.05.1.01	11.05.11	11.05.11	110511	<i>Furniture and furnishings</i>
1051011	1.05.1.01.1	11.05.11.1	11.05.11.1	110511.1	Furniture and furnishings
		11.05.11.2	11.05.11.2		
		11.05.11.3	11.05.11.3		
		11.05.11.4	11.05.11.4		
105102	1.05.1.02	11.05.12	11.05.12	110512	<i>Carpets and other floor coverings</i>
1051021	1.05.1.02.1	11.05.12	11.05.12	110512.1	Carpets and other floor coverings
105103	1.05.1.03	11.05.13	11.05.13	110513	<i>Repair of furniture, furnishings, and floor coverings</i>
1051031	1.05.1.03.1	11.05.13	11.05.13	110513.1	Repair of furniture, furnishings, and floor coverings
1052	1.05.2	11.05.2	11.05.2	110520	HOUSEHOLD TEXTILES
105201	1.05.2.01	11.05.2	11.05.2	110521	<i>Household textiles</i>
1052011	1.05.2.01.1	11.05.2	11.05.2	110521.1	Household textiles
1053	1.05.3	11.05.3	11.05.3	110530	HOUSEHOLD APPLIANCES
105301	1.05.3.01	11.05.31	11.05.31	110531	<i>Major household appliances whether electric or not</i>
1053011	1.05.3.01.1	11.05.31	11.05.31	110531.1	Major household appliances whether electric or not
105302	1.05.3.02	11.05.32	11.05.32	110532	<i>Small electric household appliances</i>
1053021	1.05.3.02.1	11.05.32	11.05.32	110532.1	Small electric household appliances
105303	1.05.3.03	11.05.33	11.05.33	110533	<i>Repair of household appliances</i>
1053031	1.05.3.03.1	11.05.33	11.05.33	110533.1	Repair of household appliances
1054	1.05.4	11.05.4	11.05.4	110540	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
	Solid fuels	Solid fuels		
	<i>Heat energy</i>	<i>Heat energy</i>		
	Heat energy	Heat energy		
AMEUBLEMENT, EQUIPEMENT MÉNAGER ET ENTRETIEN COURANT DE LA MAISON	<b>FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE HOUSEHOLD MAINTENANCE</b>	FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE HOUSEHOLD MAINTENANCE	FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE MAINTENANCE OF THE HOUSE	
MEUBLES, ARTICLES D'AMEUBLEMENT, TAPIS ET AUTRES REVÊTEMENTS DE SOL	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS	
<i>Meubles et articles d'ameublement</i>	<i>Furniture and furnishings</i>	<i>Furniture and furnishings</i>	<i>Furniture and furnishings</i>	
Meubles et articles d'ameublement	Kitchen furniture	Kitchen furniture	Furniture and furnishings	
	Bedroom furniture	Bedroom furniture		
	Living room and dining room furniture	Living room and dining room furniture		
	Other furniture and furnishings	Other furniture and furnishings		
<i>Tapis et autres revêtements de sol</i>	<i>Carpets and other floor coverings</i>	<i>Carpets and other floor coverings</i>	<i>Carpets and other floor coverings</i>	
Tapis et autres revêtements de sol	Carpets and other floor coverings	Carpets and other floor coverings	Carpets and other floor coverings	
<i>Réparation des meubles, articles d'ameublement et revêtements de sol</i>	<i>Repair of furniture, furnishings, and floor coverings</i>	<i>Repair of furniture, furnishings, and floor coverings</i>	<i>Repair of furniture, furnishings, and floor coverings</i>	
Réparation des meubles, articles d'ameublement et revêtements de sol	Repair of furniture, furnishings, and floor coverings	Repair of furniture, furnishings, and floor coverings	Repair of furniture, furnishings, and floor coverings	
ARTICLES DE MÉNAGE EN TEXTILES	HOUSEHOLD TEXTILES	HOUSEHOLD TEXTILES	HOUSEHOLD TEXTILES	
<i>Articles de ménage en textile</i>	<i>Household textiles</i>	<i>Household textiles</i>	<i>Household textiles</i>	
Articles de ménage en textile	Household textiles	Household textiles	Household textiles	
APPAREILS MÉNAGERS	HOUSEHOLD APPLIANCES	HOUSEHOLD APPLIANCES	HOUSEHOLD APPLIANCES	
<i>Gros appareils ménagers, électriques ou non</i>	<i>Major household appliances whether electric or not</i>	<i>Major household appliances whether electric or not</i>	<i>Major household appliances whether electric or not</i>	
Gros appareils ménagers, électriques ou non	Major household appliances whether electric or not	Major household appliances whether electric or not	Major household appliances whether electric or not	
<i>Petits appareils électroménagers</i>	<i>Small electric household appliances</i>	<i>Small electric household appliances</i>	<i>Small electric household appliances</i>	
Petits appareils électroménagers	Small electric household appliances	Small electric household appliances	Small electric household appliances	
<i>Réparation d'appareils ménagers</i>	<i>Repair of household appliances</i>	<i>Repair of household appliances</i>	<i>Repair of household appliances</i>	
Réparation d'appareils ménagers	Repair of household appliances	Repair of household appliances	Repair of household appliances	
VERRERIE, VAISSELLE ET USTENSILES DE MÉNAGE	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
105401	1.05.4.01	11.05.4	11.05.4	110541	<i>Glassware, tableware, and household utensils</i>
1054011	1.05.4.01.1	11.05.4	11.05.4	110541.1	Glassware, tableware, and household utensils
1055	1.05.5	11.05.5	11.05.5	110550	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN
105501	1.05.5.01	11.05.51	11.05.51	110551	<i>Major tools and equipment</i>
1055011	1.05.5.01.1	11.05.51	11.05.51	110551.1	Major tools and equipment
105502	1.05.5.02	11.05.52	11.05.52	110552	<i>Small tools and miscellaneous accessories</i>
1055021	1.05.5.02.1	11.05.52	11.05.52	110552.1	Small tools and miscellaneous accessories
1056	1.05.6	11.05.6	11.05.6	110560	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE
105601	1.05.6.01	11.05.61	11.05.61	110561	<i>Nondurable household goods</i>
1056011	1.05.6.01.1	11.05.61	11.05.61	110561.1	Nondurable household goods
105602	1.05.6.02	11.05.62	11.05.62	110562	<i>Domestic services and household services</i>
1056021	1.05.6.02.1	11.05.62.1	11.05.62.1	110562.1	Domestic services
1056022	1.05.6.02.2	11.05.62.2	11.05.62.2	110562.2	Household services
106	1.06	11.06	11.06	110600	HEALTH
1061	1.06.1	11.06.1	11.06.1	110610	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT
106101	1.06.1.01	11.06.11	11.06.11	110611	<i>Pharmaceutical products</i>
1061011	1.06.1.01.1	11.06.11	11.06.11	110611.1	Pharmaceutical products
106102	1.06.1.02	11.06.12	11.06.12	110612	<i>Other medical products</i>
1061021	1.06.1.02.1	11.06.12	11.06.12	110612.1	Other medical products
106103	1.06.1.03	11.06.13	11.06.13	110613	<i>Therapeutic appliances and equipment</i>
1061031	1.06.1.03.1	11.06.13	11.06.13	110613.1	Therapeutic appliances and equipment
1062	1.06.2	11.06.2	11.06.2	110620	OUTPATIENT SERVICES
106201	1.06.2.01	11.06.21	11.06.21	110621	<i>Medical services</i>
1062011	1.06.2.01.1	11.06.21	11.06.21	110621.1	Medical services
106202	1.06.2.02	11.06.22	11.06.22	110622	<i>Dental services</i>
1062021	1.06.2.02.1	11.06.22	11.06.22	110622.1	Dental services
106203	1.06.2.03	11.06.23	11.06.23	110623	<i>Paramedical services</i>
1062031	1.06.2.03.1	11.06.23	11.06.23	110623.1	Paramedical services
1063	1.06.3	11.06.3	11.06.3	110630	HOSPITAL SERVICES

<b>AfDB 2005 heading (French)</b>	<b>Eurostat heading</b>	<b>OECD heading</b>	<b>ICP heading</b>	<b>M: Merging two or more BHs N: Different name S: Split</b>
<i>Verrerie, vaisselle et ustensiles de ménage</i>	<i>Glassware, tableware, and household utensils</i>	<i>Glassware, tableware, and household utensils</i>	<i>Glassware, tableware, and household utensils</i>	
Verrerie, vaisselle et ustensiles de ménage	Glassware, tableware, and household utensils	Glassware, tableware, and household utensils	Glassware, tableware, and household utensils	
OUTILLAGE POUR LA MAISON ET LE JARDIN	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN	
<i>Gros outillage</i>	<i>Major tools and equipment</i>	<i>Major tools and equipment</i>	<i>Major tools and equipment</i>	
Gros outillage	Major tools and equipment	Major tools and equipment	Major tools and equipment	
<i>Petit outillage et accessoires divers</i>	<i>Small tools and miscellaneous accessories</i>	<i>Small tools and miscellaneous accessories</i>	<i>Small tools and miscellaneous accessories</i>	
Petit outillage et accessoires divers	Small tools and miscellaneous accessories	Small tools and miscellaneous accessories	Small tools and miscellaneous accessories	
BIENS ET SERVICES POUR L'ENTRETIEN COURANT DE L'HABITATION	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE	
<i>Articles de ménage non durables</i>	<i>Nondurable household goods</i>	<i>Nondurable household goods</i>	<i>Nondurable household goods</i>	
Articles de ménage non durables	Nondurable household goods	Nondurable household goods	Nondurable household goods	
<i>Services domestiques et autres services d'entretien du logement</i>	<i>Domestic services and household services</i>	<i>Domestic services and household services</i>	<i>Domestic services and household services</i>	
Services domestiques	Domestic services	Domestic services	Domestic services	
Autres services d'entretien du logement	Household services	Household services	Household services	
SANTÉ	HEALTH	HEALTH	HEALTH	
PRODUITS ET APPAREILS THERAPEUTIQUES; MATERIEL MEDICAL	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT	
<i>Produits pharmaceutiques</i>	<i>Pharmaceutical products</i>	<i>Pharmaceutical products</i>	<i>Pharmaceutical products</i>	
Produits pharmaceutiques	Pharmaceutical products	Pharmaceutical products	Pharmaceutical products	
<i>Autres produits médicaux</i>	<i>Other medical products</i>	<i>Other medical products</i>	<i>Other medical products</i>	
Autres produits médicaux	Other medical products	Other medical products	Other medical products	
<i>Appareils et matériels thérapeutiques</i>	<i>Therapeutic appliances and equipment</i>	<i>Therapeutic appliances and equipment</i>	<i>Therapeutic appliances and equipment</i>	
Appareils et matériels thérapeutiques	Therapeutic appliances and equipment	Therapeutic appliances and equipment	Therapeutic appliances and equipment	
SERVICES DE CONSULTATION EXTERNE	OUTPATIENT SERVICES	OUTPATIENT SERVICES	OUTPATIENT SERVICES	
<i>Services médicaux</i>	<i>Medical services</i>	<i>Medical services</i>	<i>Medical services</i>	
Services médicaux	Medical services	Medical services	Medical services	
<i>Services dentaires</i>	<i>Dental services</i>	<i>Dental services</i>	<i>Dental services</i>	
Services dentaires	Dental services	Dental services	Dental services	
<i>Services paramédicaux</i>	<i>Paramedical services</i>	<i>Paramedical services</i>	<i>Paramedical services</i>	
Services paramédicaux	Paramedical services	Paramedical services	Paramedical services	
SERVICES HOSPITALIERS	HOSPITAL SERVICES	HOSPITAL SERVICES	HOSPITAL SERVICES	

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Annex B (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
106301	1.06.3.01	11.06.3	11.06.3	110631	<i>Hospital services</i>
1063011	1.06.3.01.1	11.06.3	11.06.3	110631.1	Hospital services
107	1.07	11.07	11.07	110700	TRANSPORT
1071	1.07.1	11.07.1	11.07.1	110710	PURCHASE OF VEHICLES
107101	1.07.1.01	11.07.11	11.07.11	110711	<i>Motor cars</i>
1071011	1.07.1.01.1	11.07.11.1	11.07.11.1	110711.1	Motor cars, vans, etc.
		11.07.11.2	11.07.11.2		
		11.07.11.3	11.07.11.3		
		11.07.11.4	11.07.11.4		
		11.07.11.5	11.07.11.5		
107102	1.07.1.02	11.07.12	11.07.12	110712	<i>Motorcycles</i>
1071021	1.07.1.02.1	11.07.12	11.07.12	110712.1	Motorcycles
107103	1.07.1.03	11.07.13	11.07.13	110713	<i>Bicycles</i>
1071031	1.07.1.03.1	11.07.13	11.07.13	110713.1	Bicycles
107104	1.07.1.04	11.07.14	11.07.14	110714	<i>Animal-drawn vehicles</i>
1071041	1.07.1.04.1	11.07.14	11.07.14	110714.1	Animal-drawn vehicles
1072	1.07.2	11.07.2	11.07.2	110720	OPERATION OF PERSONAL TRANSPORT EQUIPMENT
		11.07.21	11.07.21		
		11.07.21	11.07.21		
107201	1.07.2.01	11.07.22	11.07.22	110722	<i>Fuels and lubricants for personal transport equipment</i>
1072011	1.07.2.01.1	11.07.22	11.07.22	110722.1	Fuels and lubricants for personal transport equipment
107202	1.07.2.02	11.07.23	11.07.23	110723	<i>Maintenance and repair of personal transport equipment</i>
1072021	1.07.2.02.1	11.07.23	11.07.23	110723.1	Tires, tubes, other parts and accessories
107203	1.07.2.03	11.07.24	11.07.24	110724	<i>Other services in respect of personal transport equipment</i>
1072031	1.07.2.03.1	11.07.24	11.07.24	110724.1	Other services in respect of personal transport equipment

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
<i>Services hospitaliers</i>	<i>Hospital services</i>	<i>Hospital services</i>	<i>Hospital services</i>	
Services hospitaliers	Hospital services	Hospital services	Hospital services	
TRANSPORTS	TRANSPORT	TRANSPORT	TRANSPORT	
ACHATS DE VÉHICULES	PURCHASE OF VEHICLES	PURCHASE OF VEHICLES	PURCHASE OF VEHICLES	
<i>Voitures particulières</i>	<i>Motor cars</i>	<i>Motor cars</i>	<i>Motor cars</i>	
Voitures particulières, minibus, etc.	Motor cars with diesel engine	Motor cars with diesel engine	Motor cars	
	Motor cars with petrol engine of cubic capacity of less than 1,200 cc	Motor cars with petrol engine of cubic capacity of less than 1,200 cc		
	Motor cars with petrol engine of cubic capacity of 1,200 cc to 1,699 cc	Motor cars with petrol engine of cubic capacity of 1,200 cc to 1,699 cc		
	Motor cars with petrol engine of cubic capacity of 1,700 cc to 2,999 cc	Motor cars with petrol engine of cubic capacity of 1,700 cc to 2,999 cc		
	Motor cars with petrol engine with cubic capacity of 3,000 cc and over	Motor cars with petrol engine with cubic capacity of 3,000 cc and over		
<i>Motocycles</i>	<i>Motorcycles</i>	<i>Motorcycles</i>	<i>Motorcycles</i>	
Motocycles	Motorcycles	Motorcycles	Motorcycles	
<i>Cycles</i>	<i>Bicycles</i>	<i>Bicycles</i>	<i>Bicycles</i>	
Cycles	Bicycles	Bicycles	Bicycles	
<i>Véhicules à traction animale</i>	<i>Animal-drawn vehicles</i>	<i>Animal-drawn vehicles</i>	<i>Animal-drawn vehicles</i>	
Véhicules à traction animale	Animal-drawn vehicles	Animal-drawn vehicles	Animal-drawn vehicles	
UTILISATION DES VEHICULES PERSONNELS	OPERATION OF PERSONAL TRANSPORT EQUIPMENT	OPERATION OF PERSONAL TRANSPORT EQUIPMENT	OPERATION OF PERSONAL TRANSPORT EQUIPMENT	
	<i>Spare parts and accessories for personal transport equipment</i>	<i>Spare parts and accessories for personal transport equipment</i>		
	Spare parts and accessories for personal transport equipment	Spare parts and accessories for personal transport equipment		
<i>Carburants et lubrifiants pour véhicules personnels</i>	<i>Fuels and lubricants for personal transport equipment</i>	<i>Fuels and lubricants for personal transport equipment</i>	<i>Fuels and lubricants for personal transport equipment</i>	
Carburants et lubrifiants pour véhicules personnels	Fuels and lubricants for personal transport equipment	Fuels and lubricants for personal transport equipment	Fuels and lubricants for personal transport equipment	
<i>Entretien et réparation des véhicules personnels</i>	<i>Maintenance and repair of personal transport equipment</i>	<i>Maintenance and repair of personal transport equipment</i>	<i>Maintenance and repair of personal transport equipment</i>	
Pneus, tubes, autres pièces et accessoires	Maintenance and repair of personal transport equipment	Maintenance and repair of personal transport equipment	Maintenance and repair of personal transport equipment	
<i>Autres services relatifs aux véhicules personnels</i>	<i>Other services in respect of personal transport equipment</i>	<i>Other services in respect of personal transport equipment</i>	<i>Other services in respect of personal transport equipment</i>	
Autres services relatifs aux véhicules personnels	Other services in respect of personal transport equipment	Other services in respect of personal transport equipment	Other services in respect of personal transport equipment	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
1073	1.07.3	11.07.3	11.07.3	110730	TRANSPORT SERVICES
107301	1.07.3.01	11.07.31	11.07.31	110731	<i>Passenger transport by railway</i>
1073011	1.07.3.01.1	11.07.31	11.07.31	110731.1	Passenger transport by railway
107302	1.07.3.02	11.07.32	11.07.32	110732	<i>Passenger transport by road</i>
1073021	1.07.3.02.1	11.07.32	11.07.32	110732.1	Passenger transport by road
107303	1.07.3.03	11.07.33	11.07.33	110733	<i>Passenger transport by air</i>
1073031	1.07.3.03.1	11.07.33	11.07.33	110733.1	Passenger transport by air
107304	1.07.3.04	11.07.34	11.07.34	110734	<i>Passenger transport by sea and inland waterway</i>
1073041	1.07.3.04.1	11.07.34	11.07.34	110734.1	Passenger transport by sea and inland waterway
107305	1.07.3.05	11.07.35	11.07.35	110735	<i>Combined passenger transport</i>
1073051	1.07.3.05.1	11.07.35	11.07.35	110735.1	Combined passenger transport
107306	1.07.3.06	11.07.36	11.07.36	110736	<i>Other purchased transport services</i>
1073061	1.07.3.06.1	11.07.36	11.07.36	110736.1	Other purchased transport services
108	1.08	11.08	11.08	110800	COMMUNICATION
1081	1.08.1	11.08.1	11.08.1	110810	POSTAL SERVICES
108101	1.08.1.01	11.08.1	11.08.1	110811	<i>Postal services</i>
1081011	1.08.1.01.1	11.08.1	11.08.1	110811.1	Postal services
1082	1.08.2	11.08.2	11.08.2	110820	TELEPHONE AND TELEFAX EQUIPMENT
108201	1.08.2.01	11.08.2	11.08.2	110821	<i>Telephone and telefax equipment</i>
1082011	1.08.2.01.1	11.08.2	11.08.2	110821.1	Telephone and telefax equipment
1083	1.08.3	11.08.3	11.08.3	110830	TELEPHONE AND TELEFAX SERVICES
108301	1.08.3.01	11.08.3	11.08.3	110831	<i>Telephone and telefax services</i>
1083011	1.08.3.01.1	11.08.3	11.08.3	110831.1	Telephone and telefax services
109	1.09	11.09	11.09	110900	RECREATION AND CULTURE
1091	1.09.1	11.09.1	11.09.1	110910	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT
		11.09.11	11.09.11		



AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
SERVICES DE TRANSPORT	TRANSPORT SERVICES	TRANSPORT SERVICES	TRANSPORT SERVICES	
<i>Transport de voyageurs par chemin de fer</i>	<i>Passenger transport by railway</i>	<i>Passenger transport by railway</i>	<i>Passenger transport by railway</i>	
Transport de voyageurs par chemin de fer	Passenger transport by railway	Passenger transport by railway	Passenger transport by railway	
<i>Transport de voyageurs par route</i>	<i>Passenger transport by road</i>	<i>Passenger transport by road</i>	<i>Passenger transport by road</i>	
Transport de voyageurs par route	Passenger transport by road	Passenger transport by road	Passenger transport by road	
<i>Transport de voyageurs par air</i>	<i>Passenger transport by air</i>	<i>Passenger transport by air</i>	<i>Passenger transport by air</i>	
Transport de voyageurs par air	Passenger transport by air	Passenger transport by air	Passenger transport by air	
<i>Transport de voyageurs par mer et voies navigables intérieures</i>	<i>Passenger transport by sea and inland waterway</i>	<i>Passenger transport by sea and inland waterway</i>	<i>Passenger transport by sea and inland waterway</i>	
Transport de voyageurs par mer et voies navigables intérieures	Passenger transport by sea and inland waterway	Passenger transport by sea and inland waterway [COICOP 07.3.4]	Passenger transport by sea and inland waterway	
<i>Transport combiné de voyageurs</i>	<i>Combined passenger transport</i>	<i>Combined passenger transport</i>	<i>Combined passenger transport</i>	
Transport combiné de voyageurs	Combined passenger transport	Combined passenger transport	Combined passenger transport	
<i>Autres achats de services de transport</i>	<i>Other purchased transport services</i>	<i>Other purchased transport services</i>	<i>Other purchased transport services</i>	
Autres achats de services de transport	Other purchased transport services	Other purchased transport services	Other purchased transport services	
COMMUNICATIONS	COMMUNICATION	COMMUNICATION	COMMUNICATION	
SERVICES POSTAUX	POSTAL SERVICES	POSTAL SERVICES	POSTAL SERVICES	
<i>Services postaux</i>	<i>Postal services</i>	<i>Postal services</i>	<i>Postal services</i>	
Services postaux	Postal services	Postal services	Postal services	
TÉLÉPHONES ET TÉLÉCOPIEURS	TELEPHONE AND TELEFAX EQUIPMENT	TELEPHONE AND TELEFAX EQUIPMENT	TELEPHONE AND TELEFAX EQUIPMENT	
<i>Téléphones et télécopieurs</i>	<i>Telephone and telefax equipment</i>	<i>Telephone and telefax equipment</i>	<i>Telephone and telefax equipment</i>	
Téléphones et télécopieurs	Telephone and telefax equipment	Telephone and telefax equipment	Telephone and telefax equipment	
SERVICES DE TÉLÉPHONE ET DE TÉLÉCOPIE	TELEPHONE AND TELEFAX SERVICES	TELEPHONE AND TELEFAX SERVICES	TELEPHONE AND TELEFAX SERVICES	
<i>Services de téléphone et de télécopie</i>	<i>Telephone and telefax services</i>	<i>Telephone and telefax services</i>	<i>Telephone and telefax services</i>	
Services de téléphone et de télécopie	Telephone and telefax services	Telephone and telefax services	Telephone and telefax services	
LOISIRS ET CULTURE	RECREATION AND CULTURE	RECREATION AND CULTURE	RECREATION AND CULTURE	
ÉQUIPEMENTS AUDIOVISUELS, PHOTOGRAPHIQUES ET INFORMATIQUES	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT	
	<i>Equipment for the reception, recording, and reproduction of sound and pictures</i>	<i>Equipment for the reception, recording, and reproduction of sound and pictures [COICOP 09.1.1]</i>		

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
		11.09.11	11.09.11		
		11.09.12	11.09.12		
		11.09.12	11.09.12		
109101	1.09.1.01	11.09.13	11.09.13	110911	<i>Audiovisual, photographic, and information processing equipment</i>
1091011	1.09.1.01.1	11.09.13	11.09.13	110911.1	Audiovisual, photographic, and information processing equipment
109102	1.09.1.02	11.09.14	11.09.14	110914	<i>Recording media</i>
1091021	1.09.1.02.1	11.09.14.1	11.09.14.1	110914.1	Recording media
		11.09.14.2	11.09.14.2		
109103	1.09.1.03	11.09.15	11.09.15	110915	<i>Repair of audiovisual, photographic, and information processing equipment</i>
1091031	1.09.1.03.1	11.09.15	11.09.15	110915.1	Repair of audiovisual, photographic, and information processing equipment
1092	1.09.2	11.09.2	11.09.2	110920	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE
109201	1.09.2.01	11.09.21	11.09.21	110921	<i>Major durables for outdoor and indoor recreation</i>
1092011	1.09.2.01.1	11.09.21	11.09.21	110921.1	Major durables for outdoor recreation
		11.09.22	11.09.22		
		11.09.22	11.09.22		
109202	1.09.2.02	11.09.23	11.09.23	110923	<i>Maintenance and repair of other major durables for recreation and culture</i>
1092021	1.09.2.02.1	11.09.23	11.09.23	110923.1	Maintenance and repair of other major durables for recreation and culture

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
	Equipment for the reception, recording, and reproduction of sound and pictures	Equipment for the reception, recording, and reproduction of sound and pictures [COICOP 09.1.1]		
	<i>Photographic and cinematographic equipment and optical instruments</i>	<i>Photographic and cinematographic equipment and optical instruments [COICOP 09.1.2]</i>		
	Photographic and cinematographic equipment and optical instruments	Photographic and cinematographic equipment and optical instruments [COICOP 09.1.2]		
<i>Équipements audiovisuels, photographiques et informatiques</i>	<i>Information processing equipment</i>	<i>Information processing equipment</i>	<i>Audiovisual, photographic, and information processing equipment</i>	
Équipements audiovisuels, photographiques et informatiques	Information processing equipment	Information processing equipment	Audiovisual, photographic, and information processing equipment	
<i>Supports d'enregistrement</i>	<i>Recording media</i>	<i>Recording media</i>	<i>Recording media</i>	
Supports d'enregistrement	Prerecorded recording media	Prerecorded recording media	Recording media	
	Unrecorded recording media	Unrecorded recording media		
<i>Réparation des équipements audiovisuels, photographiques et informatiques</i>	<i>Repair of audiovisual, photographic, and information processing equipment</i>	<i>Repair of audiovisual, photographic, and information processing equipment</i>	<i>Repair of audiovisual, photographic, and information processing equipment</i>	
Réparation des équipements audiovisuels, photographiques et informatiques	Repair of audiovisual, photographic, and information processing equipment	Repair of audiovisual, photographic, and information processing equipment	Repair of audiovisual, photographic, and information processing equipment	
AUTRES PRINCIPAUX BIENS DURABLES RECRÉATIFS ET CULTURELS	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE	
<i>Principaux biens durables pour services récréatifs d'intérieur et de plein air</i>	<i>Major durables for outdoor recreation</i>	<i>Major durables for outdoor recreation</i>	<i>Major durables for outdoor and indoor recreation</i>	
Principaux biens durables pour services récréatifs de plein air	Major durables for outdoor recreation	Major durables for outdoor recreation	Major durables for outdoor and indoor recreation	
	<i>Musical instruments and major durables for indoor recreation</i>	<i>Musical instruments and major durables for indoor recreation</i>		
	Musical instruments and major durables for indoor recreation	Musical instruments and major durables for indoor recreation		
<i>Entretien et réparation des autres principaux biens durables pour les services récréatifs et culturels</i>	<i>Maintenance and repair of other major durables for recreation and culture</i>	<i>Maintenance and repair of other major durables for recreation and culture</i>	<i>Maintenance and repair of other major durables for recreation and culture</i>	
Entretien et réparation des autres principaux biens durables pour les services récréatifs et culturels	Maintenance and repair of other major durables for recreation and culture	Maintenance and repair of other major durables for recreation and culture	Maintenance and repair of other major durables for recreation and culture	

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
1093	1.09.3	11.09.3	11.09.3	110930	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS
109301	1.09.3.01	11.09.31	11.09.31	110931	<i>Other recreational items and equipment</i>
1093011	1.09.3.01.1	11.09.31	11.09.31	110931.1	Other recreational items and equipment
		11.09.32	11.09.32		
		11.09.32	11.09.32		
109302	1.09.3.02	11.09.33	11.09.33	110933	<i>Gardens and pets</i>
1093021	1.09.3.02.1	11.09.33	11.09.33	110933.1	Gardens and pets
		11.09.34	11.09.34		
		11.09.34	11.09.34		
109303	1.09.3.03	11.09.35	11.09.35	110935	<i>Veterinary and other services for pets</i>
1093031	1.09.3.03.1	11.09.35	11.09.35	110935.1	Veterinary and other services for pets
1094	1.09.4	11.09.4	11.09.4	110940	RECREATIONAL AND CULTURAL SERVICES
109401	1.09.4.01	11.09.41	11.09.41	110941	<i>Recreational and sporting services</i>
1094011	1.09.4.01.1	11.09.41	11.09.41	110941.1	Recreational and sporting services
109402	1.09.4.02	11.09.42	11.09.42	110942	<i>Cultural services</i>
1094021	1.09.4.02.1	11.09.42.1	11.09.42	110942.1	Cultural services
		11.09.42.2	11.09.42.2		
109403	1.09.4.03	11.09.43	11.09.43	110943	<i>Games of chance</i>
1094031	1.09.4.03.1	11.09.43	11.09.43	110943.1	Games of chance
1095	1.09.5	11.09.5	11.09.5	110950	NEWSPAPERS, BOOKS, AND STATIONERY
		11.09.51	11.09.51		
		11.09.51	11.09.51		
109501	1.09.5.01	11.09.52	11.09.52	110951	<i>Newspapers, books, and stationery</i>
1095011	1.09.5.01.1	11.09.52	11.09.52	110951.1	Newspapers, books, and stationery
		11.09.53	11.09.53		

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
AUTRES ARTICLES ET EQUIPEMENTS DE LOISIRS, JARDINS ET ANIMAUX DOMESTIQUES	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS	
<i>Autres articles et équipement de loisirs</i>	<i>Games, toys, and hobbies</i>	<i>Games, toys, and hobbies</i>	<i>Other recreational items and equipment</i>	
Autres articles et équipement de loisirs	Games, toys, and hobbies	Games, toys, and hobbies	Other recreational items and equipment	
	<i>Equipment for sport, camping, and open-air recreation</i>	<i>Equipment for sport, camping, and open-air recreation</i>		
	Equipment for sport, camping, and open-air recreation	Equipment for sport, camping, and open-air recreation		
<i>Jardins et animaux domestiques</i>	<i>Gardens, plants, and flowers</i>	<i>Gardens, plants, and flowers</i>	<i>Gardens and pets</i>	M
Jardins et animaux domestiques	Gardens, plants, and flowers	Gardens, plants, and flowers	Gardens and pets	
	<i>Pets and related products</i>	<i>Pets and related products</i>		
	Pets and related products	Pets and related products		
<i>Services vétérinaires et autres services pour animaux domestiques</i>	<i>Veterinary and other services for pets</i>	<i>Veterinary and other services for pets</i>	<i>Veterinary and other services for pets</i>	
Services vétérinaires et autres services pour animaux domestiques	Veterinary and other services for pets	Veterinary and other services for pets	Veterinary and other services for pets	
SERVICES RÉCRÉATIFS ET CULTURELS	RECREATIONAL AND CULTURAL SERVICES	RECREATIONAL AND CULTURAL SERVICES	RECREATIONAL AND CULTURAL SERVICES	
<i>Services sportifs et récréatifs</i>	<i>Recreational and sporting services</i>	<i>Recreational and sporting services</i>	<i>Recreational and sporting services</i>	
Services sportifs et récréatifs	Recreational and sporting services	Recreational and sporting services	Recreational and sporting services	
<i>Services culturels</i>	<i>Cultural services</i>	<i>Cultural services</i>	<i>Cultural services</i>	
Services culturels	Photographic services	Photographic services	Cultural services	
	Other cultural services	Other cultural services		
<i>Jeux de hasard</i>	<i>Games of chance</i>	<i>Games of chance</i>	<i>Games of chance</i>	
Jeux de hasard	Games of chance	Games of chance	Games of chance	
JOURNAUX, LIVRES ET PAPETERIE	NEWSPAPERS, BOOKS, AND STATIONERY	NEWSPAPERS, BOOKS, AND STATIONERY	NEWSPAPERS, BOOKS, AND STATIONERY	
	<i>Books</i>	<i>Books</i>		
	Books	Books		
<i>Journaux, livres et papeterie</i>	<i>Newspapers and periodicals</i>	<i>Newspapers and periodicals</i>	<i>Newspapers, books, and stationery</i>	
Journaux, livres et papeterie	Newspapers and periodicals	Newspapers and periodicals	Newspapers, books, and stationery	
	<i>Stationery, drawing materials, and miscellaneous printed matter</i>	<i>Miscellaneous printed matter, stationery, and drawing materials</i>		

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Annex B (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
		11.09.53.1	11.09.53.1		
1096	1.09.6	11.09.6	11.09.6	110960	PACKAGE HOLIDAYS
109601	1.09.6.01	11.09.6	11.09.6	110961	<i>Package holidays</i>
1096011	1.09.6.01.1	11.09.6	11.09.6	110961.1	Package holidays
11	1.1	11.1	11.1	111000	EDUCATION
1101	1.10.1	11.1	11.1	111010	EDUCATION
110101	1.10.1.01	11.1	11.1	111011	<i>Education</i>
1101011	1.10.1.01.1	11.10.1	11.10.1	111011.1	Nursery school and primary school
1101012	1.10.1.01.2	11.10.1	11.10.1	111011.1	General, vocational, or technical secondary education
1101013	1.10.1.01.3	11.10.1	11.10.1	111011.1	Postsecondary, nontertiary education
1101014	1.10.1.01.4	11.10.2	11.10.2	111011.1	Tertiary education
1101015	1.10.1.01.5	11.10.2	11.10.2	111011.1	Educational programs, generally for adults
		11.10.2	11.10.2		
		11.10.3	11.10.3		
		11.10.3	11.10.3		
		11.10.3	11.10.3		
		11.10.4	11.10.4		
		11.10.4	11.10.4		
		11.10.4	11.10.4		
		11.10.5	11.10.5		
		11.10.5	11.10.5		
		11.10.5	11.10.5		
111	1.11	11.11	11.11	111100	RESTAURANTS AND HOTELS
1111	1.11.1	11.11.1	11.11.1	111110	CATERING SERVICES
111101	1.11.1.01	11.11.11	11.11.11	111111	<i>Catering services</i>
1111011	1.11.1.01.1	11.11.11.1	11.11.11.1	111111.1	Catering services in hotels and restaurants, catering services in informal sector

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
	Miscellaneous printed matter, stationery, and drawing materials	Miscellaneous printed matter, stationery, and drawing materials		
VOYAGES ORGANISES	PACKAGE HOLIDAYS	PACKAGE HOLIDAYS	PACKAGE HOLIDAYS	
<i>Voyages organisés</i>	<i>Package holidays</i>	<i>Package holidays</i>	<i>Package holidays</i>	
Voyages organisés	Package holidays	Package holidays	Package holidays	
EDUCATION	EDUCATION	EDUCATION	EDUCATION	
EDUCATION	EDUCATION	EDUCATION	EDUCATION	
<i>Education</i>	<i>Education</i>	<i>Education</i>	<i>Education</i>	
Ecole maternelle et école primaire	Preprimary and primary education	Preprimary and primary education	Education	M
Enseignement secondaire général, professionnel ou technique	Preprimary and primary education	Preprimary and primary education		
Enseignement post-secondaire non supérieur	Preprimary and primary education	Preprimary and primary education		
Enseignement supérieur	Secondary education	Secondary education		
Programmes d'enseignement, généralement pour adultes	Secondary education	Secondary education		
	Secondary education	Secondary education		
	POSTSECONDARY, NONTERTIARY EDUCATION	POSTSECONDARY, NONTERTIARY EDUCATION		
	<i>Postsecondary, nontertiary education</i>	<i>POSTSECONDARY, NONTERTIARY EDUCATION</i>		
	Postsecondary, nontertiary education	POSTSECONDARY, NONTERTIARY EDUCATION		
	TERTIARY EDUCATION	TERTIARY EDUCATION		
	<i>Tertiary education</i>	<i>TERTIARY EDUCATION</i>		
	Tertiary education	TERTIARY EDUCATION		
	EDUCATION NOT DEFINABLE BY LEVEL	EDUCATION NOT DEFINABLE BY LEVEL		
	<i>Education not definable by level</i>	<i>EDUCATION NOT DEFINABLE BY LEVEL</i>		
	Education not definable by level	EDUCATION NOT DEFINABLE BY LEVEL		
RESTAURANTS ET HOTELS	RESTAURANTS AND HOTELS	RESTAURANTS AND HOTELS	RESTAURANTS AND HOTELS	
SERVICES DE RESTAURATION	CATERING SERVICES	CATERING SERVICES	CATERING SERVICES	
<i>Services de restauration</i>	<i>Restaurants, cafés, and the like</i>	<i>Restaurants, cafés, and the like</i>	<i>Catering services</i>	
Services de restauration modernes dans les hôtels et restaurants y compris services de restauration dans le secteur informel	Restaurant services whatever the type of establishment	Restaurant services whatever the type of establishment	Catering services	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
		11.11.11.2	11.11.11.2		
		11.11.12	11.11.12		
		11.11.12	11.11.12		
1112	1.11.2	11.11.2	11.11.2	11120	ACCOMMODATION SERVICES
111201	1.11.2.01	11.11.2	11.11.2	11121	<i>Accommodation services</i>
1112011	1.11.2.01.1	11.11.2	11.11.2	11121.1	Accommodation services
112	1.12	11.12	11.12	11200	MISCELLANEOUS GOODS AND SERVICES
1121	1.12.1	11.12.1	11.12.1	11210	PERSONAL CARE
112101	1.12.1.01	11.12.11	11.12.11	11211	<i>Hairdressing salons and personal grooming establishments</i>
1121011	1.12.1.01.1	11.12.11	11.12.11	11211.1	Hairdressing salons and personal grooming establishments
112102	1.12.1.02	11.12.12	11.12.12	11212	<i>Appliances, articles, and products for personal care</i>
1121021	1.12.1.02.1	11.12.12	11.12.12	11212.1	Appliances, articles, and products for personal care
		11.12.13	11.12.13		
		11.12.13	11.12.13		
1122	1.12.2	11.12.2	11.12.2	11220	PROSTITUTION
112201	1.12.2.01	11.12.2	11.12.2	11221	<i>Prostitution</i>
1122011	1.12.2.01.1	11.12.2	11.12.2	11221.1	Prostitution
1123	1.12.3	11.12.3	11.12.3	11230	PERSONAL EFFECTS N.E.C.
112301	1.12.3.01	11.12.31	11.12.31	11231	<i>Jewelry, clocks, and watches</i>
1123011	1.12.3.01.1	11.12.31	11.12.31	11231.1	Jewelry, clocks, and watches
112302	1.12.3.02	11.12.32	11.12.32	11232	<i>Other personal effects</i>
1123021	1.12.3.02.1	11.12.32	11.12.32	11232.1	Other personal effects
1124	1.12.4	11.12.4	11.12.4	11240	SOCIAL PROTECTION
112401	1.12.4.01	11.12.4	11.12.4	11241	<i>Social protection</i>
1124011	1.12.4.01.1	11.12.4	11.12.4	11241.1	Social protection
1125	1.12.5	11.12.5	11.12.5	11250	INSURANCE
112501	1.12.5.01	11.12.5	11.12.5	11251	<i>Insurance</i>
1125011	1.12.5.01.1	11.12.5	11.12.5	11251.1	Insurance
1126	1.12.6	11.12.6	11.12.6	11260	FINANCIAL SERVICES N.E.C.
112601	1.12.6.01	11.12.61	11.12.61	11261	<i>Financial intermediation services indirectly measured (FISIM)</i>



AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
	Pubs, bars, cafés, tea rooms, and the like	Pubs, bars, cafés, tea rooms, and the like		
	<i>Canteens</i>	<i>Canteens</i>		
	Canteens	Canteens		
SERVICES D'HÉBERGEMENT	ACCOMMODATION SERVICES	ACCOMMODATION SERVICES	ACCOMMODATION SERVICES	
<i>Services d'hébergement</i>	<i>Accommodation services</i>	<i>Accommodation services</i>	<i>Accommodation services</i>	
Services d'hébergement	Accommodation services	Accommodation services	Accommodation services	
AUTRES BIENS ET SERVICES	MISCELLANEOUS GOODS AND SERVICES	MISCELLANEOUS GOODS AND SERVICES	MISCELLANEOUS GOODS AND SERVICES	
SOINS PERSONNELS	PERSONAL CARE	PERSONAL CARE	PERSONAL CARE	
<i>Salons de coiffure et esthétique corporelle</i>	<i>Hairdressing salons and personal grooming establishments</i>	<i>Hairdressing salons and personal grooming establishments</i>	<i>Hairdressing salons and personal grooming establishments</i>	
Salons de coiffure et esthétique corporelle	Hairdressing salons and personal grooming establishments	Hairdressing salons and personal grooming establishments	Hairdressing salons and personal grooming establishments	
<i>Appareils, articles et produits pour les soins personnels</i>	<i>Electric appliances for personal care</i>	<i>Electric appliances for personal care</i>	<i>Appliances, articles, and products for personal care</i>	
Appareils, articles et produits pour les soins personnels	Electric appliances for personal care	Electric appliances for personal care	Appliances, articles, and products for personal care	
	<i>Other appliances, articles, and products for personal care</i>	<i>Other appliances, articles, and products for personal care</i>		
	Other appliances, articles, and products for personal care	Other appliances, articles, and products for personal care		
PROSTITUTION	PROSTITUTION	PROSTITUTION	PROSTITUTION	
<i>Prostitution</i>	<i>Prostitution</i>	<i>Prostitution</i>	<i>Prostitution</i>	
Prostitution	Prostitution	Prostitution	Prostitution	
EFFETS PERSONNELS N.C.A.	PERSONAL EFFECTS N.E.C.	PERSONAL EFFECTS N.E.C.	PERSONAL EFFECTS N.E.C.	
<i>Articles de bijouterie, de joaillerie et d'horlogerie</i>	<i>Jewelry, clocks, and watches</i>	<i>Jewelry, clocks, and watches</i>	<i>Jewelry, clocks, and watches</i>	
Articles de bijouterie, de joaillerie et d'horlogerie	Jewelry, clocks, and watches	Jewelry, clocks, and watches	Jewelry, clocks, and watches	
<i>Autres effets personnels</i>	<i>Other personal effects</i>	<i>Other personal effects</i>	<i>Other personal effects</i>	
Autres effets personnels	Other personal effects	Other personal effects	Other personal effects	
PROTECTION SOCIALE	SOCIAL PROTECTION	SOCIAL PROTECTION	SOCIAL PROTECTION	
<i>Protection sociale</i>	<i>Social protection</i>	<i>Social protection</i>	<i>Social protection</i>	
Protection sociale	Social protection	Social protection	Social protection	
ASSURANCE	INSURANCE	INSURANCE	INSURANCE	
<i>Assurance</i>	<i>Insurance</i>	<i>Insurance</i>	<i>Insurance</i>	
Assurance	Insurance	Insurance	Insurance	
SERVICES FINANCIERS	FINANCIAL SERVICES N.E.C.	FINANCIAL SERVICES N.E.C.	FINANCIAL SERVICES N.E.C.	
<i>FISIM (SIFM in French)</i>	<i>FISIM</i>	<i>FISIM</i>	<i>FISIM</i>	

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
1126011	1.12.6.01.1	11.12.61	11.12.61	111261.1	Financial intermediation services indirectly measured (FISIM)
112602	1.12.6.02	11.12.62	11.12.62	111262	<i>Other financial services n.e.c.</i>
1126021	1.12.6.02.1	11.12.62	11.12.62	111262.1	Other financial services n.e.c.
1127	1.12.7	11.12.7	11.12.7	111270	OTHER SERVICES N.E.C.
112701	1.12.7.01	11.12.7	11.12.7	111271	<i>Other services n.e.c.</i>
1127011	1.12.7.01.1	11.12.7	11.12.7	111271.1	Other services n.e.c.
113	1.13	11.13	11.13	111300	NET PURCHASES ABROAD
1131	1.13.1	11.13.1	11.13.1	111310	NET PURCHASES ABROAD
113101	1.13.1.01	11.13.11	11.13.11	111311	<i>Net purchases abroad</i>
1131011	1.13.1.01.1	11.13.11	11.13.11	111311.1	Purchases by resident households in the rest of the world
1131012	1.13.1.01.2	11.13.2		111311.2	Purchases by nonresident households in the economic territory of the country
		11.13.21			
		11.13.21.1			
2	2	12	12	120000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>
201	2.01	12.01	12.01	120100	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS
2011	2.01.1	12.01.1	12.01.1	120110	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
FISIM (SIFM)	FISIM	FISIM	FISIM	
<i>Autres services financiers n.c.a.</i>	<i>Other financial services n.e.c.</i>	<i>Other financial services n.e.c.</i>	<i>Other financial services n.e.c.</i>	
Autres services financiers n.c.a.	Other financial services n.e.c.	Other financial services n.e.c.	Other financial services n.e.c.	
AUTRES SERVICES N.C.A.	OTHER SERVICES N.E.C.	OTHER SERVICES N.E.C.	OTHER SERVICES N.E.C.	
<i>Autres services n.c.a.</i>	<i>Other services n.e.c.</i>	<i>Other services n.e.c.</i>	<i>Other services n.e.c.</i>	
Autres services n.c.a.	Other services n.e.c.	Other services n.e.c.	Other services n.e.c.	
ACHATS NETS A L'ETRANGER	NET PURCHASES ABROAD	NET PURCHASES ABROAD	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY	
ACHATS NETS A L'ETRANGER	FINAL CONSUMPTION EXPENDITURE OF RESIDENT HOUSEHOLDS IN THE REST OF WORLD	NET PURCHASES ABROAD	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY	
<i>Achats nets à l'étranger</i>	<i>Final consumption expenditure of resident households in the rest of the world</i>	<i>Net purchases abroad</i>	<i>Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory</i>	M
Achats faits par les ménages résidents dans le reste du monde	Final consumption expenditure of resident households in the rest of the world	Net purchases abroad	Final consumption expenditure of resident households in the rest of the world	
Achats faits par les ménages non résidents sur le territoire économique du pays	Final consumption expenditure of nonresident households on the economic territory		Final consumption expenditure of nonresident households in the economic territory	
	<i>Final consumption expenditure of nonresident households on the economic territory</i>			
	Final consumption expenditure of resident households on the economic territory			
<b>DÉPENSES DE CONSOMMATION INDIVIDUELLE À LA CHARGE DES INSTITUTIONS SANS BUT LUCRATIF AU SERVICE DES MÉNAGES</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>	
DÉPENSES DE CONSOMMATION INDIVIDUELLE À LA CHARGE DES INSTITUTIONS SANS BUT LUCRATIF AU SERVICE DES MÉNAGES	HOUSING	HOUSING	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS	
DÉPENSES DE CONSOMMATION INDIVIDUELLE À LA CHARGE DES INSTITUTIONS SANS BUT LUCRATIF AU SERVICE DES MÉNAGES	HOUSING	HOUSING	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS	

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Annex B (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
201101	2.01.1.01	12.01.11	12.01.11	120111	Individual consumption expenditure by NPISHs
2011011	2.01.1.01.1	12.01.11.1	12.01.11.1	120111.1	Individual consumption expenditures by NPISHs
		12.02	12.02		
		12.02.1	12.02.1		
		12.02.11	12.02.11		
		12.02.11.1	12.02.11.1		
		12.03	12.03		
		12.03.1	12.03.1		
		12.03.11	12.03.11		
		12.03.11.1	12.03.11.1		
		12.04	12.04		
		12.04.1	12.04.1		
		12.04.11	12.04.11		
		12.04.11.1	12.04.11.1		
		12.05	12.05		
		12.05.1	12.05.1		
		12.05.11	12.05.11		
		12.05.11.1	12.05.11.1		
		12.06	12.06		
		12.06.1	12.06.1		
		12.06.11	12.06.11		
		12.06.11.1	12.06.11.1		
3	3	13	13	130000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>
301	3.01	13.01	13.01	130100	HOUSING
3011	3.01.1	13.01.1	13.01.1	130110	HOUSING
301101	3.01.1.01	13.01.11	13.01.11	130111	<i>Housing</i>
3011011	3.01.1.01.1	13.01.11.1	13.01.11.1	130111.1	Housing
302	3.02	13.02	13.02	130200	HEALTH
3021	3.02.1	13.02.1	13.02.1	130210	HEALTH BENEFITS AND REIMBURSEMENTS
302101	3.02.1.01	13.02.11	13.02.11	130211	<i>Medical products, appliances, and equipment</i>
3021011	3.02.1.01.1	13.02.11.1	13.02.11.1	130211.1	Pharmaceutical products

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
<i>Dépenses de consommation individuelle à la charge des institutions sans but lucratif au service des ménages</i>	Housing	Housing	Individual consumption expenditure by NPISHs	
Dépenses de consommation individuelle à la charge des institutions sans but lucratif au service des ménages	Housing	Housing	Individual consumption expenditure by NPISHs	M
	HEALTH	HEALTH		
	HEALTH	HEALTH		
	<i>Health</i>	<i>HEALTH</i>		
	Health	HEALTH		
	RECREATION AND CULTURE	RECREATION AND CULTURE		
	RECREATION AND CULTURE	RECREATION AND CULTURE		
	<i>Recreation and culture</i>	<i>RECREATION AND CULTURE</i>		
	Recreation and culture	RECREATION AND CULTURE		
	EDUCATION	EDUCATION		
	EDUCATION	EDUCATION		
	<i>Education</i>	<i>EDUCATION</i>		
	Education	EDUCATION		
	SOCIAL PROTECTION	SOCIAL PROTECTION		
	SOCIAL PROTECTION	SOCIAL PROTECTION		
	<i>Social protection</i>	<i>SOCIAL PROTECTION</i>		
	Social protection	SOCIAL PROTECTION		
	OTHER SERVICES	OTHER SERVICES		
	OTHER SERVICES	OTHER SERVICES		
	<i>Other services</i>	<i>OTHER SERVICES</i>		
	Other services	OTHER SERVICES		
<b>DÉPENSES DE CONSOMMATION INDIVIDUELLE À LA CHARGE DES ADMINISTRATIONS PUBLIQUES</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	
LOGEMENT	HOUSING	HOUSING	HOUSING	
LOGEMENT	HOUSING	HOUSING	HOUSING	
<i>Logement</i>	<i>Housing</i>	<i>Housing</i>	<i>Housing</i>	
Logement	Housing	Housing	Housing	
SANTE	HEALTH	HEALTH	HEALTH	
PRESTATIONS MEDICALES ET REMBOURSEMENTS	HEALTH BENEFITS AND REIMBURSEMENTS	HEALTH BENEFITS AND REIMBURSEMENTS	HEALTH BENEFITS AND REIMBURSEMENTS	
<i>Produits et appareils thérapeutiques; matériel médical</i>	<i>Medical products, appliances, and equipment</i>	Medical products, appliances, and equipment	<i>Medical products, appliances, and equipment</i>	
Produits pharmaceutiques	Pharmaceutical products	Pharmaceutical products	Pharmaceutical products	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
3021012	3.02.1.01.2	13.02.11.2	13.02.11.2	130211.2	Other medical products
3021013	3.02.1.01.3	13.02.11.3	13.02.11.3	130211.3	Therapeutic appliances and equipment
302102	3.02.1.02	13.02.12	13.02.12	130212	<i>Health services</i>
3021021	3.02.1.02.1	13.02.12.1	13.02.12.1	130212.1	Outpatient medical services
3021022	3.02.1.02.2	13.02.12.2	13.02.12.2	130212.2	Outpatient dental services
3021023	3.02.1.02.3	13.02.12.3	13.02.12.3	130212.3	Outpatient paramedical services
3021024	3.02.1.02.4	13.02.12.4	13.02.12.4	130212.4	Hospital services
3022	3.02.2	13.02.2	13.02.2	130220	NONMARKET HEALTH SERVICES
302201	3.02.2.01	13.02.21	13.02.21	130221	<i>Compensation of employees</i>
		13.02.21.1	13.02.21.1		—
		13.02.21.2	13.02.21.2		—
3022011	3.02.2.01.1	13.02.21.3	13.02.21.3	130221.1	Compensation of employees
302202	3.02.2.02	13.02.22	13.02.22	130222	<i>Intermediate consumption</i>
3022021	3.02.2.02.1	13.02.22.1	13.02.22.1	130222.1	Intermediate consumption
		13.02.22.2	13.02.22.2		
		13.02.22.3	13.02.22.3		
		13.02.22.4	13.02.22.4		
302203	3.02.2.03	13.02.23	13.02.23	130223	<i>Gross operating surplus</i>
3022031	3.02.2.03.1	13.02.23.1	13.02.23.1	130223.1	Gross operating surplus
302204	3.02.2.04	13.02.24	13.02.24	130224	<i>Net taxes on production</i>
3022041	3.02.2.04.1	13.02.24.1	13.02.24.1	130224.1	Net taxes on production
302205	3.02.2.05	13.02.25	13.02.25	130225	<i>Receipts from sales</i>
3022051	3.02.2.05.1	13.02.25.1	13.02.25.1	130225.1	Receipts from sales
303	3.03	13.03	13.03	130300	RECREATION AND CULTURE
3031	3.03.1	13.03.1	13.03.1	130310	RECREATION AND CULTURE
303101	3.03.1.01	13.03.11	13.03.11	130311	<i>Recreation and culture</i>
3031011	3.03.1.01.1	13.03.11.1	13.03.11.1	130311.1	Recreation and culture
304	3.04	13.04	13.04	130400	EDUCATION
3041	3.04.1	13.04.1	13.04.1	130410	EDUCATION BENEFITS AND REIMBURSEMENTS
304101	3.04.1.01	13.04.11	13.04.11	130411	<i>Education benefits and reimbursements</i>
3041011	3.04.1.01.1	13.04.11.1	13.04.11.1	130411.1	Education benefits and reimbursements

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
Autres produits médicaux	Other medical products	Other medical products	Other medical products	
Appareils et matériel thérapeutiques	Therapeutic appliances and equipment	Therapeutic appliances and equipment	Therapeutic appliances and equipment	
<i>Services de sante</i>	<i>Health services</i>	<i>Health services</i>	<i>Health services</i>	
Services médicaux de consultation externe	Outpatient medical services	Outpatient medical services	Outpatient medical services	
Services dentaires de consultation externe	Outpatient dental services	Outpatient dental services	Outpatient dental services	
Services paramédicaux externes	Outpatient paramedical services	Outpatient paramedical services	Outpatient paramedical services	
Services hospitaliers	Hospital services	Hospital services	Hospital services	
SERVICES DE SANTE NON MARCHANDS	PRODUCTION OF HEALTH SERVICES	PRODUCTION OF HEALTH SERVICES	PRODUCTION OF HEALTH SERVICES	M
<i>Rémunération des salariés</i>	<i>Compensation of employees</i>	<i>Compensation of employees</i>	<i>Compensation of employees</i>	
—	Physicians	Physicians	—	
—	Nurses and other medical staff	Nurses and other medical staff	—	
Rémunération des salariés	Nonmedical staff	Nonmedical staff	Compensation of employees	
<i>Consommation intermédiaire</i>	<i>Intermediate consumption</i>	<i>Intermediate consumption</i>	<i>Intermediate consumption</i>	
Consommation intermédiaire	Pharmaceutical products	Pharmaceutical products	Intermediate consumption	
	Other medical goods	Other medical goods		
	Therapeutic appliances and equipment	Therapeutic appliances and equipment		
	Intermediate consumption n.e.c.	Intermediate consumption n.e.c.		
<i>Excédent brut d'exploitation</i>	<i>Gross operating surplus</i>	<i>Gross operating surplus</i>	<i>Gross operating surplus</i>	
Excédent brut d'exploitation	Gross operating surplus	Gross operating surplus	Gross operating surplus	
<i>Impôts nets sur la production</i>	<i>Net taxes on production</i>	<i>Net taxes on production</i>	<i>Net taxes on production</i>	
Impôts nets sur la production	Net taxes on production	Net taxes on production	Net taxes on production	
<i>Recettes sur les ventes</i>	<i>Receipts from sales</i>	<i>Receipts from sales</i>	<i>Receipts from sales</i>	
Recettes sur les ventes	Receipts from sales	Receipts from sales	Receipts from sales	
LOISIRS ET CULTURE	RECREATION AND CULTURE	RECREATION AND CULTURE	RECREATION AND CULTURE	
LOISIRS ET CULTURE	RECREATION AND CULTURE	RECREATION AND CULTURE	RECREATION AND CULTURE	
<i>Loisirs et cultures</i>	<i>Recreation and culture</i>	<i>Recreation and culture</i>	<i>Recreation and culture</i>	
Loisirs et cultures	Recreation and culture	Recreation and culture	Recreation and culture	
ENSEIGNEMENT	EDUCATION	EDUCATION	EDUCATION	
PRESTATIONS SCOLAIRES ET REMBOURSEMENTS	EDUCATION BENEFITS AND REIMBURSEMENTS	EDUCATION BENEFITS AND REIMBURSEMENTS	EDUCATION BENEFITS AND REIMBURSEMENTS	
<i>Prestations scolaires et remboursements</i>	<i>Education benefits and reimbursements</i>	<i>Education benefits and reimbursements</i>	<i>Education benefits and reimbursements</i>	
Prestations scolaires et remboursements	Education benefits and reimbursements	Education benefits and reimbursements	Education benefits and reimbursements	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
3042	3.04.2	13.04.2	13.04.2	130420	NONMARKET EDUCATION SERVICES
304201	3.04.2.01	13.04.21	13.04.21	130421	<i>Primary and preprimary education services</i>
3042011	3.04.2.01.1	13.04.21.1	13.04.21.1	130421.1	Compensation of employees
3042021	3.04.2.02.1	13.04.21.2	13.04.21.2		Compensation of employees
3042031	3.04.2.03.1	13.04.21.3	13.04.21.3		Compensation of employees
3042041	3.04.2.04.1	13.04.21.4	13.04.21.4		Compensation of employees
3042051	3.04.2.05.1				Compensation of employees
304202	3.04.2.02	13.04.22	13.04.22	130422	<i>Secondary education services</i>
3042012	3.04.2.01.2	13.04.22.1	13.04.22.1	130422.1	Intermediate consumption
3042022	3.04.2.02.2				Intermediate consumption
3042032	3.04.2.03.2				Intermediate consumption
3042042	3.04.2.04.2				Intermediate consumption
3042052	3.04.2.05.2				Intermediate consumption
304203	3.04.2.03	13.04.23	13.04.23	130423	<i>Postsecondary, nontertiary education</i>
3042013	3.04.2.01.3	13.04.23.1	13.04.23.1	130423.1	Gross operating surplus
3042023	3.04.2.02.3				Gross operating surplus
3042033	3.04.2.03.3				Gross operating surplus
3042043	3.04.2.04.3				Gross operating surplus
3042053	3.04.2.05.3				Gross operating surplus
304204	3.04.2.04	13.04.24	13.04.24	130424	<i>Tertiary education services</i>
3042014	3.04.2.01.4	13.04.24.1	13.04.24.1	130424.1	Net taxes on production
3042024	3.04.2.02.4				Net taxes on production
3042034	3.04.2.03.4				Net taxes on production
3042044	3.04.2.04.4				Net taxes on production
3042054	3.04.2.05.4				Net taxes on production
304205	3.04.2.05	13.04.25	13.04.25	130425	<i>Education not defined by level</i>
3042015	3.04.2.01.5	13.04.25.1	13.04.25.1	130425.1	Receipts from sales
3042025	3.04.2.02.5				Receipts from sales
3042035	3.04.2.03.5				Receipts from sales
3042045	3.04.2.04.5				Receipts from sales



AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
SERVICES D'ENSEIGNEMENT NON MARCHANDS	PRODUCTION OF EDUCATION SERVICES	PRODUCTION OF EDUCATION SERVICES	PRODUCTION OF EDUCATION SERVICES	
<i>Enseignement primaire et maternel</i>	<i>Compensation of employees</i>	<i>Compensation of employees</i>	<i>Compensation of employees</i>	
Rémunération des salariés	Preprimary and primary education	Preprimary and primary education	Compensation of employees	M
Rémunération des salariés	Secondary education	Secondary education		
Rémunération des salariés	Postsecondary, nontertiary education	Postsecondary, nontertiary education		
Rémunération des salariés	Tertiary education	Tertiary education		
Rémunération des salariés				
<i>Enseignement secondaire</i>	<i>Intermediate consumption</i>	<i>Intermediate consumption</i>	<i>Intermediate consumption</i>	
Consommation intermédiaire	Intermediate consumption	Intermediate consumption	Intermediate consumption	M
Consommation intermédiaire				
Consommation intermédiaire				
Consommation intermédiaire				
<i>Enseignement post-secondaire non supérieur</i>	<i>Gross operating surplus</i>	<i>Gross operating surplus</i>	<i>Gross operating surplus</i>	
Excédent brut d'exploitation	Gross operating surplus	Gross operating surplus	Gross operating surplus	M
Excédent brut d'exploitation				
Excédent brut d'exploitation				
Excédent brut d'exploitation				
Excédent brut d'exploitation				
<i>Enseignement supérieur</i>	<i>Net taxes on production</i>	<i>Net taxes on production</i>	<i>Net taxes on production</i>	
Impôts nets sur la production	Net taxes on production	Net taxes on production	Net taxes on production	M
Impôts nets sur la production				
Impôts nets sur la production				
Impôts nets sur la production				
Impôts nets sur la production				
<i>Services d'enseignement non définis par des niveaux de formation</i>	<i>Receipts from sales</i>	<i>Receipts from sales</i>	<i>Receipts from sales</i>	
Recettes issues des services d'enseignement primaire et maternel	Receipts from sales	Receipts from sales	Receipts from sales	
Recettes issues des services d'enseignement secondaire				M
Recettes sur les ventes				
Recettes issues des services d'enseignement supérieur				

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Annex B (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
3042055	3.04.2.05.5				Receipts from sales
305	3.05	13.05	13.05	130500	SOCIAL PROTECTION
3051	3.05.1	13.05.1	13.05.1	130510	SOCIAL PROTECTION
305101	3.05.1.01	13.05.11	13.05.11	130511	<i>Social protection: cash benefits or benefits in kind</i>
305102	3.05.1.02				<i>Social protection: administration, operation, or support of social protection schemes</i>
3051011	3.05.1.01.1	13.05.11.1	13.05.11.1	130511.1	Social protection: cash benefits or benefits in kind
3051021	3.05.1.02.1				Social protection: administration, operation, or support of social protection schemes
4	4	14	14	140000	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>
401	4.01	14.01	14.01	140100	COLLECTIVE SERVICES
4011	4.01.1	14.01.1	14.01.1	140110	COLLECTIVE SERVICES
401101	4.01.1.01	14.01.11	14.01.11	140111	<i>Compensation of employees</i>
4011011	4.01.1.01.1	14.01.11.1	14.01.11.1	140111.1	Compensation of employees
		14.01.11.2	14.01.11.2		
401102	4.01.1.02	14.01.12	14.01.12	140112	<i>Intermediate consumption</i>
4011021	4.01.1.02.1	14.01.12.1	14.01.12.1	140112.1	Intermediate consumption
		14.01.12.2	14.01.12.2		
401103	4.01.1.03	14.01.13	14.01.13	140113	<i>Gross operating surplus</i>
4011031	4.01.1.03.1	14.01.13.1	14.01.13.1	140113.1	Gross operating surplus
		14.01.13.2			
401104	4.01.1.04	14.01.14	14.01.14	140114	<i>Net taxes on production</i>
4011041	4.01.1.04.1	14.01.14.1	14.01.14.1	140114.1	Net taxes on production
		14.01.14.2			
401105	4.01.1.05	14.01.15	14.01.15	140115	<i>Receipts from sales</i>
4011051	4.01.1.05.1	14.01.15.1	14.01.15.1	140115.1	Receipts from sales
		14.01.15.2			

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
Recettes issues des services d'enseignement non définis par des niveaux de formation				
PROTECTION SOCIALE	SOCIAL PROTECTION	SOCIAL PROTECTION	SOCIAL PROTECTION	
PROTECTION SOCIALE	SOCIAL PROTECTION	SOCIAL PROTECTION	SOCIAL PROTECTION	
<i>Protection sociale: prestations en espèces ou en nature</i>	<i>Social protection</i>	<i>Social protection</i>	<i>Social protection</i>	M
<i>Protection sociale: gestion, fonctionnement et appui aux systèmes de protection sociale</i>				
Protection sociale: prestations en espèces ou en nature	Social protection	Social protection	Social protection	M
Protection sociale: gestion, fonctionnement et appui aux systèmes de protection sociale				
<b>DÉPENSES DE CONSUMMATION COLLECTIVE À LA CHARGE DES ADMINISTRATIONS PUBLIQUES</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	
SERVICES COLLECTIFS	COLLECTIVE SERVICES	COLLECTIVE SERVICES	COLLECTIVE SERVICES	
SERVICES COLLECTIFS	COLLECTIVE SERVICES	COLLECTIVE SERVICES	COLLECTIVE SERVICES	
<i>Rémunération des salariés</i>	<i>Compensation of employees</i>	<i>Compensation of employees</i>	<i>Compensation of employees</i>	
Rémunération des salariés	Compensation of employees (defense)	Compensation of employees (collective services relating to defense)	Compensation of employees	
	Compensation of employees (collective services relating to defense)	Compensation of employees (collective services other than defense)		
<i>Consommation intermédiaire</i>	<i>Intermediate consumption</i>	<i>Intermediate consumption</i>	<i>Intermediate consumption</i>	
Consommation intermédiaire	Intermediate consumption (defense)	Intermediate consumption (collective services relating to defense)	Intermediate consumption	
		Intermediate consumption (collective services other than defense)		
<i>Excédent brut d'opération</i>	<i>Gross operating surplus</i>	<i>Gross operating surplus</i>	<i>Gross operating surplus</i>	
Excédent brut d'opération	Gross operating surplus (defense)	Gross operating surplus	Gross operating surplus	
	Gross operating surplus n.e.c.			
<i>Impôts nets sur la production</i>	<i>Net taxes on production</i>	<i>Net taxes on production</i>	<i>Net taxes on production</i>	
Impôts nets sur la production	Net taxes on production (defense)	Net taxes on production	Net taxes on production	
	Net taxes on production n.e.c.			
<i>Recettes issues des ventes</i>	<i>Receipts from sales</i>	<i>Receipts from sales</i>	<i>Receipts from sales</i>	
Recettes issues des ventes	Receipts from sales (defense)	Receipts from sales	Receipts from sales	
	Receipts from sales n.e.c.			

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
5	5	15	15	150000	<b>GROSS FIXED CAPITAL FORMATION</b>
501	5.01	15.01	15.01	150100	MACHINERY AND EQUIPMENT
5011	5.01.1	15.01.1	15.01.1	150110	METAL PRODUCTS AND EQUIPMENT
501101	5.01.1.01	15.01.11	15.01.11	150111	<i>Fabricated metal products, except machinery and equipment</i>
5011011	5.01.1.01.1	15.01.11	15.01.11	150111.1	Fabricated metal products, except machinery and equipment
501102	5.01.1.02	15.01.12	15.01.12	150112	<i>General-purpose machinery</i>
5011021	5.01.1.02.1	15.01.12.1	15.01.12.1	150112.1	Engines and turbines
5011022	5.01.1.02.2	15.01.12.2	15.01.12.2		Other general-purpose machinery
501103	5.01.1.03	15.01.13	15.01.13	150113	<i>Special-purpose machinery</i>
5011031	5.01.1.03.1	15.01.13.1	15.01.13.1	150113.1	Agricultural and forestry machinery
5011032	5.01.1.03.2	15.01.13.2	15.01.13.2		Machine tools
5011033	5.01.1.03.3	15.01.13.3	15.01.13.3		Machinery for metallurgy, mining, quarrying, and construction
5011034	5.01.1.03.4	15.01.13.4	15.01.13.4		Machinery for food, beverage, and tobacco processing
5011035	5.01.1.03.5	15.01.13.5	15.01.13.5		Machinery for textile, apparel, and leather production
5011036	5.01.1.03.6	15.01.13.6	15.01.13.6		Other special-purpose machinery
501104	5.01.1.04	15.01.14	15.01.14	150114	<i>Electrical and optical equipment</i>
5011041	5.01.1.04.1	15.01.14.1	15.01.14.1	150114.1	Office machinery, except computers
5011042	5.01.1.04.2	15.01.14.2	15.01.14.2		Computers and other information processing equipment
5011043	5.01.1.04.3	15.01.14.3	15.01.14.3		Electrical machinery and apparatus
5011044	5.01.1.04.4	15.01.14.4	15.01.14.4		Radio and television and communication equipment and apparatus
5011045	5.01.1.04.5	15.01.14.5	15.01.14.5		Medical, precision, and optical instruments, watches, and clocks
501105	5.01.1.05	15.01.15	15.01.15	150115	<i>Other manufactured goods n.e.c.</i>

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
<b>FORMATION BRUTE DE CAPITAL FIXE</b>	<b>EXPENDITURE ON GROSS FIXED CAPITAL FORMATION</b>	<b>GROSS FIXED CAPITAL FORMATION</b>	<b>GROSS FIXED CAPITAL FORMATION</b>	
MACHINES ET ÉQUIPEMENT	MACHINERY AND EQUIPMENT	MACHINERY AND EQUIPMENT	MACHINERY AND EQUIPMENT	
PRODUCTION DE METAUX ET ÉQUIPEMENT	METAL PRODUCTS AND EQUIPMENT	METAL PRODUCTS AND EQUIPMENT	METAL PRODUCTS AND EQUIPMENT	
<i>Produits fabriqués en métal, sauf machines et équipement</i>	<i>Fabricated metal products, except machinery and equipment</i>	<i>Fabricated metal products, except machinery and equipment</i>	<i>Fabricated metal products, except machinery and equipment</i>	
Produits fabriqués en métal sauf machines et équipement	Fabricated metal products, except machinery and equipment	Fabricated metal products, except machinery and equipment	Fabricated metal products, except machinery and equipment	
<i>Machines pour tout usage</i>	<i>General-purpose machinery</i>	<i>General-purpose machinery</i>	<i>General-purpose machinery</i>	
Moteurs et turbines	Engines and turbines, pumps, and compressors	Engines and turbines, pumps, and compressors	General-purpose machinery	M
Autres machines pour tout usage	Other general-purpose machinery	Other general-purpose machinery		
<i>Machines à usage spécial</i>	<i>Special-purpose machinery</i>	<i>Special-purpose machinery</i>	<i>Special-purpose machinery</i>	
Machines agricoles et de sylviculture	Agricultural and forestry machinery	Agricultural and forestry machinery	Special-purpose machinery	M
Machines-outils	Machine tools	Machine tools		
Machines pour la métallurgie, les mines, les carrières et la construction	Machinery for metallurgy, mining, quarrying, and construction	Machinery for metallurgy, mining, quarrying, and construction		
Machines pour l'industrie alimentaire, des boissons et de tabac	Machinery for food, beverages, and tobacco processing	Machinery for food, beverages, and tobacco processing		
Machines pour l'industrie textile, d'habillement et du cuir	Machinery for textile, apparel, and leather production	Machinery for textile, apparel, and leather production		
Autres machines à utilisation spéciale	Other special-purpose machinery	Other special-purpose machinery		
<i>Équipement électrique et optique</i>	<i>Electrical and optical equipment</i>	<i>Electrical and optical equipment</i>	<i>Electrical and optical equipment</i>	
Machines de bureau sauf ordinateurs	Office machinery	Office machinery	Electrical and optical equipment	M
Ordinateurs et tout autre équipement de traitement de l'information	Computers and other information processing equipment	Computers and other information processing equipment		
Machines et appareils électriques	Electrical machinery and apparatus	Electrical machinery and apparatus		
Radio et télévision et équipement et appareils de communication	Radio, television, and communications equipment and apparatus	Radio, television, and communications equipment and apparatus		
Instruments médicaux, de précision et optiques	Medical, precision, and optical instruments, watches, and clocks	Medical, precision, and optical instruments, watches, and clocks		
<i>Autres produits manufacturés n.c.a.</i>	<i>Other manufactured goods n.e.c.</i>	<i>Other manufactured goods n.e.c.</i>	<i>Other manufactured goods n.e.c.</i>	

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
5011051	5.01.1.05.1	15.01.15	15.01.15	150115.1	Other manufactured goods n.e.c.
5012	5.01.2	15.01.2	15.01.2	150120	TRANSPORT EQUIPMENT
501201	5.01.2.01	15.01.21	15.01.21	150121	<i>Road transport equipment</i>
5012011	5.01.2.01.1	15.01.21.1	15.01.21.1	150121.1	Motor vehicles, trailers, and semitrailers
5012012	5.01.2.01.2	15.01.21.2	15.01.21.2	150121.2	Other road transport
501202	5.01.2.02	15.01.22	15.01.22	150122	<i>Other transport equipment</i>
5012021	5.01.2.02.1	15.01.22.1	15.01.22.1	150122.1	Other transport equipment
		15.01.22.2	15.01.22.1		
		15.01.22.3	15.01.22.1		
502	5.02	15.02	15.02	150200	CONSTRUCTION
5021	5.02.1	15.02.1	15.02.1	150210	RESIDENTIAL BUILDINGS
502101	5.02.1.01	15.02.11	15.02.11	150211	<i>Residential buildings</i>
5021011	5.02.1.01.1	15.02.11.1	15.02.11.1	150211.1	Residential buildings
		15.02.12	15.02.12		
		15.02.12	15.02.12		
		15.02.13	15.02.13		
		15.02.13	15.02.13		
5022	5.02.2	15.02.2	15.02.2	150220	NONRESIDENTIAL BUILDINGS
502201	5.02.2.01	15.02.21	15.02.21	150221	<i>Nonresidential buildings</i>
5022011	5.02.2.01.1	15.02.21	15.02.21	150221.1	Nonresidential buildings
		15.02.22	15.02.22		
		15.02.22	15.02.22		
		15.02.23	15.02.23		
		15.02.23	15.02.23		
		15.02.24	15.02.24		
		15.02.24	15.02.24		
		15.02.25	15.02.25		
		15.02.25	15.02.25		
5023	5.02.3	15.02.3	15.02.3	150230	CIVIL ENGINEERING WORKS

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
Autres produits manufacturés n.c.a.	Other manufactured goods n.e.c.	Other manufactured goods n.e.c.	Other manufactured goods n.e.c.	
EQUIPEMENT DE TRANSPORT	TRANSPORT EQUIPMENT	TRANSPORT EQUIPMENT	TRANSPORT EQUIPMENT	
<i>Équipement de transport routier</i>	<i>Road transport equipment</i>	<i>Road transport equipment</i>	<i>Road transport equipment</i>	
Véhicules à moteur, remorques et semi-remorques	Motor vehicles, trailers, and semitrailers	Motor vehicles, trailers, and semitrailers	Motor vehicles, trailers, and semitrailers	
Autres équipements de transport routier	Other road transport	Other road transport	Other road transport	
<i>Autres équipements de transport</i>	<i>Other transport equipment</i>	<i>Other transport equipment</i>	<i>Other transport equipment</i>	
Autres équipements de transport	Boats, steamers, tugs, platforms, rigs	Ships, boats, steamers, tugs, floating platforms, rigs	Other transport equipment	
	Locomotives, vans, and wagons	Locomotives and rolling stock		
	Aircraft, helicopters, hovercraft, and other aeronautical equipment	Aircraft, helicopters, and other aeronautical equipment		
CONSTRUCTION	CONSTRUCTION	CONSTRUCTION	CONSTRUCTION	
BÂTIMENTS RÉSIDENTIELS	RESIDENTIAL BUILDINGS	RESIDENTIAL BUILDINGS	RESIDENTIAL BUILDINGS	
<i>Bâtiments résidentiels</i>	<i>One- and two-dwelling buildings</i>	<i>One- and two-dwelling buildings</i>	<i>Residential buildings</i>	
Bâtiments résidentiels	One- or two-dwelling buildings	One- or two-dwelling buildings	Residential buildings	
	<i>Multidwelling buildings</i>	<i>Multidwelling buildings</i>		
	Multidwelling buildings	Multidwelling buildings		
	<i>Renovation of residential buildings</i>	<i>Renovation of residential buildings</i>		
	Renovation of residential buildings	Renovation of residential buildings		
BÂTIMENTS NON RÉSIDENTIELS	NONRESIDENTIAL BUILDINGS	NONRESIDENTIAL BUILDINGS	NONRESIDENTIAL BUILDINGS	
<i>Bâtiments non résidentiels</i>	<i>Agricultural buildings</i>	<i>Agricultural buildings</i>	<i>Nonresidential buildings</i>	
Bâtiments non résidentiels	Agricultural buildings	Agricultural buildings	Nonresidential buildings	
	<i>Industrial buildings and warehouses</i>	<i>Industrial buildings and warehouses</i>		
	Industrial buildings and warehouses	Industrial buildings and warehouses		
	<i>Commercial buildings</i>	<i>Commercial buildings</i>		
	Commercial buildings	Commercial buildings		
	<i>Other nonresidential buildings</i>	<i>Other nonresidential buildings</i>		
	Other nonresidential buildings	Other nonresidential buildings		
	<i>Renovation of nonresidential buildings</i>	<i>Renovation of nonresidential buildings</i>		
	Renovation of nonresidential buildings	Renovation of nonresidential buildings		
TRAVAUX DE GENIE CIVIL	CIVIL ENGINEERING WORKS	CIVIL ENGINEERING WORKS	CIVIL ENGINEERING WORKS	

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**Annex B (Continued)**

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
502301	5.02.3.01	15.02.31	15.02.31	150231	<i>Civil engineering works</i>
5023011	5.02.3.01.1	15.02.31	15.02.31	150231.1	Civil engineering works
		15.02.32	15.02.32		
		15.02.32	15.02.32		
		15.02.33	15.02.33		
		15.02.33	15.02.33		
503	5.03	15.03	15.03	150300	OTHER PRODUCTS
5031	5.03.1	15.03	15.03	150310	OTHER PRODUCTS
503101	5.03.1.01	15.03.11	15.03.11	150311	<i>Other products</i>
5031011	5.03.1.01.1	15.03.11	15.03.11	150311.1	Other products
		15.03.12	15.03.12		
		15.03.12	15.03.12		
		15.03.13	15.03.13		
		15.03.13	15.03.13		
6	6	16	16	160000	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>
601	6.01	16.01	16.01	160100	CHANGES IN INVENTORIES
6011	6.01.1	16.01	16.01	160110	CHANGES IN INVENTORIES
601101	6.01.1.01	16.01	16.01	160111	<i>Changes in inventories</i>
6011011	6.01.1.01.1			160111.1	Changes in inventories
-				160111.2	
602	6.02	16.02	16.02	160200	ACQUISITIONS LESS DISPOSALS OF VALUABLES
6021	6.02.1	16.02	16.02	160210	ACQUISITIONS LESS DISPOSALS OF VALUABLES
602101	6.02.1.01	16.02	16.02	160211	<i>Acquisitions less disposals of valuables</i>
6021011	6.02.1.01.1	16.02	16.02	160211.1	Acquisitions of valuables
6021012	6.02.1.01.2			160211.2	Disposals of valuables
7	7	17	17	170000	<b>BALANCE OF EXPORTS AND IMPORTS</b>
701	7.01	17.01	17.01	170100	BALANCE OF EXPORTS AND IMPORTS



AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
Travaux de génie civil	Transport infrastructures	Transport infrastructures	Civil engineering works	
Travaux de génie civil	Transport infrastructures	Transport infrastructures	Civil engineering works	
	Pipelines, communication and power lines	Pipelines, communication and power lines		
	Pipelines, communication and power lines	Pipelines, communication and power lines		
	Other civil engineering works	Other civil engineering works		
	Other civil engineering works	Other civil engineering works		
AUTRES PRODUITS	OTHER PRODUCTS	OTHER PRODUCTS	OTHER PRODUCTS	
AUTRES PRODUITS	OTHER PRODUCTS	OTHER PRODUCTS	OTHER PRODUCTS	
Autres produits	Products of agriculture, forestry, fisheries, and aquaculture	Products of agriculture, forestry, fisheries, and aquaculture	Other products	
Autres produits	Products of agriculture, forestry, fisheries, and aquaculture	Products of agriculture, forestry, fisheries, and aquaculture	Other products	
	Software	Software		
	Software	Software		
	Other products n.e.c.	Other products n.e.c.		
	Other products n.e.c.	Other products n.e.c.		
<b>VARIATIONS DE STOCKS ET ACQUISITIONS MOINS CESSION D'OBJETS DE VALEUR</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>	
VARIATIONS DES STOCKS	CHANGES IN INVENTORIES	CHANGES IN INVENTORIES	CHANGES IN INVENTORIES	
VARIATIONS DES STOCKS	CHANGES IN INVENTORIES	CHANGES IN INVENTORIES	CHANGES IN INVENTORIES	
Variations des stocks	Changes in inventories	Changes in inventories	Changes in inventories	
Variations des stocks			Opening value of inventories	S
			Closing value of inventories	
ACQUISITIONS MOINS CESSION D'OBJETS DE VALEUR	ACQUISITIONS LESS DISPOSALS OF VALUABLES	ACQUISITIONS LESS DISPOSALS OF VALUABLES	ACQUISITIONS LESS DISPOSALS OF VALUABLES	
ACQUISITIONS MOINS CESSION D'OBJETS DE VALEUR	ACQUISITIONS LESS DISPOSALS OF VALUABLES	ACQUISITIONS LESS DISPOSALS OF VALUABLES	ACQUISITIONS LESS DISPOSALS OF VALUABLES	
Acquisitions moins cession d'objets de valeur	Acquisitions less disposals of valuables	Acquisitions less disposals of valuables	Acquisitions less disposals of valuables	
Acquisitions des objets de valeur	Acquisitions less disposals of valuables	Acquisitions less disposals of valuables	Acquisitions of valuables	
Cession d'objets de valeur			Disposals of valuables	
<b>SOLDE DES EXPORTATIONS ET DES IMPORTATIONS</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>	<b>BALANCE OF EXPORTS AND IMPORTS</b>	
SOLDE DES EXPORTATIONS ET DES IMPORTATIONS	EXPORTS OF GOODS AND SERVICES	BALANCE OF EXPORTS AND IMPORTS	BALANCE OF EXPORTS AND IMPORTS	

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
7011	7.01.1	17.01.1	17.01.1	170110	BALANCE OF EXPORTS AND IMPORTS
701101	7.01.1.01	17.01.11	17.01.11	170111	<i>Balance of exports and imports</i>
7011011	7.01.1.01.1	17.01.11.1	17.01.11.1	170111.1	Exports of goods and services
7011012	7.01.1.01.2	17.01.11.2		170111.2	Imports of goods and services
		17.01.12			
		17.01.12.1			
		17.01.2			
		17.01.21			
		17.01.21.1			
		17.01.21.2			
		17.01.22			
		17.01.22.1			
		17.02			
		17.02.1			
		17.02.11			
		17.02.11.1			
		17.02.11.2			
		17.02.12			
		17.02.12.1			
		17.02.2			
		17.02.21			
		17.02.21.1			

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
SOLDE DES EXPORTATIONS ET DES IMPORTATIONS	EXPORTS OF GOODS	BALANCE OF EXPORTS AND IMPORTS	BALANCE OF EXPORTS AND IMPORTS	
<i>Solde des exportations et des importations</i>	<i>Exports of goods to the EU and institutions of the EU</i>	<i>Balance of exports and imports</i>	<i>Balance of exports and imports</i>	
Exportations de biens et services	Exports of goods to EU countries	Balance of exports and imports	Exports of goods and services	
Importations de biens et services	Exports of goods to institutions of the EU	Value (f.o.b.) of exports of goods and services less the value (c.i.f.) of imports of goods and services	Imports of goods and services	
	<i>Exports of goods to third countries and international organizations</i>			
	Exports of goods to third countries and international organizations			
	<b>EXPORTS OF SERVICES</b>			
	<i>Exports of services to the EU and institutions of the EU</i>			
	Exports of services to EU countries			
	Exports of services to institutions of the EU			
	<i>Exports of services to third countries and international organizations</i>			
	Exports of services to third countries and international organizations			
	<b>IMPORTS OF GOODS AND SERVICES</b>			
	<b>IMPORTS OF GOODS</b>			
	<i>Imports of goods from the EU and institutions of the EU</i>			
	Imports of goods from EU countries			
	Imports of goods from institutions of the EU			
	<i>Imports of goods from third countries and international organizations</i>			
	Imports of goods from third countries and international organizations			
	<b>IMPORTS OF SERVICES</b>			
	<i>Imports of services from the EU and institutions of the EU</i>			
	Imports of services from EU countries			

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**Annex B** (Continued)

AfDB 2005 code	AfDB 2005 code	Eurostat code	OECD code	ICP code	AfDB 2005 heading (English)
		17.02.21.2			
		17.02.22			
		17.02.22.1			

Source: ICP, <http://icp.worldbank.org/>.

Note: AfDB = African Development Bank; OECD = Organisation for Economic Co-operation and Development; BH = basic heading; NPISHs = nonprofit institutions serving households; cc = cubic centimeter; COICOP = Classification of Individual Consumption According to Purpose; EU = European Union; n.e.c. = not elsewhere classified; n.c.a. = non classées ailleurs; f.o.b. = free on board; c.i.f. = cost, insurance, and freight. Yellow shading indicates that two or more basic headings were merged. Blue shading indicates that a basic heading was split.

AfDB 2005 heading (French)	Eurostat heading	OECD heading	ICP heading	M: Merging two or more BHs N: Different name S: Split
	Imports of services from institutions of the EU			
	<i>Imports of services from third countries and international organizations</i>			
	Imports of services from third countries and international organizations			

## Annex C

### Mapping of ICP Classification, ICP Operational Classification, and ICP Actual Operational Classification

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
100000	<b>GROSS DOMESTIC PRODUCT</b>		100000	<b>GROSS DOMESTIC PRODUCT</b>	
110000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>		110000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>	
110100	FOOD AND NONALCOHOLIC BEVERAGES		110100	FOOD AND NONALCOHOLIC BEVERAGES	
110110	FOOD		110110	FOOD	
110111	<i>Bread and cereals</i>		110111	<i>Bread and cereals</i>	
110111.1	Rice		110111.1	Rice	
110111.2	Other cereals, flour, and other products		110111.2	Other cereals, flour, and other products	
110111.3	Bread		110111.3	Bread	
110111.4	Other bakery products		110111.4	Other bakery products	
110111.5	Pasta products		110111.5	Pasta products	
110112	<i>Meat</i>		110112	<i>Meat</i>	
110112.1	Beef and veal		110112.1	Beef and veal	
110112.2	Pork		110112.2	Pork	
110112.3	Lamb, mutton, and goat		110112.3	Lamb, mutton, and goat	
110112.4	Poultry		110112.4	Poultry	
110112.5	Other meats and meat preparations		110112.5	Other meats and meat preparations	
110113	<i>Fish and seafood</i>		110113	<i>Fish and seafood</i>	
110113.1	Fresh, chilled, or frozen fish and seafood		110113.1	Fresh, chilled, or frozen fish and seafood	
110113.2	Preserved or processed fish and seafood		110113.2	Preserved or processed fish and seafood	
110114	<i>Milk, cheese, and eggs</i>		110114	<i>Milk, cheese, and eggs</i>	
110114.1	Fresh milk		110114.1	Fresh milk	
110114.2	Preserved milk and other milk products		110114.2	Preserved milk and other milk products	
110114.2	Cheese		110114.2	Cheese	
110114.3	Eggs and egg-based products		110114.3	Eggs and egg-based products	
110115	<i>Oils and fats</i>		110115	<i>Oils and fats</i>	
110115.1	Butter and margarine		110115.1	Butter and margarine	
110115.2	Other edible oils and fats		110115.2	Other edible oils and fats	
110116	<i>Fruit</i>		110116	<i>Fruit</i>	
110116.1	Fresh or chilled fruit		110116.1	Fresh or chilled fruit	
110116.2	Frozen, preserved, or processed fruit and fruit-based products		110116.2	Frozen, preserved, or processed fruit and fruit-based products	
110117	<i>Vegetables</i>		110117	<i>Vegetables</i>	
110117.1	Fresh or chilled vegetables other than potatoes		110117.1	Fresh or chilled vegetables other than potatoes	
110117.2	Fresh or chilled potatoes		110117.2	Fresh or chilled potatoes	
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products		110117.3	Frozen, preserved, or processed vegetables and vegetable-based products	

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
100000	<b>GROSS DOMESTIC PRODUCT</b>					
110000	<b>ACTUAL INDIVIDUAL CONSUMPTION</b>					
110100	FOOD AND NONALCOHOLIC BEVERAGES					
110110	FOOD					
110111	<i>Bread and cereals</i>					
110111.1	Rice		X		X	
110111.2	Other cereals, flour, and other products		X		X	
110111.3	Bread		X		X	
110111.4	Other bakery products		X			
110111.5	Pasta products		X			
110112	<i>Meat</i>					
110112.1	Beef and veal		X		X	
110112.2	Pork		X			
110112.3	Lamb, mutton, and goat		X		X	
110112.4	Poultry		X		X	
110112.5	Other meats and meat preparations		X		X	
110113	<i>Fish and seafood</i>					
110113.1	Fresh, chilled, or frozen fish and seafood		X		X	
110113.2	Preserved or processed fish and seafood		X			
110114	<i>Milk, cheese, and eggs</i>					
110114.1	Fresh milk		X		X	
110114.2	Preserved milk and other milk products		X		X	
110114.2	Cheese		X		X	
110114.3	Eggs and egg-based products		X		X	
110115	<i>Oils and fats</i>					
110115.1	Butter and margarine		X			
110115.2	Other edible oils and fats		X		X	
110116	<i>Fruit</i>					
110116.1	Fresh or chilled fruit		X		X	
110116.2	Frozen, preserved, or processed fruit and fruit-based products		X			
110117	<i>Vegetables</i>					
110117.1	Fresh or chilled vegetables other than potatoes		X		X	
110117.2	Fresh or chilled potatoes		X		X	
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products		X			

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**Annex C** (Continued)

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
110118	<i>Sugar, jam, honey, chocolate, and confectionery</i>		110118	<i>Sugar, jam, honey, chocolate, and confectionery</i>	
110118.1	Sugar		110118.1	Sugar	
110118.2	Jams, marmalades, and honey		110118.2	Jams, marmalades, and honey	
110118.3	Confectionery, chocolate, and ice cream		110118.3	Confectionery, chocolate, and ice cream	
110119	<i>Food products n.e.c.</i>		110119	<i>Food products n.e.c.</i>	
110119.1	Food products n.e.c.		110119.1	Food products n.e.c.	
110120	NONALCOHOLIC BEVERAGES		110120	NONALCOHOLIC BEVERAGES	
110121	<i>Coffee, tea, and cocoa</i>		110121	<i>Coffee, tea, and cocoa</i>	
110121.1	Coffee, tea, and cocoa		110121.1	Coffee, tea, and cocoa	
110122	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>		110122	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>	
110122.1	Mineral waters, soft drinks, fruit and vegetable juices		110122.1	Mineral waters, soft drinks, fruit and vegetable juices	
110200	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS		110200	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS	
110210	ALCOHOLIC BEVERAGES		110210	ALCOHOLIC BEVERAGES	
110211	<i>Spirits</i>		110211	<i>Spirits</i>	
110211.1	Spirits		110211.1	Spirits	
110212	<i>Wine</i>		110212	<i>Wine</i>	
110212.1	Wine		110212.1	Wine	
110213	<i>Beer</i>		110213	<i>Beer</i>	
110213.1	Beer		110213.1	Beer	
110220	TOBACCO		110220	TOBACCO AND NARCOTICS	
110221	<i>Tobacco</i>		110221	<i>Tobacco and narcotics</i>	
110221.1	Tobacco		110221.1	Tobacco and narcotics	b
110230	NARCOTICS				
110231	<i>Narcotics</i>				
110231.1	Narcotics				
110300	CLOTHING AND FOOTWEAR		110300	CLOTHING AND FOOTWEAR	
110310	CLOTHING		110310	CLOTHING	
110311	<i>Clothing materials, other articles of clothing, and clothing accessories</i>		110311	<i>Clothing materials, other articles of clothing, and clothing accessories</i>	
110311.1	Clothing materials, other articles of clothing, and clothing accessories		110311.1	Clothing materials, other articles of clothing, and clothing accessories	
110312	<i>Garments</i>		110312	<i>Garments</i>	
110312.1	Garments		110312.1	Garments	
110314	<i>Cleaning, repair, and hire of clothing</i>		110314	<i>Cleaning, repair, and hire of clothing</i>	
110314.1	Cleaning, repair, and hire of clothing		110314.1	Cleaning, repair, and hire of clothing	
110320	FOOTWEAR		110320	FOOTWEAR	



ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
110118	<i>Sugar, jam, honey, chocolate, and confectionery</i>					
110118.1	Sugar		X		X	
110118.2	Jams, marmalades, and honey		X			
110118.3	Confectionery, chocolate, and ice cream		X			
110119	<i>Food products n.e.c.</i>					
110119.1	Food products n.e.c.		X			
110120	NONALCOHOLIC BEVERAGES					
110121	<i>Coffee, tea, and cocoa</i>					
110121.1	Coffee, tea, and cocoa		X		X	
110122	<i>Mineral waters, soft drinks, fruit and vegetable juices</i>					
110122.1	Mineral waters, soft drinks, fruit and vegetable juices		X		X	
110200	ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS					
110210	ALCOHOLIC BEVERAGES					
110211	<i>Spirits</i>					
110211.1	Spirits		X		X	
110212	<i>Wine</i>					
110212.1	Wine		X		X	
110213	<i>Beer</i>					
110213.1	Beer		X		X	
110220	TOBACCO AND NARCOTICS					
110221	<i>Tobacco and narcotics</i>					
110221.1	Tobacco and narcotics		X		X	
						X
110300	CLOTHING AND FOOTWEAR					
110310	CLOTHING					
110311	<i>Clothing materials, other articles of clothing, and clothing accessories</i>					
110311.1	Clothing materials, other articles of clothing, and clothing accessories		X			
110312	<i>Garments</i>					
110312.1	Garments		X		X	
110314	<i>Cleaning, repair, and hire of clothing</i>					
110314.1	Cleaning, repair, and hire of clothing		X			
110320	FOOTWEAR					

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**Annex C** (Continued)

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
110321	<i>Shoes and other footwear</i>		110321	<i>Shoes and other footwear</i>	
110321.1	Shoes and other footwear		110321.1	Shoes and other footwear	
110322	<i>Repair and hire of footwear</i>		110322	<i>Repair and hire of footwear</i>	
110322.1	Repair and hire of footwear		110322.1	Repair and hire of footwear	
110400	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS		110400	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS	
110410	ACTUAL AND IMPUTED RENTALS FOR HOUSING		110410	ACTUAL AND IMPUTED RENTALS FOR HOUSING	
110411	<i>Actual and imputed rentals for housing</i>		110411	<i>Actual and imputed rentals for housing</i>	
110411.1	Actual and imputed rentals for housing		110411.1	Actual and imputed rentals for housing	
110430	MAINTENANCE AND REPAIR OF THE DWELLING		110430	MAINTENANCE AND REPAIR OF THE DWELLING	
110431	<i>Maintenance and repair of the dwelling</i>		110431	<i>Maintenance and repair of the dwelling</i>	
110431.1	Maintenance and repair of the dwelling		110431.1	Maintenance and repair of the dwelling	
110440	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING		110440	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING	
110441	<i>Water supply</i>		110441	<i>Water supply</i>	
110441.1	Water supply		110441.1	Water supply	
110442	<i>Miscellaneous services relating to the dwelling</i>		110442	<i>Miscellaneous services relating to the dwelling</i>	
110442.1	Miscellaneous services relating to the dwelling		110442.1	Miscellaneous services relating to the dwelling	
110450	ELECTRICITY, GAS, AND OTHER FUELS		110450	ELECTRICITY, GAS, AND OTHER FUELS	
110451	<i>Electricity</i>		110451	<i>Electricity</i>	
110451.1	Electricity		110451.1	Electricity	
110452	<i>Gas</i>		110452	<i>Gas</i>	
110452.1	Gas		110452.1	Gas	
110453	<i>Other fuels</i>		110453	<i>Other fuels</i>	
110453.1	Other fuels		110453.1	Other fuels	
110500	FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE MAINTENANCE OF THE HOUSE		110500	FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE MAINTENANCE OF THE HOUSE	
110510	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS		110510	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS	
110511	<i>Furniture and furnishings</i>		110511	<i>Furniture and furnishings</i>	
110511.1	Furniture and furnishings		110511.1	Furniture and furnishings	
110512	<i>Carpets and other floor coverings</i>		110512	<i>Carpets and other floor coverings</i>	
110512.1	Carpets and other floor coverings		110512.1	Carpets and other floor coverings	
110513	<i>Repair of furniture, furnishings, and floor coverings</i>		110513	<i>Repair of furniture, furnishings, and floor coverings</i>	
110513.1	Repair of furniture, furnishings, and floor coverings		110513.1	Repair of furniture, furnishings, and floor coverings	
110520	HOUSEHOLD TEXTILES		110520	HOUSEHOLD TEXTILES	

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
110321	<i>Shoes and other footwear</i>					
110321.1	Shoes and other footwear		X		X	
110322	<i>Repair and hire of footwear</i>					
110322.1	Repair and hire of footwear		X			
110400	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS					
110410	ACTUAL AND IMPUTED RENTALS FOR HOUSING					
110411	<i>Actual and imputed rentals for housing</i>					
110411.1	Actual and imputed rentals for housing	m	X		X	X
110430	MAINTENANCE AND REPAIR OF THE DWELLING					
110431	<i>Maintenance and repair of the dwelling</i>					
110431.1	Maintenance and repair of the dwelling		X		X	
110440	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING					
110441	<i>Water supply</i>					
110441.1	Water supply		X		X	
110442	<i>Miscellaneous services relating to the dwelling</i>					
110442.1	Miscellaneous services relating to the dwelling			X		
110450	ELECTRICITY, GAS, AND OTHER FUELS					
110451	<i>Electricity</i>					
110451.1	Electricity		X		X	
110452	<i>Gas</i>					
110452.1	Gas		X		X	
110453	<i>Other fuels</i>					
110453.1	Other fuels		X		X	
110500	FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE MAINTENANCE OF THE HOUSE					
110510	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS					
110511	<i>Furniture and furnishings</i>					
110511.1	Furniture and furnishings		X		X	
110512	<i>Carpets and other floor coverings</i>					
110512.1	Carpets and other floor coverings		X			
110513	<i>Repair of furniture, furnishings, and floor coverings</i>					
110513.1	Repair of furniture, furnishings, and floor coverings		X			
110520	HOUSEHOLD TEXTILES					

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**Annex C (Continued)**

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
110521	<i>Household textiles</i>		110521	<i>Household textiles</i>	
110521.1	Household textiles		110521.1	Household textiles	
110530	HOUSEHOLD APPLIANCES		110530	HOUSEHOLD APPLIANCES	
110531	<i>Major household appliances whether electric or not</i>		110531	<i>Major household appliances whether electric or not</i>	
110531.1	Major household appliances whether electric or not		110531.1	Major household appliances whether electric or not	
110532	<i>Small electric household appliances</i>		110532	<i>Small electric household appliances</i>	
110532.1	Small electric household appliances		110532.1	Small electric household appliances	
110533	<i>Repair of household appliances</i>		110533	<i>Repair of household appliances</i>	
110533.1	Repair of household appliances		110533.1	Repair of household appliances	
110540	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS		110540	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS	
110541	<i>Glassware, tableware, and household utensils</i>		110541	<i>Glassware, tableware, and household utensils</i>	
110541.1	Glassware, tableware, and household utensils		110541.1	Glassware, tableware, and household utensils	
110550	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN		110550	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN	
110551	<i>Major tools and equipment</i>		110551	<i>Major tools and equipment</i>	
110551.1	Major tools and equipment		110551.1	Major tools and equipment	
110552	<i>Small tools and miscellaneous accessories</i>		110552	<i>Small tools and miscellaneous accessories</i>	
110552.1	Small tools and miscellaneous accessories		110552.1	Small tools and miscellaneous accessories	
110560	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE		110560	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE	
110561	<i>Nondurable household goods</i>		110561	<i>Nondurable household goods</i>	
110561.1	Nondurable household goods		110561.1	Nondurable household goods	
110562	<i>Domestic services and household services</i>		110562	<i>Domestic services and household services</i>	
110562.1	Domestic services		110562.1	Domestic services and household services	c
110562.2	Household services				
110600	HEALTH		110600	HEALTH	
110610	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT		110610	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT	
110611	<i>Pharmaceutical products</i>		110611	<i>Pharmaceutical products</i>	
110611.1	Pharmaceutical products		110611.1	Pharmaceutical products	
110612	<i>Other medical products</i>		110612	<i>Other medical products</i>	
110612.1	Other medical products		110612.1	Other medical products	
110613	<i>Therapeutic appliances and equipment</i>		110613	<i>Therapeutic appliances and equipment</i>	
110613.1	Therapeutic appliances and equipment		110613.1	Therapeutic appliances and equipment	

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
110521	<i>Household textiles</i>					
110521.1	Household textiles		X			
110530	HOUSEHOLD APPLIANCES					
110531	<i>Major household appliances whether electric or not</i>					
110531.1	Major household appliances whether electric or not		X		X	
110532	<i>Small electric household appliances</i>					
110532.1	Small electric household appliances		X		X	
110533	<i>Repair of household appliances</i>					
110533.1	Repair of household appliances		X			
110540	GLASSWARE, TABLEWARE, AND HOUSEHOLD UTENSILS					
110541	<i>Glassware, tableware, and household utensils</i>					
110541.1	Glassware, tableware, and household utensils		X		X	
110550	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN					
110551	<i>Major tools and equipment</i>					
110551.1	Major tools and equipment		X			
110552	<i>Small tools and miscellaneous accessories</i>					
110552.1	Small tools and miscellaneous accessories		X			
110560	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE					
110561	<i>Nondurable household goods</i>					
110561.1	Nondurable household goods		X		X	
110562	<i>Domestic services and household services</i>					
110562.1	Domestic services and household services		X			
				X		
110600	HEALTH					
110610	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT					
110611	<i>Pharmaceutical products</i>					
110611.1	Pharmaceutical products	n	X		X	
110612	<i>Other medical products</i>					
110612.1	Other medical products	o	X			
110613	<i>Therapeutic appliances and equipment</i>					
110613.1	Therapeutic appliances and equipment	p	X			

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**Annex C (Continued)**

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
110620	OUTPATIENT SERVICES		110620	OUTPATIENT SERVICES	
110621	<i>Medical services</i>		110621	<i>Medical services</i>	
110621.1	Medical services		110621.1	Medical services	
110622	<i>Dental services</i>		110622	<i>Dental services</i>	
110622.1	Dental services		110622.1	Dental services	
110623	<i>Paramedical services</i>		110623	<i>Paramedical services</i>	
110623.1	Paramedical services		110623.1	Paramedical services	
110630	HOSPITAL SERVICES		110630	HOSPITAL SERVICES	
110631	<i>Hospital services</i>		110631	<i>Hospital services</i>	
110631.1	Hospital services		110631.1	Hospital services	
110700	TRANSPORT		110700	TRANSPORT	
110710	PURCHASE OF VEHICLES		110710	PURCHASE OF VEHICLES	
110711	<i>Motor cars</i>		110711	<i>Motor cars</i>	
110711.1	Motor cars		110711.1	Motor cars	
110712	<i>Motorcycles</i>		110712	<i>Motorcycles</i>	
110712.1	Motorcycles		110712.1	Motorcycles	
110713	<i>Bicycles</i>		110713	<i>Bicycles and animal-drawn vehicles</i>	
110713.1	Bicycles		110713.1	Bicycles and animal-drawn vehicles	d
110714	<i>Animal-drawn vehicles</i>				
110714.1	Animal-drawn vehicles				
110720	OPERATION OF PERSONAL TRANSPORT EQUIPMENT		110720	OPERATION OF PERSONAL TRANSPORT EQUIPMENT	
110722	<i>Fuels and lubricants for personal transport equipment</i>		110722	<i>Fuels and lubricants for personal transport equipment</i>	
110722.1	Fuels and lubricants for personal transport equipment		110722.1	Fuels and lubricants for personal transport equipment	
110723	<i>Maintenance and repair of personal transport equipment</i>		110723	<i>Maintenance and repair of personal transport equipment</i>	
110723.1	Maintenance and repair of personal transport equipment		110723.1	Maintenance and repair of personal transport equipment	
110724	<i>Other services in respect of personal transport equipment</i>		110724	<i>Other services in respect of personal transport equipment</i>	
110724.1	Other services in respect of personal transport equipment		110724.1	Other services in respect of personal transport equipment	
110730	TRANSPORT SERVICES		110730	TRANSPORT SERVICES	
110731	<i>Passenger transport by railway</i>		110731	<i>Passenger transport by railway</i>	
110731.1	Passenger transport by railway		110731.1	Passenger transport by railway	
110732	<i>Passenger transport by road</i>		110732	<i>Passenger transport by road</i>	
110732.1	Passenger transport by road		110732.1	Passenger transport by road	

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
110620	OUTPATIENT SERVICES					
110621	<i>Medical services</i>					
110621.1	Medical services	q	X		X	
110622	<i>Dental services</i>					
110622.1	Dental services	r	X		X	
110623	<i>Paramedical services</i>					
110623.1	Paramedical services	s	X			
110630	HOSPITAL SERVICES					
110631	<i>Hospital services</i>					
110631.1	Hospital services	t		X	X	
110700	TRANSPORT					
110710	PURCHASE OF VEHICLES					
110711	<i>Motor cars</i>					
110711.1	Motor cars		X		X	
110712	<i>Motorcycles</i>					
110712.1	Motorcycles		X			
110713	<i>Bicycles and animal-drawn vehicles</i>					
110713.1	Bicycles and animal-drawn vehicles		X			
			X			X
110720	OPERATION OF PERSONAL TRANSPORT EQUIPMENT					
110722	<i>Fuels and lubricants for personal transport equipment</i>					
110722.1	Fuels and lubricants for personal transport equipment		X		X	
110723	<i>Maintenance and repair of personal transport equipment</i>					
110723.1	Maintenance and repair of personal transport equipment		X		X	
110724	<i>Other services in respect of personal transport equipment</i>					
110724.1	Other services in respect of personal transport equipment		X			
110730	TRANSPORT SERVICES					
110731	<i>Passenger transport by railway</i>					
110731.1	Passenger transport by railway		X			
110732	<i>Passenger transport by road</i>					
110732.1	Passenger transport by road		X		X	

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**Annex C** (Continued)

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
110733	<i>Passenger transport by air</i>		110733	<i>Passenger transport by air</i>	
110733.1	Passenger transport by air		110733.1	Passenger transport by air	
110734	<i>Passenger transport by sea and inland waterway</i>		110734	<i>Passenger transport by sea and inland waterway</i>	
110734.1	Passenger transport by sea and inland waterway		110734.1	Passenger transport by sea and inland waterway	
110735	<i>Combined passenger transport</i>		110735	<i>Combined passenger transport</i>	
110735.1	Combined passenger transport		110735.1	Combined passenger transport	
110736	<i>Other purchased transport services</i>		110736	<i>Other purchased transport services</i>	
110736.1	Other purchased transport services		110736.1	Other purchased transport services	
110800	COMMUNICATION		110800	COMMUNICATION	
110810	POSTAL SERVICES		110810	POSTAL SERVICES	
110811	<i>Postal services</i>		110811	<i>Postal services</i>	
110811.1	Postal services		110811.1	Postal services	
110820	TELEPHONE AND TELEFAX EQUIPMENT		110820	TELEPHONE AND TELEFAX EQUIPMENT	
110821	Telephone and telefax equipment		110821	<i>Telephone and telefax equipment</i>	
110821.1	Telephone and telefax equipment		110821.1	Telephone and telefax equipment	
110830	TELEPHONE AND TELEFAX SERVICES		110830	TELEPHONE AND TELEFAX SERVICES	
110831	<i>Telephone and telefax services</i>		110831	<i>Telephone and telefax services</i>	
110831.1	Telephone and telefax services		110831.1	Telephone and telefax services	
110900	RECREATION AND CULTURE		110900	RECREATION AND CULTURE	
110910	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT		110910	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT	
110911	<i>Audiovisual, photographic, and information processing equipment</i>		110911	<i>Audiovisual, photographic, and information processing equipment</i>	
110911.1	Audiovisual, photographic, and information processing equipment		110911.1	Audiovisual, photographic, and information processing equipment	
110914	<i>Recording media</i>		110914	<i>Recording media</i>	
110914.1	Recording media		110914.1	Recording media	
110915	<i>Repair of audiovisual, photographic, and information processing equipment</i>		110915	<i>Repair of audiovisual, photographic, and information processing equipment</i>	
110915.1	Repair of audiovisual, photographic, and information processing equipment		110915.1	Repair of audiovisual, photographic, and information processing equipment	
110920	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE		110920	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE	
110921	<i>Major durables for outdoor and indoor recreation</i>		110921	<i>Major durables for outdoor and indoor recreation and their maintenance and repair</i>	
110921.1	Major durables for outdoor and indoor recreation		110921.1	Major durables for outdoor and indoor recreation and their maintenance and repair	e
110923	<i>Maintenance and repair of other major durables for recreation and culture</i>				



ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
110733	<i>Passenger transport by air</i>					
110733.1	Passenger transport by air		X		X	
110734	<i>Passenger transport by sea and inland waterway</i>					
110734.1	Passenger transport by sea and inland waterway		X			
110735	<i>Combined passenger transport</i>					
110735.1	Combined passenger transport			X		X
110736	<i>Other purchased transport services</i>					
110736.1	Other purchased transport services			X		
110800	COMMUNICATION					
110810	POSTAL SERVICES					
110811	<i>Postal services</i>					
110811.1	Postal services		X			
110820	TELEPHONE AND TELEFAX EQUIPMENT					
110821	<i>Telephone and telefax equipment</i>					
110821.1	Telephone and telefax equipment		X		X	
110830	TELEPHONE AND TELEFAX SERVICES					
110831	<i>Telephone and telefax services</i>					
110831.1	Telephone and telefax services		X		X	
110900	RECREATION AND CULTURE					
110910	AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT					
110911	<i>Audiovisual, photographic, and information processing equipment</i>					
110911.1	Audiovisual, photographic, and information processing equipment		X		X	
110914	<i>Recording media</i>					
110914.1	Recording media		X			
110915	<i>Repair of audiovisual, photographic, and information processing equipment</i>					
110915.1	Repair of audiovisual, photographic, and information processing equipment		X			
110920	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE					
110921	<i>Major durables for outdoor and indoor recreation and their maintenance and repair</i>					
110921.1	Major durables for outdoor and indoor recreation and their maintenance and repair		X			

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**Annex C (Continued)**

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
110923.1	Maintenance and repair of other major durables for recreation and culture				
110930	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS		110930	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS	
110931	<i>Other recreational items and equipment</i>		110931	<i>Other recreational items and equipment</i>	
110931.1	Other recreational items and equipment		110931.1	Other recreational items and equipment	
110933	<i>Gardens and pets</i>		110933	<i>Gardens and pets</i>	
110933.1	Gardens and pets		110933.1	Gardens and pets	
110935	<i>Veterinary and other services for pets</i>		110935	<i>Veterinary and other services for pets</i>	
110935.1	Veterinary and other services for pets		110935.1	Veterinary and other services for pets	
110940	RECREATIONAL AND CULTURAL SERVICES		110940	RECREATIONAL AND CULTURAL SERVICES	
110941	<i>Recreational and sporting services</i>		110941	<i>Recreational and sporting services</i>	
110941.1	Recreational and sporting services		110941.1	Recreational and sporting services	
110942	<i>Cultural services</i>		110942	<i>Cultural services</i>	
110942.1	Cultural services		110942.1	Cultural services	
110943	<i>Games of chance</i>		110943	<i>Games of chance</i>	
110943.1	Games of chance		110943.1	Games of chance	
110950	NEWSPAPERS, BOOKS, AND STATIONERY		110950	NEWSPAPERS, BOOKS, AND STATIONERY	
110951	<i>Newspapers, books, and stationery</i>		110951	<i>Newspapers, books, and stationery</i>	
110951.1	Newspapers, books, and stationery		110951.1	Newspapers, books, and stationery	
110960	PACKAGE HOLIDAYS		110960	PACKAGE HOLIDAYS	
110961	<i>Package holidays</i>		110961	<i>Package holidays</i>	
110961.1	Package holidays		110961.1	Package holidays	
111000	EDUCATION		111000	EDUCATION	
111010	EDUCATION		111010	EDUCATION	
111011	<i>Education</i>		111011	<i>Education</i>	
111011.1	Education		111011.1	Education	
111100	RESTAURANTS AND HOTELS		111100	RESTAURANTS AND HOTELS	
111110	CATERING SERVICES		111110	CATERING SERVICES	
111111	<i>Catering services</i>		111111	<i>Catering services</i>	
111111.1	Catering services		111111.1	Catering services	
111120	ACCOMMODATION SERVICES		111120	ACCOMMODATION SERVICES	
111121	<i>Accommodation services</i>		111121	<i>Accommodation services</i>	
111121.1	Accommodation services		111121.1	Accommodation services	
111200	MISCELLANEOUS GOODS AND SERVICES		111200	MISCELLANEOUS GOODS AND SERVICES	
111210	PERSONAL CARE		111210	PERSONAL CARE	
111211	<i>Hairdressing salons and personal grooming establishments</i>		111211	<i>Hairdressing salons and personal grooming establishments</i>	

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
X						
110930	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS					
110931	<i>Other recreational items and equipment</i>					
110931.1	Other recreational items and equipment		X			
110933	<i>Gardens and pets</i>					
110933.1	Gardens and pets		X			
110935	<i>Veterinary and other services for pets</i>					
110935.1	Veterinary and other services for pets		X			
110940	RECREATIONAL AND CULTURAL SERVICES					
110941	<i>Recreational and sporting services</i>					
110941.1	Recreational and sporting services	u	X		X	
110942	<i>Cultural services</i>					
110942.1	Cultural services	u	X		X	
110943	<i>Games of chance</i>					
110943.1	Games of chance			X	X	X
110950	NEWSPAPERS, BOOKS, AND STATIONERY					
110951	<i>Newspapers, books, and stationery</i>					
110951.1	Newspapers, books, and stationery		X		X	
110960	PACKAGE HOLIDAYS					
110961	<i>Package holidays</i>					
110961.1	Package holidays			X		
111000	EDUCATION					
111010	EDUCATION					
111011	<i>Education</i>					
111011.1	Education	v	X		X	X
111100	RESTAURANTS AND HOTELS					
111110	CATERING SERVICES					
111111	<i>Catering services</i>					
111111.1	Catering services		X		X	
111120	ACCOMMODATION SERVICES					
111121	<i>Accommodation services</i>					
111121.1	Accommodation services		X		X	
111200	MISCELLANEOUS GOODS AND SERVICES					
111210	PERSONAL CARE					
111211	<i>Hairdressing salons and personal grooming establishments</i>					

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**Annex C (Continued)**

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
111211.1	Hairdressing salons and personal grooming establishments		111211.1	Hairdressing salons and personal grooming establishments	
111212	<i>Appliances, articles, and products for personal care</i>		111212	<i>Appliances, articles, and products for personal care</i>	
111212.1	Appliances, articles, and products for personal care		111212.1	Appliances, articles, and products for personal care	
111220	PROSTITUTION				
111221	<i>Prostitution</i>				
111221.1	Prostitution	a			
111230	PERSONAL EFFECTS		111230	PERSONAL EFFECTS	
111231	<i>Jewelry, clocks, and watches</i>		111231	<i>Jewelry, clocks, and watches</i>	
111231.1	Jewelry, clocks, and watches		111231.1	Jewelry, clocks, and watches	
111232	<i>Other personal effects</i>		111232	<i>Other personal effects</i>	
111232.1	Other personal effects		111232.1	Other personal effects	
111240	SOCIAL PROTECTION		111240	SOCIAL PROTECTION	
111241	<i>Social protection</i>		111241	<i>Social protection</i>	
111241.1	Social protection		111241.1	Social protection	
111250	INSURANCE		111250	INSURANCE	
111251	<i>Insurance</i>		111251	<i>Insurance</i>	
111251.1	Insurance		111251.1	Insurance	
111260	FINANCIAL SERVICES		111260	FINANCIAL SERVICES	
111261	<i>Financial intermediation services indirectly measured (FISIM)</i>		111261	<i>Financial intermediation services indirectly measured (FISIM)</i>	
111261.1	Financial intermediation services indirectly measured (FISIM)		111261.1	Financial intermediation services indirectly measured (FISIM)	
111262	<i>Other financial services</i>		111262	<i>Other financial services</i>	
111262.1	Other financial services		111262.1	Other financial services	
111270	OTHER SERVICES		111270	OTHER SERVICES	
111271	<i>Other services n.e.c.</i>		111271	<i>Other services n.e.c.</i>	
111271.1	Other services n.e.c.		111271.1	Other services n.e.c.	
111300	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY		111300	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY	
111310	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY		111310	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY	
111311	<i>Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory</i>		111311	<i>Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory</i>	
111311.1	Final consumption expenditure of resident households in the rest of the world		111311.1	Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory	f

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
111211.1	Hairdressing salons and personal grooming establishments		X		X	
111212	<i>Appliances, articles, and products for personal care</i>					
111212.1	Appliances, articles, and products for personal care		X		X	
				X		X
111230	PERSONAL EFFECTS					
111231	<i>Jewelry, clocks, and watches</i>					
111231.1	Jewelry, clocks, and watches		X			
111232	<i>Other personal effects</i>					
111232.1	Other personal effects		X			
111240	SOCIAL PROTECTION					
111241	<i>Social protection</i>					
111241.1	Social protection	w		X		
111250	INSURANCE					
111251	<i>Insurance</i>					
111251.1	Insurance			X		
111260	FINANCIAL SERVICES					
111261	<i>Financial intermediation services indirectly measured (FISIM)</i>					
111261.1	Financial intermediation services indirectly measured (FISIM)			X		X
111262	Other financial services					
111262.1	Other financial services		X			
111270	OTHER SERVICES					
111271	<i>Other services n.e.c.</i>					
111271.1	Other services n.e.c.		X			
111300	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY					
111310	BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS IN THE ECONOMIC TERRITORY					
111311	<i>Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory</i>					
111311.1	Balance of expenditures of residents abroad and expenditures of nonresidents in the economic territory			X		X

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Annex C (Continued)

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
111311.2	Final consumption expenditure of nonresident households in the economic territory				
120000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>		120000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS</b>	
120100	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS		120100	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS	
120110	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS		120110	INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS	
120111	<i>Individual consumption expenditure by NPISHs</i>		120111	<i>Individual consumption expenditure by NPISHs</i>	
120111.1	Individual consumption expenditure by NPISHs		120111.1	Individual consumption expenditure by NPISHs	
130000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>		130000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	
130100	HOUSING		130100	HOUSING	
130110	HOUSING		130110	HOUSING	
130111	<i>Housing</i>		130111	<i>Housing</i>	
130111.1	Housing		130111.1	Housing	
130200	HEALTH		130200	HEALTH	
130210	HEALTH BENEFITS AND REIMBURSEMENTS		130210	HEALTH BENEFITS AND REIMBURSEMENTS	
130211	<i>Medical products, appliances, and equipment</i>		130211	<i>Medical products, appliances, and equipment</i>	
130211.1	Pharmaceutical products		130211.1	Pharmaceutical products	
130211.2	Other medical products		130211.2	Other medical products	
130211.3	Therapeutic appliances and equipment		130211.3	Therapeutic appliances and equipment	
130212	<i>Health services</i>		130212	<i>Health services</i>	
130212.1	Outpatient medical services		130212.1	Outpatient medical services	
130212.2	Outpatient dental services		130212.2	Outpatient dental services	
130212.3	Outpatient paramedical services		130212.3	Outpatient paramedical services	
130212.4	Hospital services		130212.4	Hospital services	
130220	PRODUCTION OF HEALTH SERVICES		130220	PRODUCTION OF HEALTH SERVICES	
130221	<i>Compensation of employees</i>		130221	<i>Compensation of employees</i>	
130221.1	Compensation of employees		130221.1	Compensation of employees	
130222	<i>Intermediate consumption</i>		130222	<i>Intermediate consumption</i>	
130222.1	Intermediate consumption		130222.1	Intermediate consumption	
130223	<i>Gross operating surplus</i>		130223	<i>Gross operating surplus</i>	
130223.1	Gross operating surplus		130223.1	Gross operating surplus	
130224	<i>Net taxes on production</i>		130224	<i>Net taxes on production</i>	
130224.1	Net taxes on production		130224.1	Net taxes on production	
130225	Receipts from sales		130225	<i>Receipts from sales</i>	



Annex C (Continued)

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
130225.1	Receipts from sales		130225.1	Receipts from sales	
130300	RECREATION AND CULTURE		130300	RECREATION AND CULTURE	
130310	RECREATION AND CULTURE		130310	RECREATION AND CULTURE	
130311	<i>Recreation and culture</i>		130311	<i>Recreation and culture</i>	
130311.1	Recreation and culture		130311.1	Recreation and culture	
130400	EDUCATION		130400	EDUCATION	
130410	EDUCATION BENEFITS AND REIMBURSEMENTS		130410	EDUCATION BENEFITS AND REIMBURSEMENTS	
130411	Education benefits and reimbursements		130411	<i>Education benefits and reimbursements</i>	
130411.1	Education benefits and reimbursements		130411.1	Education benefits and reimbursements	
130420	PRODUCTION OF EDUCATION SERVICES		130420	PRODUCTION OF EDUCATION SERVICES	
130421	<i>Compensation of employees</i>		130421	<i>Compensation of employees</i>	
130421.1	Compensation of employees		130421.1	Compensation of employees	
130422	<i>Intermediate consumption</i>		130422	<i>Intermediate consumption</i>	
130422.1	Intermediate consumption		130422.1	Intermediate consumption	
130423	<i>Gross operating surplus</i>		130423	<i>Gross operating surplus</i>	
130423.1	Gross operating surplus		130423.1	Gross operating surplus	
130424	<i>Net taxes on production</i>		130424	<i>Net taxes on production</i>	
130424.1	Net taxes on production		130424.1	Net taxes on production	
130425	<i>Receipts from sales</i>		130425	<i>Receipts from sales</i>	
130425.1	Receipts from sales		130425.1	Receipts from sales	
130500	SOCIAL PROTECTION		130500	SOCIAL PROTECTION	
130510	SOCIAL PROTECTION		130510	SOCIAL PROTECTION	
130511	<i>Social protection</i>		130511	<i>Social protection</i>	
130511.1	Social protection		130511.1	Social protection	
140000	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>		140000	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	
140100	COLLECTIVE SERVICES		140100	COLLECTIVE SERVICES	
140110	COLLECTIVE SERVICES		140110	COLLECTIVE SERVICES	
140111	<i>Compensation of employees</i>		140111	<i>Compensation of employees</i>	
140111.1	Compensation of employees		140111.1	Compensation of employees	
140112	<i>Intermediate consumption</i>		140112	Intermediate consumption	
140112.1	Intermediate consumption		140112.1	Intermediate consumption	
140113	<i>Gross operating surplus</i>		140113	<i>Gross operating surplus</i>	
140113.1	Gross operating surplus		140113.1	Gross operating surplus	
140114	<i>Net taxes on production</i>		140114	<i>Net taxes on production</i>	
140114.1	Net taxes on production		140114.1	Net taxes on production	
140115	<i>Receipts from sales</i>		140115	<i>Receipts from sales</i>	
140115.1	Receipts from sales		140115.1	Receipts from sales	



ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
130225.1	Receipts from sales			X	X	X
				X		
130400	EDUCATION					
				X		X
130420	PRODUCTION OF EDUCATION SERVICES					
130421	<i>Compensation of employees</i>					
130421.1	Compensation of employees		X		X	X
130422	<i>Intermediate consumption</i>					
130422.1	Intermediate consumption			X	X	X
130423	<i>Gross operating surplus</i>					
130423.1	Gross operating surplus			X	X	X
130424	<i>Net taxes on production</i>					
130424.1	Net taxes on production			X	X	X
130425	<i>Receipts from sales</i>					
130425.1	Receipts from sales			X	X	X
				X	X	X
140000	<b>COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT</b>					
140100	COLLECTIVE SERVICES					
140110	COLLECTIVE SERVICES					
140111	<i>Compensation of employees</i>					
140111.1	Compensation of employees		X		X	X
140112	<i>Intermediate consumption</i>					
140112.1	Intermediate consumption			X	X	X
140113	<i>Gross operating surplus</i>					
140113.1	Gross operating surplus			X	X	X
140114	<i>Net taxes on production</i>					
140114.1	Net taxes on production			X	X	X
140115	<i>Receipts from sales</i>					
140115.1	Receipts from sales			X	X	X

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**Annex C (Continued)**

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
150000	<b>GROSS FIXED CAPITAL FORMATION</b>		150000	<b>GROSS FIXED CAPITAL FORMATION</b>	
150100	MACHINERY AND EQUIPMENT		150100	MACHINERY AND EQUIPMENT	
150110	METAL PRODUCTS AND EQUIPMENT		150110	METAL PRODUCTS AND EQUIPMENT	
150111	<i>Fabricated metal products, except machinery and equipment</i>		150111	<i>Fabricated metal products, machinery, and equipment</i>	
150111.1	Fabricated metal products, except machinery and equipment		150111.1	Fabricated metal products, machinery, and equipment	g
150112	<i>General-purpose machinery</i>				
150112.1	General-purpose machinery				
150113	<i>Special-purpose machinery</i>				
150113.1	Special-purpose machinery				
150114	<i>Electrical and optical equipment</i>				
150114.1	Electrical and optical equipment				
150115	<i>Other manufactured goods n.e.c.</i>				
150115.1	Other manufactured goods n.e.c.				
150120	TRANSPORT EQUIPMENT		150120	TRANSPORT EQUIPMENT	
150121	<i>Road transport equipment</i>		150121	<i>Transport equipment</i>	
150121.1	Motor vehicles, trailers, and semitrailers		150121.1	Motor vehicles, trailers, and semitrailers, and other transport equipment	h
150121.2	Other road transport				
150122	<i>Other transport equipment</i>				
150122.1	Other transport equipment				
150200	CONSTRUCTION		150200	CONSTRUCTION	
150210	RESIDENTIAL BUILDINGS		150210	RESIDENTIAL BUILDINGS	
150211	<i>Residential buildings</i>		150211	<i>Residential buildings</i>	
150211.1	Residential buildings		150211.1	Residential buildings	
150220	NONRESIDENTIAL BUILDINGS		150220	NONRESIDENTIAL BUILDINGS	
150221	<i>Nonresidential buildings</i>		150221	<i>Nonresidential buildings</i>	
150221.1	Nonresidential buildings		150221.1	Nonresidential buildings	
150230	CIVIL ENGINEERING WORKS		150230	CIVIL ENGINEERING WORKS	
150231	<i>Civil engineering works</i>		150231	<i>Civil engineering works</i>	
150231.1	Civil engineering works		150231.1	Civil engineering works	
150300	OTHER PRODUCTS		150300	OTHER PRODUCTS	
150310	OTHER PRODUCTS		150310	OTHER PRODUCTS	
150311	Other products		150311	<i>Other products</i>	
150311.1	Other products		150311.1	Other products	
160000	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>		160000	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>	
160100	CHANGES IN INVENTORIES		160100	CHANGES IN INVENTORIES	

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
150000	<b>GROSS FIXED CAPITAL FORMATION</b>					
150100	MACHINERY AND EQUIPMENT					
150110	METAL PRODUCTS AND EQUIPMENT					
150111	<i>Fabricated metal products, machinery, and equipment</i>					
150111.1	Fabricated metal products, machinery, and equipment		X		X	X
			X		X	X
			X		X	X
			X		X	X
			X			X
150120	TRANSPORT EQUIPMENT					
150121	<i>Transport equipment</i>					
150121.1	Motor vehicles, trailers, and semitrailers, and other transport equipment		X		X	X
			X			X
				X	X	X
150200	CONSTRUCTION					
150210	RESIDENTIAL BUILDINGS					
150211	<i>Residential buildings</i>					
150211.1	Residential buildings		X		X	X
150220	NONRESIDENTIAL BUILDINGS					
150221	<i>Nonresidential buildings</i>					
150221.1	Nonresidential buildings		X		X	X
150230	CIVIL ENGINEERING WORKS					
150231	<i>Civil engineering works</i>					
150231.1	Civil engineering works		X		X	X
150300	OTHER PRODUCTS					
150310	OTHER PRODUCTS					
150311	<i>Other products</i>					
150311.1	Other products		X		X	X
160000	<b>CHANGES IN INVENTORIES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES</b>					
160100	CHANGES IN INVENTORIES					

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**Annex C** (Continued)

ICP code	ICP heading	Notes	ICP operational code	ICP operational heading	Notes
160110	CHANGES IN INVENTORIES		160110	CHANGES IN INVENTORIES	
160111	<i>Changes in inventories</i>		160111	<i>Changes in inventories</i>	
160111.1	Opening value of inventories		160111.1	Changes in inventories	i
160111.2	Closing value of inventories				
160200	ACQUISITIONS LESS DISPOSALS OF VALUABLES		160200	ACQUISITIONS LESS DISPOSALS OF VALUABLES	
160210	ACQUISITIONS LESS DISPOSALS OF VALUABLES		160210	ACQUISITIONS LESS DISPOSALS OF VALUABLES	
160211	<i>Acquisitions less disposals of valuables</i>		160211	<i>Acquisitions less disposals of valuables</i>	
160211.1	Acquisitions of valuables		160211.1	Acquisitions less disposals of valuables	j
160211.2	Disposals of valuables				
170000	<b>BALANCE OF EXPORTS AND IMPORTS</b>		170000	<b>BALANCE OF EXPORTS AND IMPORTS</b>	
170100	BALANCE OF EXPORTS AND IMPORTS		170100	BALANCE OF EXPORTS AND IMPORTS	
170110	BALANCE OF EXPORTS AND IMPORTS		170110	BALANCE OF EXPORTS AND IMPORTS	
170111	<i>Balance of exports and imports</i>		170111	<i>Balance of exports and imports</i>	
170111.1	Exports of goods and services		170111.1	Balance of exports and imports	k
170111.2	Imports of goods and services				

Source: ICP, <http://icp.worldbank.org/>.

Note: n.e.c. = not elsewhere classified; PPP = purchasing power parity. Headings shaded in blue were merged or expanded in order to move them to the operational classification.

Headings shaded in green were affected by the items under nonprofit institutions serving households (NPISHs) and government that were transferred from the ICP Classification to the ICP Actual Operational Classification.

- a. Countries mostly do not report expenditures on prostitution. Combines "prostitution" with "other services n.e.c." (111271.1) when expenditures are reported.
- b. Combines "tobacco" (110221.1) and "narcotics" (110231.1).
- c. Combines "domestic services" (110562.1) and "household services" (110562.2).
- d. Combines "bicycles" (110713.1) and "animal-drawn vehicles" (110714.1).
- e. Combines "major durables for outdoor and indoor recreation" (110921.1) and "maintenance and repair of other major durables" (110923.1).
- f. Combines "final consumption expenditure of resident households in the rest of the world" (111311.1) and "final consumption expenditure of nonresident households in the economic territory" (111311.2).
- g. Combines "fabricated metal products, except machinery and equipment" (150111), "general-purpose machinery" (150112.1), "special-purpose machinery" (150113.1), "electrical and optical equipment" (150114.1), and "other manufactured goods n.e.c." (150115.1).
- h. Combines "motor vehicles, trailers, and semitrailers and other transport equipment" (150121.1), "other road transport" (150121.2), and "other transport equipment" (150122.1).
- i. Combines "opening value of inventories" (160111.1) and "closing value of inventories" (160111.2).
- j. Combines "acquisitions of valuables" (160211.1) and "disposals of valuables" (160211.2).
- k. Combines "exports of goods and services" (170111.1) and "imports of goods and services" (170111.2).
- l. Includes transfers from NPISH (120000) and "individual consumption expenditure by government" (130000).

ICP actual operational code	ICP actual operational heading	Notes	Price and national accounts (NA) aspects			
			Price availability	Reference PPPs BHs	Important NA weight	Difficulty for NA
160110	CHANGES IN INVENTORIES					
160111	<i>Changes in inventories</i>					
160111.1	Changes in inventories			X	X	X
				X	X	X
160200	ACQUISITIONS LESS DISPOSALS OF VALUABLES					
160210	ACQUISITIONS LESS DISPOSALS OF VALUABLES					
160211	<i>Acquisitions less disposals of valuables</i>					
160211.1	Acquisitions less disposals of valuables			X		X
				X		X
170000	<b>BALANCE OF EXPORTS AND IMPORTS</b>					
170100	BALANCE OF EXPORTS AND IMPORTS					
170110	BALANCE OF EXPORTS AND IMPORTS					
170111	<i>Balance of exports and imports</i>					
170111.1	Balance of exports and imports			X	X	
				X	X	

m. Includes transfers from government housing (130111.11).

n. Includes transfers from NPISHs (120111.1) and government "pharmaceutical products" (130211.1).

o. Includes transfers from NPISHs (120111.1) and government "other medical products" (130211.2).

p. Includes transfers from NPISHs (120111.1) and government "therapeutic appliances and equipment" (130211.3).

q. Includes transfers from NPISHs (120111.1) and government "outpatient medical services" (130212.1).

r. Includes transfers from NPISHs (120111.1) and government "outpatient dental services" (130212.2).

s. Includes transfers from NPISHs (120111.1) and government "outpatient paramedical services" (130212.3).

t. Includes transfers from NPISHs (120111.1) and government "hospital services" (130212.4).

u. Includes transfers from NPISHs (120111.1) and government "recreation and culture" (130311.1).

v. Includes transfers from NPISHs (120111.1) and government "education benefits and reimbursements" (130411.1).

w. Includes transfers from government "social protection" (130511.1).

## Annex D

### ICP Economy and Currency Codes

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
<b>A</b>					
Afghanistan	AF	AFG	AFG	Afghani	AFN
Aland Islands	AX	ALA			
Albania	AL	ALB	ALB	lek	ALL
Algeria	DZ	DZA	DZA	Algerian dinar	DZD
American Samoa	AS	ASM	ASM	U.S. dollar	USD
Andorra	AD	AND	ADO	euro	EUR
Angola	AO	AGO	AGO	kwanza	AOA
Anguilla	AI	AIA	AIA	East Caribbean dollar	XCD
Antigua and Barbuda	AG	ATG	ATG	East Caribbean dollar	XCD
Argentina	AR	ARG	ARG	Argentine peso	ARS
Armenia	AM	ARM	ARM	Armenian dram	AMD
Aruba	AW	ABW	ABW	Aruban guilder	AWG
Australia	AU	AUS	AUS	Australian dollar	AUD
Austria	AT	AUT	AUT	euro	EUR
Azerbaijan	AZ	AZE	AZE	Azerbaijani manat	AZN
<b>B</b>					
Bahamas, The	BS	BHS	BHS	Bahamian dollar	BSD
Bahrain	BH	BHR	BHR	Bahraini dinar	BHD
Bangladesh	BD	BGD	BGD	taka	BDT
Barbados	BB	BRB	BRB	Barbados dollar	BBD
Belarus	BY	BLR	BLR	Belarusian ruble	BYR
Belgium	BE	BEL	BEL	euro	EUR
Belize	BZ	BLZ	BLZ	Belize dollar	BZD
Benin	BJ	BEN	BEN	CFA franc BCEAO	XOF
Bermuda	BM	BMU	BMU	Bermudian dollar	BMD
Bhutan	BT	BTN	BTN	Indian rupee	INR
Bolivia	BO	BOL	BOL	boliviano	BOB
Bonaire, Sint Eustatius and Saba	BQ	BES			
Bosnia and Herzegovina	BA	BIH	BIH	convertible mark	BAM
Botswana	BW	BWA	BWA	pula	BWP
Bouvet Island	BV	BVT		Norwegian krone	NOK
Brazil	BR	BRA	BRA	Brazilian real	BRL
British Indian Ocean Territory	IO	IOT		U.S. dollar	USD
Brunei Darussalam	BN	BRN	BRN	Brunei dollar	BND
Bulgaria	BG	BGR	BGR	Bulgarian lev	BGN
Burkina Faso	BF	BFA	BFA	CFA franc BCEAO	XOF
Burundi	BI	BDI	BDI	Burundi franc	BIF

**Annex D (Continued)**

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
<b>C</b>					
Cabo Verde	CV	CPV	CPV	Cape Verde escudo	CVE
Cambodia	KH	KHM	KHM	riel	KHR
Cameroon	CM	CMR	CMR	CFA franc BEAC	XAF
Canada	CA	CAN	CAN	Canadian dollar	CAD
Cayman Islands	KY	CYM	CYM	Cayman Islands dollar	KYD
Central African Republic	CF	CAF	CAF	CFA franc BEAC	XAF
Chad	TD	TCD	TCD	CFA franc BEAC	XAF
Chile	CL	CHL	CHL	Chilean peso	CLP
China	CN	CHN	CHN	yuan renminbi	CNY
Christmas Island	CX	CXR		Australian dollar	AUD
Cocos (Keeling) Islands	CC	CCK		Australian dollar	AUD
Colombia	CO	COL	COL	Colombian peso	COP
Comoros	KM	COM	COM	Comoro franc	KMF
Congo, Dem. Rep.	CD	COD	ZAR	Congolese franc	CDF
Congo, Rep.	CG	COG	COG	CFA franc BEAC	XAF
Costa Rica	CR	CRI	CRI	Costa Rican colon	CRC
Côte d'Ivoire	CI	CIV	CIV	CFA franc BCEAO	XOF
Croatia	HR	HRV	HRV	Croatian kuna	HRK
Cuba	CU	CUB	CUB	Cuban peso	CUP
Curaçao	CW	CUW	CUW	Netherlands Antillean guilder	ANG
Cyprus	CY	CYP	CYP	euro	EUR
Czech Republic	CZ	CZE	CZE	Czech koruna	CZK
<b>D</b>					
Denmark	DK	DNK	DNK	Danish krone	DKK
Djibouti	DJ	DJI	DJI	Djibouti franc	DJF
Dominica	DM	DMA	DMA	East Caribbean dollar	XCD
Dominican Republic	DO	DOM	DOM	Dominican peso	DOP
<b>E</b>					
Ecuador	EC	ECU	ECU	U.S. dollar	USD
Egypt, Arab Rep.	EG	EGY	EGY	Egyptian pound	EGP
El Salvador	SV	SLV	SLV	El Salvador colon	SVC
Equatorial Guinea	GQ	GNQ	GNQ	CFA franc BEAC	XAF
Eritrea	ER	ERI	ERI	nakfa	ERN
Estonia	EE	EST	EST	euro	EUR
Ethiopia	ET	ETH	ETH	Ethiopian birr	ETB
<b>F</b>					
Falkland Islands (Malvinas)	FK	FLK		Falkland Islands pound	FKP
Faeroe Islands	FO	FRO	FRO	Danish krone	DKK

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**Annex D (Continued)**

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
Fiji	FJ	FJI	FJI	Fiji dollar	FJD
Finland	FI	FIN	FIN	euro	EUR
France	FR	FRA	FRA	euro	EUR
French Guiana	GF	GUF		euro	EUR
French Polynesia	PF	PYF	PYF	CFP franc	XPF
French Southern Territories	TF	ATF		euro	EUR
<b>G</b>					
Gabon	GA	GAB	GAB	CFA franc BEAC	XAF
Gambia, The	GM	GMB	GMB	dalasi	GMD
Georgia	GE	GEO	GEO	lari	GEL
Germany	DE	DEU	DEU	euro	EUR
Ghana	GH	GHA	GHA	cedi	GHS
Gibraltar	GI	GIB	GIB	Gibraltar pound	GIP
Greece	GR	GRC	GRC	euro	EUR
Greenland	GL	GRL	GRL	Danish krone	DKK
Grenada	GD	GRD	GRD	East Caribbean dollar	XCD
Guadeloupe	GP	GLP		euro	EUR
Guam	GU	GUM	GUM	U.S. dollar	USD
Guatemala	GT	GTM	GTM	quetzal	GTQ
Guernsey	GG	GGY		pound sterling	GBP
Guinea	GN	GIN	GIN	Guinea franc	GNF
Guinea-Bissau	GW	GNB	GNB	CFA franc BCEAO	XOF
Guyana	GY	GUY	GUY	Guyana dollar	GYD
<b>H</b>					
Haiti	HT	HTI	HTI	gourde	HTG
Heard Island and McDonald Islands	HM	HMD		Australian dollar	AUD
Honduras	HN	HND	HND	lempira	HNL
Hong Kong SAR, China	HK	HKG	HKG	Hong Kong dollar	HKD
Hungary	HU	HUN	HUN	forint	HUF
<b>I</b>					
Iceland	IS	ISL	ISL	Iceland krona	ISK
India	IN	IND	IND	Indian rupee	INR
Indonesia	ID	IDN	IDN	rupiah	IDR
Iran, Islamic Rep.	IR	IRN	IRN	Iranian rial	IRR
Iraq	IQ	IRQ	IRQ	Iraqi dinar	IQD
Ireland	IE	IRL	IRL	euro	EUR
Isle of Man	IM	IMN	IMY	pound sterling	GBP
Israel	IL	ISR	ISR	new Israeli sheqel	ILS
Italy	IT	ITA	ITA	euro	EUR
<b>J</b>					
Jamaica	JM	JAM	JAM	Jamaican dollar	JMD
Japan	JP	JPN	JPN	yen	JPY



**Annex D (Continued)**

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
Jersey	JE	JEY		pound sterling	GBP
Jordan	JO	JOR	JOR	Jordanian dinar	JOD
<b>K</b>					
Kazakhstan	KZ	KAZ	KAZ	tenge	KZT
Kenya	KE	KEN	KEN	Kenyan shilling	KES
Kiribati	KI	KIR	KIR	Australian dollar	AUD
Korea, Dem. People's Rep.	KP	PRK	PRK	North Korean won	KPW
Korea, Rep.	KR	KOR	KOR	won	KRW
Kuwait	KW	KWT	KWT	Kuwaiti dinar	KWD
Kyrgyz Republic	KG	KGZ	KGZ	som	KGS
<b>L</b>					
Lao PDR	LA	LAO	LAO	kip	LAK
Latvia	LV	LVA	LVA	Latvian lats	LVL
Lebanon	LB	LBN	LBN	Lebanese pound	LBP
Lesotho	LS	LSO	LSO	loti	LSL
Liberia	LR	LBR	LBR	Liberian dollar	LRD
Libya	LY	LBY	LBY	Libyan dinar	LYD
Liechtenstein	LI	LIE	LIE	Swiss franc	CHF
Lithuania	LT	LTU	LTU	Lithuanian litas	LTL
Luxembourg	LU	LUX	LUX	euro	EUR
<b>M</b>					
Macao SAR, China	MO	MAC	MAC	pataca	MOP
Macedonia, FYR	MK	MKD	MKD	denar	MKD
Madagascar	MG	MDG	MDG	Malagasy ariary	MGA
Malawi	MW	MWI	MWI	kwacha	MWK
Malaysia	MY	MYS	MYS	Malaysian ringgit	MYR
Maldives	MV	MDV	MDV	rufiyaa	MVR
Mali	ML	MLI	MLI	CFA franc BCEAO	XOF
Malta	MT	MLT	MLT	euro	EUR
Marshall Islands	MH	MHL	MHL	U.S. dollar	USD
Martinique	MQ	MTQ		euro	EUR
Mauritania	MR	MRT	MRT	ouguiya	MRO
Mauritius	MU	MUS	MUS	Mauritius rupee	MUR
Mayotte	YT	MYT	MYT	euro	EUR
Mexico	MX	MEX	MEX	Mexican peso	MXN
Micronesia, Fed. Sts.	FM	FSM	FSM	U.S. dollar	USD
Moldova	MD	MDA	MDA	Moldovan leu	MDL
Monaco	MC	MCO	MCO	euro	EUR
Mongolia	MN	MNG	MNG	tugrik	MNT
Montenegro	ME	MNE	MNE	euro	EUR

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**Annex D** (Continued)

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
Montserrat	MS	MSR		East Caribbean dollar	XCD
Morocco	MA	MAR	MAR	Moroccan dirham	MAD
Mozambique	MZ	MOZ	MOZ	metical	MZN
Myanmar	MM	MMR	MMR	kyat	MMK
<b>N</b>					
Namibia	NA	NAM	NAM	Namibia dollar	NAD
Nauru	NR	NRU		Australian dollar	AUD
Nepal	NP	NPL	NPL	Nepalese rupee	NPR
Netherlands	NL	NLD	NLD	euro	EUR
New Caledonia	NC	NCL	NCL	CFP franc	XPF
New Zealand	NZ	NZL	NZL	New Zealand dollar	NZD
Nicaragua	NI	NIC	NIC	Cordoba oro	NIO
Niger	NE	NER	NER	CFA franc BCEAO	XOF
Nigeria	NG	NGA	NGA	naira	NGN
Niue	NU	NIU		New Zealand dollar	NZD
Norfolk Island	NF	NFK		Australian dollar	AUD
Northern Mariana Islands	MP	MNP	MNP	U.S. dollar	USD
Norway	NO	NOR	NOR	Norwegian krone	NOK
<b>O</b>					
Oman	OM	OMN	OMN	rial Omani	OMR
<b>P</b>					
Pakistan	PK	PAK	PAK	Pakistan rupee	PKR
Palau	PW	PLW	PLW	U.S. dollar	USD
West Bank and Gaza	PS	PSE	WBG		
Panama	PA	PAN	PAN	balboa	PAB
Papua New Guinea	PG	PNG	PNG	kina	PGK
Paraguay	PY	PRY	PRY	guaraní	PYG
Peru	PE	PER	PER	nuevo sol	PEN
Philippines	PH	PHL	PHL	Philippine peso	PHP
Pitcairn	PN	PCN		New Zealand dollar	NZD
Poland	PL	POL	POL	zloty	PLN
Portugal	PT	PRT	PRT	euro	EUR
Puerto Rico	PR	PRI	PRI	U.S. dollar	USD
<b>Q</b>					
Qatar	QA	QAT	QAT	Qatari rial	QAR
<b>R</b>					
Réunion	RE	REU		euro	EUR
Romania	RO	ROU	ROM	leu	RON
Russian Federation	RU	RUS	RUS	Russian ruble	RUB
Rwanda	RW	RWA	RWA	Rwanda franc	RWF

**Annex D (Continued)**

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
<b>S</b>					
Samoa	WS	WSM	WSM	tala	WST
San Marino	SM	SMR	SMR	euro	EUR
São Tomé and Príncipe	ST	STP	STP	dobra	STD
Saudi Arabia	SA	SAU	SAU	Saudi riyal	SAR
Senegal	SN	SEN	SEN	CFA franc BCEAO	XOF
Serbia	RS	SRB	SRB	Serbian dinar	RSD
Seychelles	SC	SYC	SYC	Seychelles rupee	SCR
Sierra Leone	SL	SLE	SLE	leone	SLL
Singapore	SG	SGP	SGP	Singapore dollar	SGD
Sint Maarten (Dutch Part)	SX	SXM	SXM	Netherlands Antillean guilder	ANG
Slovak Republic	SK	SVK	SVK	euro	EUR
Slovenia	SI	SVN	SVN	euro	EUR
Solomon Islands	SB	SLB	SLB	Solomon Islands dollar	SBD
Somalia	SO	SOM	SOM	Somali shilling	SOS
South Africa	ZA	ZAF	ZAF	rand	ZAR
South Georgia and the South Sandwich Islands	GS	SGS			
South Sudan	SS	SSD			
Spain	ES	ESP	ESP	euro	EUR
Sri Lanka	LK	LKA	LKA	Sri Lanka rupee	LKR
St. Barthélemy	BL	BLM			
St. Helena, Ascension and Tristan da Cunha	SH	SHN		Saint Helena pound	SHP
St. Kitts and Nevis	KN	KNA	KNA	East Caribbean dollar	XCD
St. Lucia	LC	LCA	LCA	East Caribbean dollar	XCD
St. Martin (French Part)	MF	MAF	MAF	euro	EUR
St. Pierre and Miquelon	PM	SPM		euro	EUR
St. Vincent and the Grenadines	VC	VCT	VCT	East Caribbean dollar	XCD
<b>T</b>					
Taiwan, China	TW	TWN	TWN	New Taiwan dollar	TWD
Tajikistan	TJ	TJK	TJK	somoni	TJS
Tanzania	TZ	TZA	TZA	Tanzanian shilling	TZS
Thailand	TH	THA	THA	baht	THB
Timor-Leste	TL	TLS	TMP	U.S. dollar	USD
Togo	TG	TGO	TGO	CFA franc BCEAO	XOF
Tokelau	TK	TKL		New Zealand dollar	NZD
Tonga	TO	TON	TON	pa'anga	TOP
Trinidad and Tobago	TT	TTO	TTO	Trinidad and Tobago dollar	TTD
Tunisia	TN	TUN	TUN	Tunisian dinar	TND

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## Annex D (Continued)

Economy name	Economy code (ISO 3166-1 alpha-2)	Economy code (ISO 3166-1 alpha-3)	World Bank code	Currency name (ISO 4217)	Currency code (ISO 4217)
Turkey	TR	TUR	TUR	Turkish lira	TRY
Turkmenistan	TM	TKM	TKM	new manat	TMT
Turks and Caicos Islands	TC	TCA	TCA	U.S. dollar	USD
Tuvalu	TV	TUV	TUV	Australian dollar	AUD
<b>U</b>					
Uganda	UG	UGA	UGA	Uganda shilling	UGX
Ukraine	UA	UKR	UKR	hryvnia	UAH
United Arab Emirates	AE	ARE	ARE	UAE dirham	AED
United Kingdom	GB	GBR	GBR	pound sterling	GBP
United States	US	USA	USA	U.S. dollar	USD
United States Minor Outlying Islands	UM	UMI		U.S. dollar	USD
Uruguay	UY	URY	URY	peso Uruguayo	UYU
Uzbekistan	UZ	UZB	UZB	Uzbekistan sum	UZS
<b>V</b>					
Vanuatu	VU	VUT	VUT	vanuatu	VUV
Vatican City State	VA	VAT		euro	EUR
Venezuela, RB	VE	VEN	VEN	Bolivar fuerte	VEF
Vietnam	VN	VNM	VNM	dong	VND
Virgin Islands, British	VG	VGB		U.S. dollar	USD
Virgin Islands (U.S.)	VI	VIR	VIR	U.S. dollar	USD
<b>W</b>					
Wallis and Futuna	WF	WLF		CFP franc	XPF
Western Sahara	EH	ESH		Moroccan dirham	MAD
<b>Y</b>					
Yemen, Rep.	YE	YEM	YEM	Yemeni rial	YER
<b>Z</b>					
Zambia	ZM	ZMB	ZMB	Zambian kwacha	ZMK
Zimbabwe	ZW	ZWE	ZWE	Zimbabwe dollar	ZWL

Source: ICP, <http://icp.worldbank.org/>.

Note: This table does not correspond with the ICP 2011 participation. ISO = International Organization for Standardization. The World Bank follows the ISO three-digit and two-digit codes to represent most of the economies with some exceptions. For three-digit codes, the following economies have different codes: Andorra, Democratic Republic of Congo, Isle of Man, Montenegro, Romania, Timor-Leste, and West Bank and Gaza. Refer to <http://data.worldbank.org/node/18> for details. Green shading indicates not available; blue indicates no match.

## Annex E

### ICP Government Occupations

ICP 2011 occupation	ISCO 08 code	ISCO 88 code	ICP 2005 occupation
Hospital manager	1120	1210	Hospital chief executive
Hospital doctor	2211	2221/1229	Doctor, head of department
		2221/1229	Doctor (20 years of seniority)
		2221/1229	Doctor (10 years of seniority)
Specialist medical practitioner	2212	2212	
Hospital nurse	2221	2230/3231/3232	Nurse, head of department
		2230/3231/3232	Nurse, operating theater
		2230/3231/3232	Nurse
Laboratory assistant	3212	3211	Laboratory assistant
Auxiliary nurse	3221	2230	Nursing auxiliary
Medical records clerk	3252	4143	
Medical secretary (hospital)	3344	4115/4111 /4112	Secretary (hospital)
Building caretaker	5153	9141	Building caretaker
Office cleaners	9112	9132	Cleaner
Secondary school principal	1345	1229	Head teacher
University teacher	2310	2310	University lecturer
Vocational education teacher	2320	2310/2320	
Secondary school teacher	2330	2320	Secondary teacher
Primary school teacher	2341	2331/3310	Primary teacher
Secretaries (not medical)	4120	4115/4111/4112	Secretary (not hospital)
Building caretaker	5153	9141	Building caretaker
Teacher's aides	5312	5131	
Office cleaners	9112	9132	Cleaner
Senior government officials (not education or health)	1112	1120	
Data processing manager	1330	1226	
Government statistician	2120	2121/2122	
Government accountants	2411	2411	
Human resources professional	2423	2412	
Database administrator	2521	2131	Database administrator
Judge	2612	2422	
Government economist	2631	2441	
Office supervisors	3341	3431/3439/3442/3443/3449	Executive official (skill level III)
		3431/3439/3442/3443/3449	Executive official (skill level IV)
Customs inspector	3351	3441	
Computer operator	3511	3122	Computer operator
Secretaries (not medical)	4120	4115/4111/4112	Secretary (not hospital)
Accounting and bookkeeping clerks	4311	4121	Bookkeeping clerk
Payroll clerks	4313	4121	
Cooks	5120	5122	Cook (not head cook)
Building caretaker	5153	9141	Building caretaker

*table continues next page*

**Annex E (Continued)**

ICP 2011 occupation	ISCO 08 code	ISCO 88 code	ICP 2005 occupation
Firefighter	5411	5161	Firefighter
Policeman or woman	5412	5162	Policeman/woman
Prison guard	5413	5163	Prison guard
Driver (general-duty)	8322	8322	Chauffeur
Office cleaners	9112	9132	Cleaner
Kitchen helpers	9412	9132	
Messengers	9621	9151	Messenger

Source: ICP, <http://icp.worldbank.org/>.

Note: ISCO = International Standard Classification of Occupations. The table presents only how the ICP 2011 occupations correspond with those from the 2005 round through ISCO 08 and ISCO 88 mapping, and thus the mapping does not show the complete 2005 occupation list.

## Annex F

### ICP Private Education Items

ICP 2011		International Standard Classification of Education (ISCED)	
ICP code	ICP item name	ISCED coding level	ISCED item name
111011.11	Primary education (primary)	0	Preprimary education
111011.12	Secondary education (lower secondary)	1	Primary education (first stage of basic education)
111011.13	Secondary education (upper secondary)	2	Lower secondary education (second stage of basic education)
111011.14	Tertiary education (computer science degree)	3	(Upper) secondary education
111011.15	Tertiary education (degree in humanities or social science)	4	Postsecondary nontertiary education
111011.16	Other education programs (foreign language course or lessons)	5	First stage of tertiary education (not leading directly to an advanced research qualification)
111011.17	Other education programs (private lessons in mathematics—outside school hours)	6	Second stage of tertiary education (leading to an advanced research qualification)

Source: ICP, <http://icp.worldbank.org/>.

Note: Private education products in the ICP 2011 do not necessarily map one to one with the ISCED classification; the latter contains more complex dimensions. For detailed specifications of the ICP private education, refer to the ICP website, <http://www.icp.worldbank.org/>, and for ISCED 1997 visit UNESCO's website, <http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx>.





## ICP Data Types

The data used by the International Comparison Program (ICP) can be classified into three categories. The first category, price/cost data, includes the prices of household goods and services as well as the rents paid by individuals, salaries of government employees and the costs of equipment and construction inputs. These data are used to compute purchasing power parities (PPPs) through the direct input approach in which the prices of goods and services are based on direct observations. The second category is quantity data. These data are essential in computing PPPs for areas in which the number of dwellings, students, or patients, for example, plays a direct role in computing indirect PPP estimates. The third category of ICP data is the national accounts expenditure data for each basic heading. The following sections provide more detail on the categories of ICP data and their applications in computing PPPs by means of the input and output approaches.

### THE INPUT APPROACH TO COMPUTING PPPs

The input approach is the most commonly used approach to computing PPPs for ICP purposes. It involves using the collected prices of goods and services to compute PPPs for basic headings under household consumption. Rental data

are used to compute housing PPPs, and the compensation or salaries of government employees are used to compute government compensation PPPs. Similarly, the observed costs of machinery and equipment goods, as well as the costs of construction inputs, are used to produce the corresponding PPP estimates.

### THE OUTPUT APPROACH TO COMPUTING PPPs

The output approach to computing PPPs uses output data based on quantity and quality indicators. Housing PPPs can be computed through the quantity approach by directly estimating the relative volumes of dwelling services. PPPs are derived indirectly by comparing the volumes with the expenditure figures. The quantity approach uses both quantitative and qualitative data to construct a volume index. The quantitative data are the usable surface of dwellings, number of rooms, and number of dwellings. One or the other of these quantities is taken as the quantity index. The qualitative data are the percentages of dwellings with facilities such as electricity, inside water supply, inside toilets, air-conditioning, or central heating. The percentages of dwellings with these facilities are averaged to produce a quality index.

## NATIONAL ACCOUNTS DATA

Economies participating in ICP 2011 were required to provide a very detailed breakdown of the final expenditure categories of their gross domestic product (GDP). The 155 expenditure basic headings involved are defined in the ICP expenditure classification in chapter 2. A detailed breakdown of the national accounts aggregates is needed to provide the values that are converted into real expenditures at the basic heading level. These values also provide the weights that are used in calculating the PPPs at more aggregated levels, up to the level of GDP itself. As is generally the case with price indexes, the prices of goods and services that account for large shares of the final expenditure are given a larger weight in calculating the PPPs for broader aggregates than are the prices of goods and services that have relatively small shares.

In ICP 2011, the expenditure data for the 155 basic headings were compiled by the economies using the Model Report on Expenditure Statistics, or MORES (see chapter 1 on national accounts). Special approaches were used to

help compile expenditure data for government and housing.

### **Government: Special Questionnaires**

Specially designed questionnaires asked for information on government current and capital expenditures. They covered general government, with a breakdown between the central/federal government, on the one hand, and the local/state/municipal government, on the other. All government functions were covered. Information on health, education, and collective services was reported separately through distinctly designed questionnaires (see chapter 10 on government). The information provided in these questionnaires was based on final government accounts.

### **Housing: User Cost Method**

The user cost method consists of estimating the costs that owners of dwellings would have to take into account in fixing a market rent if they decided to rent their dwellings to other people. A detailed explanation of the user cost method appears in chapter 16 on housing.

# Household Consumption: Approach and Data Requirements

This chapter describes the price survey of the International Comparison Program (ICP) for household consumption products (the survey forms appear in annex A). It was designed to serve as a practical guideline for economies carrying out the main price survey in accordance with the established methods and procedures for the 2011 round of the ICP. This chapter covers the development and use of the ICP's global core list, the suggested process for developing the ICP 2011 regional lists, the overall survey framework, the outlet definitions and price types, the definitions of availability and importance, and the distinction between homogeneous and heterogeneous basic headings (BHs).

## DEVELOPMENT OF THE ICP 2011 GLOBAL CORE LIST

A significant improvement over ICP 2005 was the development of a set of global core products that became embedded in the list of products specific to each region. During the 2011 round of the ICP, a global core list of 618 products was priced for the household consumption survey. It was developed through a participatory and iterative process, which makes it a truly global list in the sense that it reflects comments and proposals provided by the regional and national coordinating agencies from all

ICP regions as well as Eurostat, the statistical arm of the European Commission, and the Organisation for Economic Co-operation and Development (OECD).

The ICP 2011 global core list grew out of the ICP 2005 Ring list that was used to link the regions and the Eurostat-OECD purchasing power parities (PPPs) to the global results. In the interim period prior to ICP 2011, the ICP Global Office prepared a subset that approximately reproduced the 2005 results using a reduced list of 350 items distributed across all household consumption basic headings. Matrixes of products and economies such as the average prices of products, quotes to be collected, and diagnostics of the country product dummy (CPD) residuals fed into the decision of which products to include in the global core list.<sup>1</sup> Tables also included coefficients of variation of CPD residuals by economy and by product, indicating the coherency of prices across economies and products. A combinatorial approach was then used to single out products. A very important consideration in the selection process was providing sufficient overlap for computing CPD-based PPPs. This model-based list was amended by a review group that added 30 essential items automatically discarded in the reduction process. The amended list was discussed with the regional coordinating agencies in three workshops, ending with 601 items in October 2010. In the summer of 2011, 17 items

related to fast-evolving technology and passenger transport by air were added to complete the process, bringing the total to 618 products.

The preparation of the structured product descriptions (SPDs) of the 2011 global core list of items (see next section) was completed about three months before household consumption surveys were begun in the ICP regions in January 2011. The main list of items was designed to cover prices for representative goods and services purchased by households in the ICP regions for their personal consumption during the year of the survey operation, which was 2011 for most regions and 2012 for the Caribbean and Pacific Islands.

## PROCESS FOR DEVELOPING THE ICP 2011 REGIONAL LISTS

The process for developing the ICP 2011 regional lists consisted of a number of steps, including revising the ICP 2005 regional list and making amendments and revisions to products or removing obsolete products entirely and adding newly relevant ones. To improve the process for selecting comparable products across economies for ICP 2005, the Global Office designed a system—structured product descriptions—for specifying the goods and services to be priced. The detailed process for developing the ICP 2011 regional lists appears in box 4.1.

### BOX 4.1

#### Process for Developing the ICP 2011 Regional Lists

*Step 1. Start with the ICP 2005 regional list and the ICP 2011 global core list.*

It was recommended that regions refer to their ICP 2005 regional list and the ICP 2011 global core list when developing their ICP 2011 regional list. To complete the first step, both lists had to be available in a structured product description format.

*Step 2. Create a first draft of the 2011 regional list:*

- Identify the 2005 products to be deleted. Such products may be described as obsolete, problematic, or imprecisely specified.
- Identify the 2005 products to be updated or amended. The relevant product specifications must be added.
- Include any new products needed as well as the products' full specifications.

*Step 3. Compare the first draft of the regional list with the ICP 2011 global core list:*

- Identify perfect matches (in terms of characteristics) of products found in both lists. These products are added to the draft regional list without repetition.
- Identify comparable products and retain their relevant product characteristics from

the global core list. Supplement them with regional specificities.

- Identify exclusive products in the amended regional list.
- Identify exclusive products in the global core list.

*Step 4. Consolidate the ICP 2011 regional list.*

- Combine products under step 3 without repetition.
- For each basic heading, align characteristics of all products to the global core list SPDs. Regions may add characteristics to the basic heading SPDs.

*Step 5. Prepare the matrix of availability and importance (more information on the concept of availability and importance appears later in this chapter):*

- Ensure that all economies indicate each product's availability.
- Consolidate all economy input into a single matrix.

*Step 6. Flag the global core list products, the regional core products, as well as the subregional specific products in the 2011 regional list.*

*Step 7. Submit the final matrix of availability and importance to the Global Office.*

Successful implementation of the process described in box 4.1 may have required holding regional workshops to assist regions in conducting each of the steps correctly. In addition, continual communication between the regional coordinating agencies and the Global Office was expected throughout the process of developing the regional product lists.

## OVERALL SURVEY FRAMEWORK

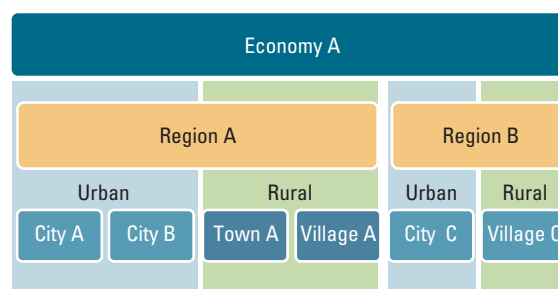
Three sampling aspects of the main price survey require special consideration during implementation of the price survey on household consumption products.<sup>2</sup> The first aspect incorporates the spatial components of the survey design, properly stratifying an economy to ensure that all geographical locations are represented. For the second, economies need to select the individual outlets within those geographical locations where data collection will occur. The third aspect is selection of the individual products to price.

### Spatial Framework: Geographical Stratification

The primary objective of the ICP is to measure price levels across economies. To meet this objective, it is imperative that the national average prices covering expenditures in all economic territories of an economy are obtained for the calculation of purchasing power parities. Thus all economic areas of an economy must be represented in the exercise because urban and rural territories often exhibit distinct pricing patterns, resulting in price levels that diverge considerably. Even though these trends may reflect similar changes in prices over time, different price levels can still be observed. The spatial aspects of the survey framework ensure that the ICP accurately captures national average prices, therefore ultimately accomplishing its primary objective of measuring price levels.

ICP 2011 covered nearly 200 economies that, across regions, exhibit very different and unique economic and pricing structures. A crucial component of the spatial framework is to properly stratify an economy into regions,

**Table 4.1** Stratification of an Economy, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

provinces, and states in order to obtain the needed price information. Table 4.1 illustrates how economy A can be split into two regions (A and B), and then further divided into urban and rural areas. The last row shows how the individual cities and towns in which the data are collected are identified within the selected urban and rural areas. This process provides a practical method for considering all the relevant cities and towns across the various economic territories of an economy and therefore ensures that the collected prices are indeed the national average prices required for the ICP.

### Selection of Individual Outlets

The second aspect of the survey framework entails identifying the relevant outlet categories. Nine different types of outlets have been identified for ICP purposes, including large shops (supermarkets, hypermarkets, department stores) and medium-size and small shops (mini-markets, kiosks, neighborhood shops, grocery stores, convenience stores), or other. Once the categories are identified, economies can proceed to select the appropriate type and number of outlets in each of the defined categories (see World Bank 2013, chap. 7).

The process of selecting outlets should take into account the diverse types of outlets and their relative shares of overall expenditure. Some important considerations for the selection of outlets include:

- Volume of their sales
- Variability of their prices (within and between outlet types)

**Table 4.2** Stratification of Outlets, ICP 2011

City/town/village														
Shopping district A									Shopping district B					
Outlet type A			Outlet type B			Outlet type C			Outlet type A			Outlet type B		
Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet

Source: ICP, <http://icp.worldbank.org/>.

- Their location (taking into account rural and urban areas)
- Number of outlets per outlet type.

Table 4.2 is a visual depiction of how the various shopping districts within a particular city could be determined and how the different outlet types could be selected. The last row of the table represents the individual outlets in which data will be collected.

The advantage of selecting outlets by type, location, and volume of sales is that the approach provides a self-weighting sample, thereby making the process of estimating national average prices much more straightforward.

The selection of individual outlets is especially important because different products have different distribution profiles. Prices for the same product can vary between outlet types because of the various circumstances such as the services provided. For these reasons, the selection of outlets should take into account the different types of outlets and their relative share of the overall expenditures. Table 4.3 on outlet types and definitions provides guidelines to the selection process. This process usually requires expert judgment because of the lack of a sample frame with expenditures by outlet or outlet type (World Bank 2013, chap. 7).

During the price collection process, economies had to ensure differentiation among the different price types. In ICP 2011, there were three main types of prices: (1) R, the regular price; (2) S, the sale price; and (3) B, the bargained price. A distinction among these prices had to be made and clearly noted during price collection. If a particular product was available at a sale or bargained price, the price type was to be clearly indicated in the survey forms in addition to the monetary price.

### Selection of Products to Be Priced

The third aspect of the overall survey framework is selection of the products to be priced. In ICP 2011, economies were required to select at least one product from the global core list and at least three products from the regional list for each basic heading. Basic headings were the most detailed level of expenditures for which economies were asked to supply expenditure shares. Economies were therefore not expected to classify goods and services according to their known expenditure shares. Instead, economies were asked to indicate whether, if expenditure shares were available at the product level, the shares for each product were large or small within the basic heading. This information is useful in determining whether a product is important or less important. For example, if expenditure shares are known and are expected to be large for a particular product, this product can be classified as important. Similarly, if expenditure shares are small, the product can be classified as less important. The importance of basic headings is measured by their expenditure shares of consumption. The basic heading PPPs with larger expenditure shares receive additional attention because they receive more weight in the aggregation process.

It is critically important to remember that the reliability of PPPs at the basic heading level, as well as at higher levels of aggregation, depends on the accuracy and comparability of collected prices. Certain guidelines have to be strictly followed during the selection process because several factors can directly affect the quality of the final PPPs. First, the levels of detail associated with specifying price-determining characteristics can play a key role in ensuring that comparable products are priced—for example, differentiating among long grain rice, parboiled

**Table 4.3** Outlet Types and Definitions, ICP 2011

Code and type	Examples	Definition
1. Large shops	Hypermarkets, supermarkets, department stores	<i>Hypermarket:</i> An especially large superstore that is a combination of a supermarket and a department store. It is essentially a very large retail facility that carries a vast range of products under the same roof, including groceries, clothing, hardware, and electrical products. Hypermarkets enable customers to satisfy all their regular everyday shopping needs all at once.
		<i>Supermarket:</i> Essentially a self-service grocery store that offers a vast variety of food and household products. It is generally larger than a traditional grocery store and smaller than a hypermarket. Products normally found at a supermarket are meat, dairy, fresh produce, and baked goods. Supermarkets organized in departments also carry canned and packaged goods as well as nonfood products. In addition, one can find cleaning supplies, alcohol (if legal), and pharmaceutical products. Some supermarkets carry a larger variety of nonfood products than others.
		<i>Department store:</i> A retail outlet type that offers a wide range of consumer personal and residential durable goods. It carries a variety of merchandise lines at variable price points covering all product categories. Department stores offer apparel, home appliances and furniture, electronics, cosmetics, toys, jewelry, and sporting goods. They tend to be part of a regional, national, or international retail chain with a large number of stores.
2. Medium-size and small shops	Mini-markets, kiosks, neighborhood shops, grocery stores, convenience stores	<i>Mini-market:</i> A market with few shops in it. Although smaller than a normal-size market, it offers a convenient method for shopping because it provides a certain degree of variety all at one place.
		<i>Kiosk:</i> A booth located on the street in which vendors sell small and inexpensive consumer products such as newspapers, cigarettes, gum, and candy through a window opening on one side of the kiosk.
		<i>Neighborhood shop:</i> A retail shop that blends in with the surrounding neighborhood and focuses on local tastes and needs.
		<i>Grocery store:</i> A store that sells mainly food. The owner of the shop is in charge of stocking the outlet with various kinds of food from a number of places.
		<i>Convenience store:</i> A centrally located small store that offers a limited variety of goods. Convenience stores are usually open longer hours and can charge higher than average prices than the high-volume retail outlets such as supermarkets.
3. Markets	Open markets, covered markets, wet markets	<i>Open market:</i> A market in which transactions occur with no restrictions on price.
		<i>Covered market:</i> A market covered by a structure such as a tent.
		<i>Wet market:</i> An open food market. The floors and settings are regularly sprayed and washed with water—to the point of flooding it at recurrent intervals—which leads to the term <i>wet market</i> .
4. Street outlets	Mobile shops, street vendors	<i>Mobile shop:</i> A registered vehicle from which individuals display and sell merchandise or food. Mobile shops were previously known as "hawkers." This category does not include the consumption of food in or at the vehicle.
		<i>Street vendor:</i> A person who sells his or her wares in the open air rather than in a formal retail setting. Vendors either have stands or use carts that can be taken away at the end of the day. Occasionally referred to as a peddler, the street vendor is normally found in metropolitan areas, at outdoor events, and sometimes at public beaches. A street vendor or hawker is a vendor of goods that can be transported with no trouble.
		<i>Street vendor:</i> A person who offers goods or services for sale at mobile stalls or temporary static structures. Street vendors may be stationary by occupying space on the sidewalks or other public or private areas, or they may be mobile, moving from place to place carrying their wares on pushcarts or on bicycles or baskets on their heads. Or they may sell their goods on a moving bus.

table continues next page

**Table 4.3** Outlet Types and Definitions, ICP 2011 (*Continued*)

Code and type	Examples	Definition
5. Bulk and discount shops	Wholesale stores, discount shops	<i>Wholesale store:</i> A dealer-managed store in which goods are sold directly to the consumer, avoiding retailers. Prices are generally lower than those found at normal retailers. <i>Discount shop:</i> A store in which goods—especially consumer goods—are offered at discounted prices from suggested manufacturers' prices.
6. Specialized shops	Supply shops, hardware shops, furniture shops	<i>Supply shop:</i> A store in which tools and materials are sold such as the materials needed for building construction. <i>Hardware shop:</i> A so-called do-it-yourself (DIY) store that offers a variety of household hardware, including fasteners, hand tools, power tools, keys, locks, hinges, chains, plumbing supplies, electrical supplies, cleaning products, utensils, paint, and lawn and garden products. These products are sold directly to consumers for home or business use. Depending on the region, hardware shops may offer specialties tailored to local interests.
7. Private service providers	n.a.	Taxicabs, hotels, restaurants, private schools, private hospitals, etc.
8. Public or semi-public service providers	n.a.	Water suppliers, electric power companies, public schools, public hospitals, etc.
9. Other kinds of trade	Online (Internet) shopping sites, catalog orders	<i>Online (Internet) shopping site:</i> Essentially an online store—also called an e-shop, e-store, Internet shop, web shop, web store, online store, or virtual store—that allows consumers to obtain the same products they normally purchase at a physical retailer such as a shopping center. <i>(Mail) catalog orders:</i> The process of buying products or services by mail delivery. Consumers can place an order with the merchant for the desired product over the telephone. Products are delivered directly to the buyer at the address provided at the time of purchase. Goods can also be shipped for pick-up to a nearby, prespecified location. Some merchants also allow goods to be shipped directly to a third-party customer, which is an efficient and quite popular way to send a gift to a recipient living in a different location.

Source: ICP, <http://icp.worldbank.org/>.

Note: n.a. = not applicable.

rice, and packaged rice. Second, the number of products to be priced in each basic heading depends importantly on the heterogeneity of the basic heading, the degree of overlap of products across economies, and the overlap of products each economy identifies as important to its economy. And, third, the sample design for the price survey itself, which provides the number and types of outlets to be included, should be carefully thought out.

When selecting the specific products to price within each basic heading, economies were asked to take into account the notion of importance. For the ICP 2011 round, economies were asked to classify all goods and services in the household final consumption expenditure that were available as either "important" or "less important" in

order to accurately identify the expenditure shares of products in the basic heading.

The importance of products is taken into account not only during the compilation of the regional product lists, but also during the price validation process because products identified as important by an economy will be given more weight in calculating their PPPs. Therefore, economies had to ensure that important products for each basic heading were properly included in both the core and regional lists. The concept of importance does not encourage economies to ignore products classified as less important. After all, those products will provide links with other economies where the product in question, despite being less important, is available. If a good or service is not available in a particular



economy, the notion of important or less important is not applicable to that good or service.

An important product is one that has a large expenditure share within the basic heading to which it belongs. Such a product may have a very small expenditure share within the household consumption sector as a whole, but may still be important within its basic heading. For example, in many economies, few people buy wine, but that does not mean that all the products specified within the wine basic heading are less important. In that heading, one or two types of wine may be best-sellers, and the wine merchant can almost certainly identify them. These particular wines are important within the basic heading even though their expenditure share of total household consumption may be negligible.

For ICP 2011, economies in regions other than the Eurostat-OECD and Commonwealth of Independent States (CIS) regions classified all goods and services in the household final consumption expenditure (HFCE) that were "available" as either "important" or "less important."<sup>2</sup> If a good or a service was "not available" in the economy, the notion of important/less important was not applicable to that good or service. Importance is defined by reference to the expenditure share of the product within a basic heading. However, defining importance by reference to expenditure shares raises an obvious problem in that economies are never asked to provide expenditure weights below the basic heading level. The basic headings are in fact defined as the most detailed level of expenditure for which economies can reasonably be asked to supply expenditure shares. Therefore, economies cannot be expected to classify goods and services according to their known expenditure shares. Economies were required to provide information on whether the expenditure shares for each product would be large or small within the basic heading because expenditure shares are available at the product level.

Economies were also asked to provide prices for all products they identified as "important." They were required as well to price products they classified as "less important" in order to provide links with other economies. As a rule, each economy had to provide prices for at least one product per basic heading and declare at least

one product to be important under each basic heading. It is essential to consider the importance of products for a certain basic heading in relation to the product list by asking which of the products *included* in the list are the most typical.

The following three approaches can help determine whether a product is important or less important:

1. *Consider the consumer price index (CPI).* Economies can start by asking whether the product is in their national CPI. If an item is the same as or very similar to one in the consumer or retail price index, the economy should always classify it as important. Nevertheless, products in the ICP lists but not in the CPI may still be important.
2. *Use expert judgment or common knowledge.* Economies can use expert judgment or common knowledge in determining importance. Statisticians can call on their own knowledge of what are widely available and commonly purchased products within the basic heading context. For example, the basic heading for cheese typically includes a number of products for different types of cheese. It may be known that cheddar cheese is sold in almost all food shops, but that Brie is available only in specialty shops. Cheddar, then, is important, and Brie is less important. However, in another economy the situation might be the opposite. Both products should thus be priced in order to provide a sufficient number of links with other economies.
3. *Ask an expert.* Another approach to establishing importance involves asking experts, most of whom tend to be shopkeepers. The success of their businesses depends on knowing which products are best-sellers and which are bought less often. For example, the basic heading rice normally contains products for different types of rice, but also products referring to different quantities such as a package of 1 kilogram or 15 kilograms of white rice. In economies in which rice is not typically consumed in large quantities, for example, the shopkeeper may say that the smaller package is sold more often than the larger package. The situation might be the opposite in economies where rice is consumed in large quantities.

When selecting individual products to price, economies must recognize that some basic headings are considerably more heterogeneous than others—in other words, some basic headings contain products that serve a variety of purposes. For example, the garment basic heading includes clothing for men, women, and children. Because of the unique nature of such basic headings, they must be split into homogeneous subgroups (men, women, and children) before assigning importance to each of the individual products.

Because several basic headings are rather heterogeneous, containing a range of products that serve different purposes, splitting them into homogeneous subgroups before deciding on importance is a critical part of the process. For example, the basic heading for newspapers contains books and stationery, which are rather heterogeneous because they serve different purposes. They should therefore be split into newspapers, books, and stationery before assigning importance to particular products. Garments is another heterogeneous basic heading because it includes clothing for men, women, and children. It should be split into these three components before assigning importance.

Many of the heterogeneous basic headings are combinations of the more homogeneous basic headings in the Eurostat-OECD classification on which the ICP Expenditure Classification is based. The ICP Classification shows which of these more homogeneous basic headings have been combined. It is recommended that economies use the table in annex B as a starting point for splitting up heterogeneous basic headings before allocating products to the "important" and "less important" categories. In addition, the actual household consumption product list, culture, and other factors should be taken into account.

## SOURCES OF VARIABILITY IN ESTIMATING PPPs

So far, this chapter has covered the process of developing the ICP 2011 regional lists by providing a general idea of the overall survey framework outline as well as aspects related to both the spatial aspect of the survey and the

issues to be considered when selecting individual products to price. This section presents some of the natural sources of variability in the estimation of PPPs, along with solutions on how to address them.

Table 4.4 is based on data from the 2005 Ring survey for the rice basic heading for six economies. The Ring survey was based on a global set of products priced by a subset of economies in each region; the purpose was to compute interregional PPPs. The basic heading PPPs for each economy were used to convert the national price for each product into the currency of the base economy, effectively becoming a PPP price. The geometric mean of the PPP prices for each product became its international price. In the table, in economy B the deviation of the PPP price for brown rice from the international price for brown rice is 0.80. The variation in the PPP product prices in economy B ranges from 1.32 to 0.80. The table indicates that medium grain rice in economy B is relatively expensive compared with brown rice. The relative standard deviation of the residuals in economy B is 0.17. In economies E and F, the variabilities shown by the standard deviations are both around 0.30. The standard deviations, as well as the number of products within the basic heading and the number each economy priced, provide guidelines for the survey framework. The economies were not able to price every product; the number of products priced is a determining factor in the estimates of the sampling error (World Bank 2013, chap. 7).

Two of the six economies priced only two products, and another two priced only three products. This finding implies that either more products should have been included, or that the product descriptions should be reviewed to make them more comparable across economies.

Medium grain rice was priced only by three economies, but shows extreme variability—the ratios of the PPP prices to the international prices range from 0.22 to 1.45 and contribute considerably to the relative sampling errors in the economies pricing this kind of rice. This finding suggests that the product description be reviewed with each economy to determine whether all economies are pricing the same product. Economies A and C, especially, should be queried to determine whether they

**Table 4.4** Variability of PPP Prices by Product and Relative Sampling Error, ICP 2005

	Country product dummy (CPD) residuals					
	Economy A	Economy B	Economy C	Economy D	Economy E	Economy F
<i>Rice (basic heading)</i>						
Long grain, prepacked	0.95			1.31	0.66	0.69
Long grain, loose		0.88		1.00		
Basmati		1.02		1.34	1.16	
Medium grain		1.32		0.22		1.45
Short grain	1.05	1.05	1.27	0.39		
Brown		0.80	0.55	1.22	1.31	1.00
Basic heading PPP	1.795	853.1	1,047.0	4.801	19.98	319.6
Standard deviation of residuals	0.05	0.172	0.236	0.285	0.298	0.303
Relative sampling error	0.035	0.077	0.169	0.117	0.172	0.175
90 percent confidence interval	±0.058	±0.128	±0.282	±0.195	±0.288	±0.292

Source: World Bank 2013, chap. 7.

Note: PPP = purchasing power parity. CPD residuals: the ratio of each product price converted to the currency of the base economy (PPP price) to the geometric mean of the PPP prices across economies for each product. The geometric mean is the international price of each product. *Standard deviation of residuals*: expressed as a ratio, an estimate of the variability of the relative product prices in each economy. *Relative sampling error*: standard deviation divided by the square root of the number of products priced.

**Table 4.5** Sample Sizes by Target Precision and Relative Standard Deviation, with 10 Percent Significance Level, ICP 2005

	Estimated relative standard deviation: s/m				
	0.05	0.1	0.2	0.3	0.4
Target precision (%)	Number of products or number of price observations				
	3	10	45	100	176
0	1	3	10	25	100
5		1	5	10	20

Source: World Bank 2013.

priced only products important to their own economies rather than all available and comparable products.

Even though the sample of products is not from a random selection, the principles of sampling theory can be used in deciding on the number of products to price. Table 4.5 shows the suggested sample sizes by the desired precision given the standard deviations of the relative prices in the basic headings. The goal is to price enough products so that the sampling error of the basic heading PPP based on the product PPPs falls within the predefined limits of precision. The standard deviation of the residuals for each

economy can be used as a measure of the variability stemming from the differences in product PPPs. If one assumes random sampling, inferences can be made about the precision of the estimated basic heading PPP for each economy using the relative sampling error. The relative sampling error is a function of the variability of the relative product prices and the number of products priced—that is, the standard deviation divided by the square root of the number of products priced. Although in table 4.4 the standard deviation for economy D was only slightly less than that for economy E, economy D priced twice as many products, resulting in a sampling

error for its PPP of 11.7 percent, compared with over 17.0 percent for economy E. The estimated PPP for economy D was thus more precise (World Bank 2013, chap. 7).

The relative sampling error can be used to make probability statements about the accuracy of the estimates of the basic heading PPPs. The last row in table 4.4 shows the confidence interval or the range within which the basic heading PPP should fall 90 percent of the time if the sampling process were repeated. The confidence interval ranges from 0.058 for economy A to 0.292 for economy F. The value for economy F implies that the PPP for the rice basic heading could vary as much as  $\pm 30$  percent with repeated sampling. If economy F had priced all of the products resulting in the same standard deviation, the confidence interval would have fallen to  $\pm 20$  percent. Instead, just three products were priced. Only economy D priced all six products, but because of the variability of the relative prices, it has a PPP with about a 20 percent confidence band (World Bank 2013, chap. 7).

The greater the population variance, the lower is the level of precision in the estimated mean for any given sample size. Conversely, the larger the size of the sample, the greater is the level of precision in the estimated mean achieved for any given variance in the population. The size of the sample needed to achieve a given level of precision, say 5 percent, may increase sharply with the relative standard deviation—for example, when  $s/m$  increases from 0.2–0.3, the minimum sample size needed more than doubles, from 45 to 100.

Table 4.6 is based on sampling theory and shows the relationships between the number of products, the relative standard deviations, and the target levels of precision. These relationships were used to evaluate the number of products priced for the Ring price survey for several basic headings using the data in table 4.6. This evaluation could also be used as a guideline for the number of products to be priced in the ICP 2011 round.

The fresh or chilled fruit basic heading contains 12 products, and economies priced between 6 and 11 of them. Although the standard deviations of the residual ratios are as large as they are for rice, the sampling errors are

markedly fewer because more products were priced. The garment basic heading contains 68 products with large standard deviations. However, the sampling errors are small because of the large numbers priced by each economy. This basic heading is very heterogeneous because it includes clothing for men, women, and children; it also has a relatively large share of the expenditures. Therefore, it is important that the PPPs be as precise as possible. Several reasons account for the sampling variability in the electricity basic heading. For one thing, only five products are included and all economies priced them, except for one economy that priced three. In addition, all products have relative, homogeneous prices. Similar patterns can be observed for products such as milk and eggs, implying that a small number of products should be selected for those basic headings. The pharmaceutical products basic heading contains 43 products, but the economies priced only 8–19 of them. Because of these sample sizes and the variability in the relative prices, the sampling variability could be considered logical. In view of the importance of the basic heading and the difficulty encountered by the economies in pricing all products, the large number of products is warranted, but the specifications should be reviewed (World Bank 2013, chap. 7).

Table 4.7 illustrates the ranges of the basic heading standard deviations across economies for rice and the four other basic headings shown in table 4.6, as well as the suggested number of products to be priced as compared with the number included in the 2005 Ring survey. The target sample sizes are presented in ranges, using the guidelines in table 4.6. The larger figure should be used when the basic heading exhibits above-average expenditure shares.

The relative price levels for rice are more variable than those for other products across economies, ranging from 0.05 to 0.30. This finding suggests that more than 10 products be priced, unless the economy or region is willing to accept a 15 percent level of precision rather than 10 percent. Because electricity is usually furnished by a very small number of providers, there is very little variability in the rates, as evidenced by the relative standard deviations, ranging from 0.03 to 0.17 across economies

**Table 4.6** Basic Heading PPPs, Relative Standard Deviations of Basic Heading PPPs, Number of Products Priced, Relative Standard Deviations of Product PPPs, and Sampling Errors, ICP 2005

	Economy					
	A	B	C	D	E	F
Aggregated basic heading PPPs	2.933	634.5	676.9	4.052	285.6	7.879
Relative standard deviation of basic heading PPPs	0.245	0.234	0.2856	0.2981	0.298	0.303
Basic heading						
Rice (6 products)						
PPP	1.794	853.146	1046.6	4.801	19.975	319.551
Number of products priced	2	5	2	6	3	3
Relative standard deviation	0.050	0.172	0.236	0.285	0.298	0.303
Relative sampling error	0.035	0.077	0.169	0.117	0.172	0.175
Fresh or chilled fruit (12 products)						
PPP	1.770	384.203	327.819	1.900	15.649	276.714
Number of products priced	7	6	11	9	11	9
Relative standard deviation	0.374	0.252	0.194	0.32	0.188	0.202306
Relative sampling error	0.141	0.103	0.058	0.109	0.057	0.067
Garments (68 products)						
PPP	2.863	689.751	925.769	4.898	22.222	393.127
Number of products priced	38	46	47	58	54	41
Relative standard deviation	0.252	0.261	0.243	0.300	0.243	0.239
Relative sampling error	0.041	0.039	0.035	0.039	0.033	0.037
Electricity (5 products)						
PPP	5.674	853.378	828.622	1.2855	14.729	349.603
Number of products priced	5	5	5	5	5	3
Relative standard deviation	0.039	0.039	0.039	0.169	0.094	0.081
Relative sampling error	0.018	0.018	0.017	0.076	0.042	0.081
Pharmaceuticals (43 products)						
PPP	4.398	955.445	1212.91	7.88	18.289	310.953
Number of products priced	12	19	8	12	13	12
Relative standard deviation	0.384	0.268	0.271	0.262	0.277	0.329
Relative sampling error	0.111	0.062	0.096	0.076	0.077	0.095

Source: World Bank 2013, chap. 7.

Note: PPP = purchasing power parity.

**Table 4.7** Examples of Target Numbers of Products to Price, ICP 2005

Product	Standard deviation of relative prices	Target number of products to price	Number in 2005 Ring survey
Rice	0.05–0.30	10–15	6
Fresh or chilled fruit	0.19–0.37	10–15	12
Garments	0.24–0.30	70–100	68
Electricity	0.03–0.17	3–5	5
Pharmaceuticals	0.26–0.38	50+	43

Source: World Bank 2013.

(the 0.17 deviation suggests an additional review of economy D's prices). With these small deviations, an economy may need to price only three to five products to be 90 percent confident that the resulting PPP is within 5 percent of the target. As noted, products such as milk and eggs also exhibit very little price variability (World Bank 2013).

When economies decide on the number of products to price, it is essential that they consider the relative importance of the basic heading itself. If it constitutes an important part of the consumption basket, economies have to target the number of products needed to obtain measures of the relative prices that will result in a 5–10 percent level of precision. However, if the basic heading has a very small weight, then the target level of precision could be increased to 10–15 percent so that resources can be directed toward the more important basic headings. The garment basic heading requires a large number of products as it is both heterogeneous and accounts for a significant part of household consumption expenditures (World Bank 2013, chap. 7).

Because not every economy is capable of pricing every product, the target number of products is increased so that each economy can price the minimum number. As the number of overlapping products across economies decreases, more products will be defined so that each economy can submit prices for a minimum number. The number of products priced should be comparable across economies. Because expenditure weights are not available for individual products, the only weighting is provided by the importance classification and the number of products each economy prices (World Bank 2013, chap. 7).

## TIME FRAME

When decisions on where to collect data and what products to price are finalized, economies establish the appropriate frequency of data collection.

The goal of the ICP is to calculate the annual average national price for each product. Therefore, the prices for most products must be collected several times during a one-year survey reference period. Although the standard approach is to measure prices quarterly, it is often true that decisions on the frequency of surveys are made on a case-by-case basis, depending on the product in question. Nevertheless, for most of the economies the survey period was the year 2011.

Economies consider several factors when designing the survey time frame. First, the frequency with which prices need to be collected depends on the extent to which they vary over time. Apart from strongly seasonal products, quarterly price collections are generally considered frequent enough for ICP purposes when the annual percentage rate of general inflation is low or moderate—for example, a single-digit rate.

Second, it is essential to differentiate between the timing and frequency of price collection because timing refers to the point, or points, in time within the month or quarter in question when the prices are actually collected.

Third, the scheduling of price collection dates, including times of day, must be set in advance, taking into account various elements such as the price variations during the day, week, month, or quarter; the relative volume of sales at these different price levels (estimated); possible quality changes in goods at different times; and fashion and other seasonal factors.

## Annex A

### Household Consumption Price Survey Forms, ICP 2011

#### Single Product Survey Form

ICP 2011 Household Consumption Price Survey  
Single Product Survey Form

<b>Country code</b>		<b>Year and quarter</b>	
<b>Country name</b>		<b>Price collection period</b>	
<b>Survey category</b>		<b>Observation date</b>	
<b>Basic heading code</b>		<b>Price collector name</b>	
<b>Basic heading name</b>		<b>Price collector signature</b>	
<b>Product code</b>		<b>Currency</b>	
<b>Product name</b>		<b>Currency unit</b>	
<b>Outlet code</b>		<b>Outlet type code</b>	
<b>Outlet name</b>		<b>Outlet type</b>	
<b>Outlet location code</b>		<b>Outlet location (Address)</b>	
<b>Observed quantity</b>		<b>Comments</b>	
<b>Observed UoM code</b>			
<b>Observed UoM name</b>			
<b>Observed price</b>			
<b>Price type code</b>			
<b>Price type</b>			

Note: UoM = unit of measurement.

*table continues next page*





## Annex B

### Homogeneous and Heterogeneous Basic Headings, ICP 2011

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
<i>Bread and cereals</i>				
110111.1	Rice (ND)	HO		Rice in all forms except flour
110111.2	Other cereals, flour, and other cereal products (ND)		HE	Maize, wheat, barley, oats, rye, and other cereals in the form of grain Meal or flour Cereal preparations (cornflakes, oat flakes, etc.) Other cereal products Malt, malt flour, malt extract, potato starch, tapioca, sago, and other starches Includes couscous, rice flour
110111.3	Bread (ND)	HO		Fresh bread and special bread
110111.4	Other bakery products (ND)		HE	Bakery products such as crispbread, rusks, toasted bread Bakery products such as biscuits, gingerbread, wafers, waffles, crumpets, muffins, croissants, cakes, tarts Bakery products such as pies, quiches, pizzas Includes mixes and doughs for the preparation of bakery products
110111.5	Pasta products (ND)	HO		Pasta products in all forms
<i>Meat and fish</i>				
110112.1	Beef and veal (ND)	HO		Fresh, chilled, or frozen meat of bovine animals
110112.2	Pork (ND)	HO		Fresh, chilled, or frozen meat of swine
110112.3	Lamb, mutton, and goat (ND)	HO		Fresh, chilled, or frozen meat of sheep and goat
110112.4	Poultry (ND)	HO		Fresh, chilled, or frozen meat of poultry (chicken, duck, goose, turkey, guinea fowl); includes edible poultry offal
110112.5	Other meats and meat preparations (ND)		HE	<b>OECD 110112.5 Other meats and edible offal (ND)</b> 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 <b>OECD 110112.6 Delicatessen and other meat preparations (ND)</b> 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.)
110113.1	Fresh, chilled, or frozen fish and seafood (ND)		HE	Fresh, chilled, or frozen fish Fresh, chilled, or frozen seafood (crustaceans, mollusks, and other shellfish, sea snails); includes land crabs, land snails, and frogs, and fish and seafood purchased live for consumption as food
110113.2	Preserved or processed fish and seafood (ND)		HE	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.)
<i>Milk, cheese, and eggs and oils and fats</i>				
110114.1	Fresh milk (ND)	HO		Raw milk; pasteurized or sterilized milk; includes whole and low fat milk, recombined or reconstituted milk, soya milk

table continues next page

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110114.2	Preserved milk and other milk products (ND)		HE	Condensed, evaporated, or powdered milk Yogurt, cream Milk-based desserts Milk-based beverages and other similar milk-based products Includes milk, cream, and yogurt containing sugar, cocoa, fruit, or flavorings
110114.3	Cheese (ND)	HO		
110114.4	Eggs and egg-based products (ND)	HO		Eggs and egg products made wholly from eggs
110115.1	Butter and margarine (ND)	HO		<b>OECD 110115.1 Butter (ND)</b> Butter and butter products (butter oil, ghee, etc.) <b>OECD 110115.2 Margarine (ND)</b> Margarine; includes "diet" margarine
110115.3	Other edible oil and fats (ND)		HE	Edible oils (olive oil, corn oil, sunflower seed oil, cottonseed oil, soybean oil, groundnut oil, walnut oil, etc.) Edible animal fats (lard, etc.); edible vegetable fats (peanut butter, etc.)
<i>Fruits and vegetables</i>				
110116.1	Fresh or chilled fruit (ND)		HE	Fresh fruit Chilled fruit Includes melons and watermelons
110116.2	Frozen, preserved, or processed fruit and fruit-based products (ND)		HE	Frozen fruit Dried fruit, fruit peel Fruit kernels, nuts, and edible seeds Other preserved fruit, processed fruit, and fruit-based products
110117.1	Fresh or chilled vegetables other than potatoes (ND)		HE	Fresh or chilled vegetables cultivated for their leaves or stalks (asparagus, broccoli, cauliflower, endive, fennel, spinach, etc.) Fresh or chilled vegetables cultivated for their fruit (aubergine, cucumber, courgette, green pepper, pumpkin, tomato, etc.) Fresh or chilled vegetables cultivated for their roots (beetroot, carrot, onion, parsnip, radish, turnip, etc.) Includes olives, garlic, pulses, sweet corn, sea fennel and other edible seaweed, mushrooms and other edible fungi
110117.2	Fresh or chilled potatoes (ND)	HO		Fresh or chilled potatoes; includes other tuber vegetables (manioc, arrowroot, cassava, sweet potatoes, etc.)
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products (ND)		HE	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 flour, meal, flakes, purees, chips, crisps
<i>Sugar, jam, honey, chocolate, and confectionery</i>				
110118.1	Sugar (ND)	HO		Cane or beet sugar, unrefined or refined, powdered, crystallized, or in lumps; includes artificial sugar substitutes

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110118.2	Jams, marmalades, and honey (ND)		HE	Jams, marmalades, compotes, jellies, fruit purees, and pastes Natural and artificial honey Maple syrup Molasses and parts of plants preserved in sugar
110118.3	Confectionery, chocolate, and ice cream (ND)		HE	<b>OECD 110118.3 Confectionery, chocolate, and other cocoa preparations (ND)</b> Chocolate in bars and slabs, chewing gum, sweets, toffees, pastilles, and other confectionery products; cocoa-based foods and cocoa-based dessert preparations <b>OECD 110118.4 Edible ice, ice cream, and sorbet (ND)</b> Edible ice, ice cream, and sorbet
110119.1	Food products n.e.c. (ND)		HE	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. Homogenized baby food and dietary preparations irrespective of the composition
<i>Nonalcoholic beverages</i>				
110121.1	Coffee, tea, and cocoa (ND)		HE	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
110122.1	Mineral waters, soft drinks, fruit and vegetable juices (ND)		HE	<b>OECD 110122.1 Mineral waters (ND)</b> Mineral or spring waters; all drinking water sold in containers <b>OECD 110122.2 Soft drinks and concentrates (ND)</b> Soft drinks such as sodas, lemonades, and colas; syrups and concentrates for the preparation of beverages <b>OECD 110122.3 Fruit and vegetable juices (ND)</b> Fruit and vegetable juices
<i>Alcoholic beverages and tobacco</i>				
110211.1	Spirits (ND)		HE	Eaux-de-vie, liqueurs, and other spirits; includes mead, aperitifs other than wine-based aperitifs
110212.1	Wine (ND)	HO		Wine, cider, and perry, including sake, champagne and other sparkling wines, fortified wines, wine-based aperitifs
110213.1	Beer (ND)	HO		All kinds of beer such as ale, lager, and porter; includes nonalcoholic beer, shandy
110221.1	Tobacco (ND)	HO		Cigarettes, cigarette tobacco, and cigarette papers; cigars, pipe tobacco, chewing tobacco or snuff

table continues next page

Annex B (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
<i>Clothing and footwear</i>				
110311.1	Clothing materials, other articles of clothing, and clothing accessories (SD)		HE	<p><b>OECD 110313.1 Other articles of clothing and clothing accessories (SD)</b></p> <p>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; includes gardening gloves and working gloves, crash helmets for motorcycles and bicycles</p> <p><b>OECD 110311.1 Clothing materials (SD)</b></p> <p>Clothing materials of natural fibers, manmade fibers, and their mixtures</p>
110312.1	Garments (SD) <sup>1</sup>		HE	<p><b>OECD 110312.1 Men's clothing (SD)</b></p> <p>Men's clothing as defined in note<sup>1</sup></p> <p><b>OECD 110312.2 Women's clothing (SD)</b></p> <p>Women's clothing as defined in note<sup>1</sup></p> <p><b>OECD 110312.3 Children's and infant's clothing (SD)</b></p> <p>Children's and infant's clothing as defined above; includes baby clothes and baby booties made of fabric</p>
110314.1	Cleaning, repair, and hire of clothing (S)	HO		Dry-cleaning, laundering, and dyeing of garments; darning, mending, repair, and altering of garments; hire of garments; includes total value of the repair service (i.e., both the cost of labor and the cost of materials are covered)
110321.1	Shoes and other footwear (SD) <sup>1</sup>		HE	<p><b>OECD 110321.1 Men's footwear (SD)</b></p> <p>Men's footwear as defined in note<sup>1</sup></p> <p><b>OECD 110321.2 Women's footwear (SD)</b></p> <p>Women's footwear as defined in note<sup>1</sup></p> <p><b>OECD 110321.3 Children's and infant's footwear (SD)</b></p> <p>Children's and infant's footwear as defined in note<sup>1</sup></p>
110322.1	Repair and hire of footwear (S)	HO		
<i>Housing, water, electricity, gas, and other fuels</i>				
110431.1	Maintenance and repair of the dwelling (ND)		HE	<p><b>OECD 110431.1 Materials for the maintenance and repair of the dwelling (ND)</b></p> <p>Products and materials such as paints and varnishes, renderings, wallpapers, fabric wall coverings, window panes, plaster, cement, putty, and wallpaper pastes purchased for minor maintenance and repair of the dwelling; includes small plumbing products (pipes, taps, joints, etc.), surfacing materials (floor boards, ceramic tiles, etc.), and brushes and scrapers for paint, varnish, and wallpaper</p> <p><b>OECD 110432.1 Services for the maintenance and repair of the dwelling (S)</b></p> <p>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 (i.e., both the cost of labor and the cost of materials are covered)</p>
110441.1	Water supply (ND)	HO		Water supply; includes associated expenditure such as hire of meters, reading of meters, standing charges

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110451.1	Electricity (ND)	HO		Electricity; includes associated expenditure such as hire of meters, reading of meters, standing charges
110452.1	Gas (ND)	HO		Town gas and natural gas; liquefied hydrocarbons (butane, propane, etc.); includes associated expenditure such as hire of meters, reading of meters, standing charges
110453.1	Other fuels (ND)		HE	<p><b>OECD 110453.1 Liquid fuels (ND)</b></p> <p>Domestic heating and lighting oils</p> <p><b>OECD 110454.1 Solid fuels (ND)</b></p> <p>Coal, coke, briquettes, firewood, charcoal, peat, and the like</p> <p><b>OECD 110455.1 Heat energy (ND)</b></p> <p>Hot water and steam purchased from district heating plants; includes associated expenditure such as hire of meters, reading of meters, standing charges; ice used for cooling and refrigeration purposes</p>
<i>Furnishings, household equipment, and routine maintenance of the house</i>				
110511.1	Furniture and furnishings (D)		HE	<p><b>OECD 110511.1 Kitchen furniture (D)</b></p> <p>Tables, chairs, cupboards, etc. for kitchens</p> <p><b>OECD 110511.2 Bedroom furniture (D)</b></p> <p>Beds, tables, chairs, wardrobes, chests of drawers, etc. for bedrooms; includes base-mattresses, mattresses, tatamis</p> <p><b>OECD 110511.3 Living room and dining room furniture (D)</b></p> <p>Sofas, sofa beds, couches, tables, chairs, cupboards, dressers, wall systems, bookshelves for living rooms and dining rooms</p> <p><b>OECD 110511.4 Other furniture and furnishings (D)</b></p> <p>Baby furniture such as cradles, high chairs, and play pens; camping and garden furniture; lighting equipment such as ceiling lights, standard lamps, globe lights, 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, mirrors, candleholders, candlesticks</p>
110512.1	Carpets and other floor coverings (D)	HO		Loose carpets, rugs, mats, and other such movable floor coverings; fitted carpets, linoleum, and other such fixed floor coverings; includes laying of floor covers
110513.1	Repair of furniture, furnishings, and floor coverings (S)	HO		Repair of furniture, furnishings, floor coverings; includes total value of the service (i.e., both the cost of labor 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)
110521.1	Household textiles (SD)		HE	<p>Furnishing fabrics, curtain material, curtains, double curtains, awnings, door curtains, fabric blinds</p> <p>Bedding such as futons, pillows, bolsters, hammocks</p> <p>Bed linen such as sheets, pillowcases, blankets, traveling rugs, plaids, eiderdowns, counterpanes, mosquito nets</p> <p>Table linen and bathroom linen such as tablecloths, table napkins, towels, face cloths</p> <p>Other textile household articles such as shopping bags, laundry bags, shoe bags, covers for clothes and furniture, flags, sunshades</p> <p>Repair of such articles; includes cloth bought by the piece, oilcloth, bathroom mats, rush mats, door mats</p>

table continues next page

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110531.1	Major household appliances whether electric or not (D)		HE	Refrigerators, freezers, fridge-freezers Washing machines, dryers, drying cabinets, dishwashers Ironing and pressing machines Cookers, spit roasters, hobs, ranges, ovens, microwave ovens Air-conditioners, humidifiers, space heaters, water heaters, ventilators, extractor hoods Vacuum cleaners, steam-cleaning machines, carpet shampooing machines, machines for scrubbing Waxing and polishing floors; safes, sewing machines, knitting machines, water softeners, etc.
110532.1	Small electric household appliances (SD)		HE	Coffee mills, coffee makers Juice extractors Can openers Food mixers, deep fryers, meat grills Knives Toasters Ice cream makers, sorbet makers, yogurt makers Hot plates, irons, kettles, fans, electric blankets, etc.
110533.1	Repair of household appliances (S)	HO		Repair of household appliances; includes total value of the service (i.e., both the cost of labor and the cost of materials are covered)
110541.1	Glassware, tableware, and household utensils (SD)		HE	Glassware, crystal ware, and ceramic ware of a kind used for table, kitchen, bathroom, toilet, office, and indoor decoration Cutlery, flatware, silverware Nonelectric kitchen utensils of all materials such as saucepans, stewpots, pressure cookers, frying pans, coffee mills, purée-makers, mincers, hot plates, household scales, other such mechanical devices Nonelectric household articles of all materials such as containers for bread, coffee, spices, etc., waste bins, wastepaper baskets, laundry baskets, portable money boxes and strong boxes, towel rails, bottle racks, irons and ironing boards, letter boxes, feeding bottles, thermos flasks, ice boxes Repair of glassware, tableware, and household utensils
110551.1	Major tools and equipment (D)		HE	Motorized tools and equipment such as electric drills, saws, sanders, hedge cutters Motorized tools and equipment such as garden tractors, lawn mowers, cultivators Motorized tools and equipment such as chain saws Motorized tools and equipment such as water pumps Repair of such articles Includes charges for leasing or rental of do-it-yourself machinery and equipment

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110552.1	Small tools and miscellaneous accessories (SD)		HE	<p>Small electric accessories such as power sockets, switches, wiring flex</p> <p>Small electric accessories such as electric bulbs, fluorescent lighting tubes, torches, hand lamps</p> <p>Small electric accessories such as electric batteries for general use</p> <p>Small electric accessories such as bells and alarms</p> <p>Hand tools such as saws, hammers, screwdrivers, wrenches, spanners, pliers, trimming knives, rasps and files</p> <p>Garden tools such as wheel barrows, watering cans, hoses</p> <p>Garden tools such as spades, shovels, rakes, forks, scythes, sickles, secateurs</p> <p>Garden tools such as ladders, steps</p> <p>Door fittings (hinges, handles, locks)</p> <p>Fittings for radiators and fireplaces</p> <p>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</p>
110561.1	Nondurable household goods (ND)		HE	<p>Cleaning and maintenance products such as soaps, washing powders, washing liquids, scouring powders, detergents, disinfectant bleaches, softeners, conditioners, window-cleaning products</p> <p>Cleaning and maintenance products such as waxes, polishes</p> <p>Cleaning and maintenance products such as dyes</p> <p>Cleaning and maintenance products such as unblocking agents, disinfectants, insecticides, pesticides, fungicides</p> <p>Distilled water</p> <p>Articles for cleaning such as brooms, scrubbing brushes, dust pans and dust brushes, dusters</p> <p>Articles for cleaning such as tea towels, floor cloths, household sponges</p> <p>Articles for cleaning such as scourers, steel wool, chamois leathers</p> <p>Paper products such as filters, tablecloths and table napkins, kitchen paper, vacuum cleaner bags, cardboard tableware</p> <p>Other nondurable 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, rubber gloves; includes polishes, creams, and other shoe-cleaning articles; aluminum foil, cellophane wrap, and plastic bin liners; shoe trees and shoehorns; fire extinguishers for households</p>
110562.1	Domestic services (S)		HE	<p>Domestic services supplied by paid staff in private service such as butlers, cooks, maids, cleaners, drivers, gardeners, governesses</p> <p>Domestic services supplied by paid staff in private service such as secretaries, tutors, au pairs</p> <p>Domestic services, including babysitting and housework, supplied by enterprises or self-employed persons</p>

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**Annex B (Continued)**

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
<i>Health</i>				
110611.1	Pharmaceutical products (ND)		HE	Medicinal preparations, medicinal drugs, patent medicines Serums and vaccines Vitamins and minerals, cod liver oil and halibut liver oil, oral contraceptives
110612.1	Other medical products (ND)		HE	Clinical thermometers Adhesive and nonadhesive bandages Hypodermic syringes First-aid kits Hot-water bottles and ice bags Medical hosiery products such as elasticized stockings and knee supports Pregnancy tests, condoms and other mechanical contraceptive devices
110613.1	Therapeutic appliances and equipment (D)		HE	Corrective eyeglasses and contact lenses Hearing aids Glass eyes Artificial limbs and other prosthetic devices Orthopedic braces and supports, orthopedic 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
110621.1	Medical services (S)	HO		Services of physicians in general or specialist practice; includes orthodontic specialists
110622.1	Services of dentists (S)	HO		Services of dentists, oral hygienists, and other dental auxiliaries; includes fitting costs of dentures but not the dentures themselves
110623.1	Paramedical services (S)		HE	Services of medical analysis laboratories and X-ray centers Services of freelance nurses and midwives Services of freelance acupuncturists, chiropractors, optometrists, physiotherapists, speech therapists, etc. Medically prescribed corrective gymnastic therapy Outpatient thermal bath or seawater treatments Ambulance services other than hospital ambulance services Hire of therapeutic equipment Includes services of practitioners of traditional medicine



Annex B (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
<i>Transport</i>				
110711.1	Motor cars (D)		HE	<p><b>OECD 110711.1 Motor cars with a diesel engine (D)</b></p> <p>Motor cars, etc. with a diesel engine</p> <p><b>OECD 110711.2 Motor cars with a petrol engine of cubic capacity of less than 1,200 (D)</b></p> <p>Motor cars, etc. with a petrol engine of cubic capacity of less than 1,200</p> <p><b>OECD 110711.3 Motor cars with a petrol engine of cubic capacity of 1,200–1,699 (D)</b></p> <p>Motor cars, etc. with a petrol engine of cubic capacity of 1,200–1,699</p> <p><b>OECD 110711.4 Motor cars with a petrol engine of cubic capacity of 1,700–2,999 (D)</b></p> <p>Motor cars, etc. with a petrol engine of cubic capacity of 1,700–2,999</p> <p><b>OECD 110711.5 Motor cars with a petrol engine of cubic capacity of 3,000 and over (D)</b></p> <p>Motor cars, etc. with a petrol engine of cubic capacity of 3,000 and over</p>
110712.1	Motorcycles (D)	HO		Motorcycles of all types, scooters and powered bicycles; includes side cars, snowmobiles, rickshaws
110713.1	Bicycles (D)	HO		Bicycles and tricycles of all types; includes rickshaws
110714.1	Animal-drawn vehicles (D)	HO		Animal-drawn vehicles; includes animals required to draw the vehicles and related equipment (yokes, collars, harnesses, bridles, reins, etc.)
110722.1	Fuels and lubricants for personal transport equipment (ND)		HE	<p>Petrol and other fuels such as diesel, liquid petroleum gas, alcohol, and two-stroke mixtures</p> <p>Lubricants, brake and transmission fluids, coolants and additives</p> <p>Includes fuel for recreational vehicles covered under (11.09.21.1)</p>
110723.1	Maintenance and repair of personal transport equipment (SD)		HE	<p><b>OECD 110721.1 Spare parts and accessories for personal transport equipment (SD)</b></p> <p>Tires (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, motorcycles, etc.</p> <p><b>OECD 110723.1 Maintenance and repair of personal transport equipment (S)</b></p> <p>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 (i.e., both the cost of labor and the cost of materials are covered)</p>
110724.1	Other services in respect of personal transport equipment (S)		HE	<p>Hire of garages or parking spaces not providing parking in connection with the dwelling</p> <p>Toll facilities (bridges, tunnels, shuttle-ferries, motorways, etc.) and parking meters</p> <p>Driving lessons, driving tests, driving licenses</p> <p>Road worthiness tests; hire of personal transport equipment without drivers</p>

table continues next page

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110731.1	Passenger transport by railway (S)	HO		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
110732.1	Passenger transport by road (S)	HO		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
110733.1	Passenger transport by air (S)	HO		Transport of individuals and groups of persons and luggage by airplane and helicopter
<i>Communication</i>				
110811.1	Postal services (S)	HO		Payments for the delivery of letters, postcards, and parcels; private mail and parcel delivery; includes all purchases of new postage stamps, pre-franked postcards, aerograms
110821.1	Telephone and telefax equipment (D)		HE	Purchases of telephones, radio-telephones Telefax machines, telephone answering machines, telephone loudspeakers Repair of such articles
110831.1	Telephone and telefax services (S)	HO		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 radiotelex services
<i>Recreation and culture</i>				
110911.1	Audiovisual, photographic, and information processing equipment (D)		HE	<b>OECD 110911.1 Equipment for the reception, recording, and reproduction of sound and pictures (D)</b> Television sets, videocassette 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 <b>OECD 110912.1 Photographic and cinematographic equipment and optical instruments (D)</b> Still cameras, movie cameras, 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 <b>OECD 110913.1 Information processing equipment (D)</b> Personal computers, visual display units, printers and miscellaneous accessories accompanying them; computer software packages such as operating systems, applications, languages; calculators, including pocket calculators; typewriters and word processors; includes telefax and telephone answering facilities provided by personal computers

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110914.1	Recording media (SD)		HE	<p><b>OECD 110914.1 Pre-recorded recording media (SD)</b></p> <p>Records and compact discs; prerecorded tapes, cassettes, videocassettes, diskettes, and CD-ROMs for tape recorders, cassette recorders, video recorders, and personal computers; includes prerecorded diskettes and CD-ROMs containing books, dictionaries, encyclopedias, foreign language trainers, multimedia presentations, etc. in the form of software</p> <p><b>OECD 110914.2 Unrecorded recording media (SD)</b></p> <p>Unrecorded tapes, cassettes, videocassettes, 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</p>
110915.1	Repair of audiovisual, photographic, and information processing equipment (S)	HO		<p>Repair of audiovisual, photographic, and information processing equipment; includes total value of the service (i.e., both the cost of labor and the cost of materials are covered)</p>
110921.1	Major durables for outdoor and indoor recreation (D)		HE	<p><b>OECD 110921.1 Major durables for outdoor recreation (D)</b></p> <p>Camper vans, caravans, and trailers; airplanes, 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 products 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.</p> <p><b>OECD 110922.1 Musical instruments and major durables for indoor recreation (D)</b></p> <p>Musical instruments of all sizes, including electronic musical instruments such as pianos, organs, violins, guitars, drums, trumpets, clarinets, flutes, recorders, harmonicas; billiard tables, ping-pong tables, pinball machines, gaming machines, etc.</p>
110923.1	Maintenance and repair of other major durables for recreation and culture (S)	HO		<p>Maintenance and repair of other major durables for recreation and culture; includes total value of the service (i.e., both the cost of labor 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</p>
110931.1	Other recreational items and equipment (SD)		HE	<p><b>OECD 110931.1 Games, toys, and hobbies (SD)</b></p> <p>Card games, parlor 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 canceled postage stamps, stamp albums, etc.), other products 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</p>

*table continues next page*

Annex B (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
				<p><b>OECD 110932.1 Equipment for sport, camping, and open-air recreation (SD)</b></p> <p>Gymnastic, physical education, and sports equipment such as balls, rackets, bats, skis, golf clubs, foils, sabres, poles, weights, discuses, javelins, dumbbells, 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 backpacks, air mattresses and inflating pumps, camping stoves and barbecues; repair of such articles; includes game-specific footwear (ski boots, football boots, golf 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.</p>
110933.1	Gardens and pets (ND)		HE	<p><b>OECD 110933.1 Gardens, plants, and flowers (ND)</b></p> <p>Natural or artificial flowers and foliage, plants, shrubs, bulbs, tubers, seeds, fertilizers, 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</p> <p><b>OECD 110934.1 Pets and related products (ND)</b></p> <p>Pets, pet foods, veterinary and grooming products for pets, collars, leashes, kennels, birdcages, fish tanks, cat litters, etc.</p>
110935.1	Veterinary and other services for pets (S)	HO		Veterinary and other services for pets such as grooming and boarding
110941.1	Recreational and sporting services (S)		HE	<p>Services provided by sports stadiums, horse racing courses, motor racing circuits, velodromes, skating rinks, swimming pools, golf courses, gymnasiums, fitness centers, tennis courts, squash courts, bowling alleys, fairs, amusement parks, roundabouts, seesaws and other playground facilities for children, pinball machines and other games for adults other than games of chance, ski slopes, ski lifts, and the like</p> <p>Hire of equipment and accessories for sport and recreation such as airplanes, boats, horses, skiing, and camping equipment</p> <p>Out-of-school individual or group lessons in bridge, chess, aerobics, dancing, music, skating, skiing, swimming, or other pastimes</p> <p>Services of mountain guides, tour guides, etc.; navigational aid services for boating</p> <p>Includes hire of game-specific footwear (ski boots, football boots, golf shoes, and other such footwear fitted with ice skates, rollers, spikes, studs, etc.)</p>
110942.1	Cultural services (S)		HE	<p><b>OECD 110942.1 Photographic services (S)</b></p> <p>Services of photographers such as film developing, print processing, enlarging, portrait photography, wedding photography</p> <p><b>OECD 110942.2 Other cultural services (S)</b></p> <p>Services provided by cinemas, theaters, opera houses, concert halls, music halls, circuses, sound and light shows, museums, libraries, art galleries, exhibitions, historic monuments, national parks, zoological and botanical gardens, aquariums; hire of equipment and accessories for culture such as television sets, videocassettes; television and radio broadcasting—in particular, license fees for television equipment and subscriptions to television networks; includes services of musicians, clowns, performers for private entertainment.</p>

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
110951.1	Newspapers, books, and stationery (ND)		HE	<p><b>OECD 110951.1 Books (SD)</b></p> <p>Books, including atlases, dictionaries, encyclopedias, textbooks, guidebooks, and musical scores; includes scrapbooks and albums for children; bookbinding</p> <p><b>OECD 110952.1 Newspapers and periodicals (ND)</b></p> <p>Newspapers, magazines, and other periodicals</p> <p><b>OECD 110953.1 Miscellaneous printed matter, stationery, and drawing materials (ND)</b></p> <p>Writings pads, envelopes, account books, notebooks, diaries, etc.; pens, pencils, fountain pens, ballpoint 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; catalogs 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</p>
<i>Restaurants and hotels</i>				
111111.1	Catering services (S)		HE	<p><b>OECD 111111.1 Restaurant services whatever the type of establishment (S)</b></p> <p>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 customer's home</p> <p><b>OECD 111111.2 Pubs, bars, cafés, tea rooms, and the like (S)</b></p> <p>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</p> <p><b>OECD 111112.1 Canteens (S)</b></p> <p>Catering services of work canteens, office canteens, and canteens in schools, universities, and other educational establishments; includes university refectories, military messes, wardrooms</p>
111211.1	Accommodation services (S)	HO		<p>Accommodation services provided by hotels, boarding houses, motels, inns, holiday villages, holiday centers, 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</p>
<i>Miscellaneous goods and services</i>				
112111.1	Hairdressing salons and personal grooming establishments (S)	HO		<p>Services of hairdressing salons, barbers, beauty shops, manicures, pedicures, Turkish baths, saunas, solariums, nonmedical massages, etc.; includes body care, depilation, and the like</p>

table continues next page

**Annex B** (Continued)

Code	Basic heading	Homogeneous (HO)	Heterogeneous (HE)	Example of clusters under basic headings
111212.1	Appliances, articles, and products for personal care (ND)		HE	<p><b>OECD 111212.1 Electric appliances for personal care (SD)</b></p> <p>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</p> <p><b>OECD 111213.1 Other appliances, articles, and products for personal care (ND)</b></p> <p>Nonelectric 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, makeup and makeup removal products (including powder compacts, brushes, and powder puffs), hair lacquers and lotions, pre-shave and after-shave products, sunbathing 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, baby napkins, etc.</p>
111231.1	Jewelry, clocks, and watches (D)	HO		Precious stones and metals and jewelry fashioned out of such stones and metals; costume jewelry, cuff links, and tie-pins; clocks, watches, stopwatches, alarm clocks, travel clocks; repair of such articles
111232.1	Other personal effects (SD)		HE	<p>Suitcases, trunks, travel bags, attaché cases, satchels, handbags</p> <p>Wallets, purses, etc.</p> <p>Articles for babies: baby carriages, push-chairs, carry-cots, recliners, car beds and seats, back carriers, front carriers, reins and harnesses, etc.</p> <p>Articles for smokers: pipes, lighters, cigarette cases, cigar cutters, ashtrays, etc.</p> <p>Miscellaneous personal articles: sunglasses, walking sticks and canes, umbrellas and parasols, fans, key rings, etc.</p> <p>Funerary articles: urns, coffins, gravestones, etc.</p> <p>Repair of such articles</p> <p>Includes lighter fuel, wall thermometers, and barometers</p>
111262.1	Other financial services n.e.c. (S)	HO		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 counselors, tax consultants, and the like; administrative charges of private pension funds and the like
111271.1	Other services n.e.c. (S)		HE	<p>Fees for legal services, employment agencies, etc.</p> <p>Charges for undertaking and other funeral services</p> <p>Payment for the services of estate agents, housing agents, auctioneers, operators of salesrooms, and other intermediaries</p> <p>Payment for photocopies and other reproductions of documents</p> <p>Fees for the issue of birth, marriage, and death certificates and other administrative documents</p> <p>Payment for newspaper notices and advertisements</p> <p>Payment for the services of graphologists, astrologers</p> <p>Private detectives, bodyguards</p> <p>Matrimonial agencies and marriage guidance counselors</p> <p>Public writers, miscellaneous concessions (seats, toilets, cloakrooms), etc.</p>

Source: ICP, <http://icp.worldbank.org/>.

Note: ND = nondurable good; SD = semidurable good; S = consumer service; D = durable good; n.e.c. = not elsewhere classified.

1. <http://www.oecd.org/std/prices-ppp/PPP%20manual%20revised%202012.pdf>.

## NOTES

1. See Dikhanov (2009) for explicit examples used in the Asia and the Pacific region.
2. In addition to the survey on household consumption products, ICP price surveys were carried out on machinery and equipment, construction, health, education, and housing.
3. The ICP 2011 regions were Africa, Asia and the Pacific, CIS, Eurostat-OECD, Latin America, the Caribbean, Western Asia, and the Pacific Islands.

## REFERENCES

- Dikhanov, Yuri. 2009. "Efficiency of the Core Product List in International Comparisons." Paper prepared for meeting of Technical Advisory Group, International Comparison Program, World Bank, Washington, DC, October 1–2. <http://icp.worldbank.org/>.
- World Bank. 2013. *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)*. [http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/10\\_ICPBook\\_Validation\\_F.pdf](http://siteresources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/10_ICPBook_Validation_F.pdf).





## Fast-Evolving Technology Items: Approach and Data Requirements

Technology products such as audiovisual, photographic, and information processing equipment pose unique challenges for the price collection process of the International Comparison Program (ICP) and for the computation of purchasing power parities (PPPs). Challenges are primarily related to the short life cycles and the overall fast-changing nature of these products. Further complicating the task, the introduction of new models may not occur simultaneously across different markets, and consumer electronics companies may tend to create market fragmentation by introducing models with minor variations for certain groups of economies or even for individual economies. In view of this situation, standard ICP practices cannot in general produce satisfactory PPPs.

An approach to resolving this problem is based on four steps:

1. Focus on products with wide availability, a low number of alternative models for the same product type, and a relatively long lifespan, or with replacement models that can be clearly identified.
2. Improve the item specifications so they list the key price-determining factors and indicate a product series instead of a single model.
3. Use the whole scope of the basic heading(s).
4. Collect brand and model information for validation purposes.

The first step identifies clearly universal products such as media players or tablet computers that can be priced by all economies. The second step guides the pricing of products that are not available in identical fashion in all economies. The key parameters for a variety of products differ relatively little across economies and are also fairly stable over a certain period of time, even if the models and especially the model codes vary and change constantly. The third step is intended to ensure that the item list also includes items that are relatively easy to price. The final step is used in the validation work so that outlier prices can be checked for potentially differing models and cross-checks for priced models can be made across economies.

### BASIC HEADINGS COVERED

The issue of fast-evolving technology relates mainly to basic heading 110911.1, audiovisual, photographic, and information processing equipment.<sup>1</sup> The annex to this chapter presents a full description of this basic heading. Although similar obstacles can be observed for other household products such as refrigerators and vacuum cleaners, the magnitude of the problem with those types of products is considerably smaller.

## OPERATIONAL ACTIVITIES

Based on the four steps just described, the global core list (GCL) was revised for ICP 2011 to include 16 new items in basic heading 110911.1, audiovisual, photographic, and information processing equipment. The prices of these items were collected in quarters 3 and 4 of the ICP 2011 round. These items were treated just like any other GCL item. Before the addition of these new items, the GCL already included items under the basic heading of concern here. Regions were allowed to decide on the treatment of these "old items" and their respective prices based on the results of the Q1 and Q2 price collections. They did not have to collect prices for the old items within Q3 and Q4. The new items had new item codes, but overlap was expected for three items. However, because the item specifications had been modified, it was not guaranteed that the price data collected for these items would be comparable. The regional coordinating agencies were allowed to add items to their regional lists following the approach described here. The old items were either kept or deleted, depending on the results for previous quarters. For each new item, price collectors were asked to enter (write down) the priced brand and model in the comments cell of the price survey form. This information was used during the inter-economy validation process, when outlier prices and the comparability of the price data across economies were checked.

## ITEM SPECIFICATIONS

What follows is an example of an item specification that defines the series for the given brand and the key price-determining parameters for the product. Reference to an actual model code is not made directly. It is included only as an example because the model code can differ across economies for exactly the same product and can change quickly even within an economy because of very minor changes in the actual product. Series, by contrast, are more universal and stable. In addition to the series, the key product features are clearly listed to facilitate the price collection

and to assist the price collectors and shop assistants in finding comparable models in the national market. It is important that the model code be recorded exactly because a one-to-one match between the model code and the characteristics often exists; characteristics can always be checked on the manufacturer's website. The model code will be an important check for the collected item when matched with the characteristics.

An item specification might look like this:

**Basic heading:** 110911.1, audiovisual, photographic, and information processing equipment

**Product:** 110911160, BRAND X Series Y netbook computer

**Brand:** BRAND X

**Series:** Series Y

**Model:** D255E-13639

**Type:** Netbook computer

**Screen size:** 10.1"

**Processor:** Letni Atom N455

**Installed memory:** 1 GB

**Hard disc:** 250 GB

**Wireless connectivity:** Wi-fi (WLAN), Bluetooth

**Exclude:** 3G/4G models

**Number of units:** 1

**Unit of measurement:** Piece

**Specify:** Brand and model

## PRICING GUIDELINES

Three simple pricing rules should be followed during price collection:

1. *Price only the brand(s) and series listed in the item specification.* Brand(s) and series define features such as physical characteristics, type of product, and the technology used in general terms. To collect comparable price data, the collectors should price only the listed brands and series. In addition, only original brands should be priced, not imitations or illegal copies.
2. *Price the cheapest product that fulfills the given item parameters.* Even within a series, there may be models that are more expensive. In this case, the cheapest product that fulfills the item parameters should be priced.

3. If a product with the suggested key parameters is not found, the closest one should be priced and the differences written down. The availability of identical products across economies may be limited. Nevertheless, products with very similar specifications can still be found. The closest match should be priced, and the parameters that differ along with the model number should be noted in the comments cell of the price survey form. The key parameters in item specifications will help collectors identify equivalent products.

## ANNEX

### CLASSIFICATION OF THE AUDIOVISUAL, PHOTOGRAPHIC, AND INFORMATION PROCESSING EQUIPMENT BASIC HEADING

#### 110911.0 Audiovisual, photographic, and information processing equipment [COICOP<sup>2</sup> 09.1.1, 09.1.2, and 09.1.3]

##### 110911.1 Audiovisual, photographic, and information processing equipment (D)<sup>3</sup>

###### OECD 11.09.11.1 Equipment for the reception, recording, and reproduction of sound and pictures (D)

Television sets, videocassette 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).

###### OECD 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.

###### OECD 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, and languages; 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, encyclopedias, 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).

## NOTES

1. In the Eurostat-OECD (Organisation for Economic Co-operation and Development) comparison, there are three different basic headings:
  - 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.
2. COICOP = Classification of Individual Consumption According to Purpose.
3. (D) = durable goods.



## Water: Approach and Data Requirements

Traditionally, water is drawn from local surface or groundwater sources and then treated and distributed by registered water supply utilities. These utilities may be owned or operated by state or local municipal governments, private developers, or community management organizations, among others. Most water treatment facilities have a design life of several decades or more. They represent a major capital investment and normally significant ongoing operating and maintenance costs. Usually, tight regulations govern the water service subsector and cover areas including but not limited to infrastructure, production, distribution, sewerage, sanitation, human health, environment, and price schedule.

Water distribution includes outdoor and indoor outlets for residential as well as nonresidential water customers. The economics of water uses assumes that water can be priced in two ways: direct pricing and indirect pricing. Direct pricing involves setting prices, fees, and charges payable by users, reusers, and disposers of water. Indirect pricing assesses parameters and mechanisms to derive the cost of using water and the associated resources. Historically, direct pricing has been preferred for ease of observation. But as standardized water pricing systems evolve, indirect pricing may provide more accurate indicators comparable across economies.

The ICP 2011 global core list (GCL) for the household consumption survey of the

International Comparison Program (ICP) was designed to collect the associated cost of water consumption through the direct pricing method. It covered three items under the basic heading 110441.1, water supply. Participating regions/economies collected prices for one cubic meter (1 m<sup>3</sup>) of (1) drinking water, excluding sewerage; (2) drinking water, including sewerage; and (3) tap water for individual consumption. Prices and quantities were collected for each item and validated at the economy, regional, and global levels.

In the past, the ICP adopted different approaches to collecting prices for water supply services. During the ICP 2005 round, for example, prices were collected using different lists of items in the regions—in particular during the Ring exercise. As a result, the purchasing power parities (PPPs) derived had comparability issues. The statistical discrepancies observed in the ICP participating economies were mainly related to differences in water sector regulation, nature of the provider (public versus private), water treatment, water service quality, and forms of distribution of drinking water through individual versus collective taps. It was also reported that in some regions the provision of water services at the municipality level varied according to location. For example, prices in urban areas tend to be higher than in rural areas, where the water service is sometimes subsidized.

## DATA COLLECTION FORM FOR WATER TARIFF

In order to better understand the formation of water tariffs in the ICP economies, the Global Office developed for ICP 2011 a special form for collecting important structural information. This form was intended to capture indirect pricing and featured the status of the water service management company (e.g., public or private), the tariff structure type per block of consumption volumes for water and sewerage, the typical monthly variable and fixed costs, consumption patterns, exchange rates, and a few data assessment indicators such as an economy's gross domestic product (GDP) per capita, per capita domestic consumption volume, and the water/wastewater bill as a percentage of GDP per capita. The block pricing concept can be uniformly applied across economies. The thresholds may vary from economy to economy, but almost all economies would have blocks for lower, average, and higher household consumption expressed in volume (cubic meter or cubic feet).

Calibration information collected through the data collection form for the water tariff (see figure 6.1 for an example) was expected to support the prices collected under the water supply basic heading, including GCL items and regional items. This information may be used to adjust prices or PPPs for quality at both the regional and global comparison levels, if needed.

## WATER TARIFF SYSTEMS

Several different types of water charges are used in the domestic, industrial, and agriculture sectors in various parts of the world. The price structure is typically influenced by the availability of water, consumer income, purpose and usage, and certain socioeconomic factors. The types of charges typically include flat or uniform rates, block rates, seasonal rates, peak rates, conservation rates, and capacity rates.

The choice and formulation of an effective pricing system are based on factors influencing the price such as the characteristics of water demand, depletion of resources, cost recovery, social well-being, religious obligations, legal

and administrative requirements, and consumer acceptance. The charged price should reflect, among other things, the quality, timing, convenience, and reliability of the water supply, while accounting for social and political considerations (UN Economic and Social Commission for Western Asia 2005).

Water and wastewater tariffs include volumetric components in which metering is applied or a flat rate with no metering is applied. Many utilities apply two-part tariffs when a volumetric tariff is combined with a fixed charge. The latter may specify minimum consumption. The level of the fixed charge often depends on the diameter of the connection.

Volumetric tariffs vary, depending on the actual practice in a location. The most common volumetric tariffs include:

- Proportional consumption, a pure volumetric tariff with no rate changes
- Increasing-block tariffs (IBTs) in which the rate increases with consumption. Two of these are popular:
  - IBT-variable band—the rate changes according to the volume consumed.<sup>1</sup>
  - IBT-fixed band—the rate changes when the consumer reaches a specific consumption level.
- Decreasing-block tariffs (DBTs)—the rate decreases with consumption.
- Minimum consumption tariff
- Prepaid tariff per specific consumption.

Additional charges may apply to water, including a metering charge that varies according to the diameter of the water pipe. The typical size is 5/8 inch or 20 millimeters, but a different size may be used in selected locations. The meter reading charge and the water abstraction fee also increase the volumetric tariff.

Wastewater charges include pollution fee, wastewater treatment fee (separate from wastewater collection), environmental fee, and rainwater collection fee.

## DEFINITION AND TERMINOLOGY

The value added tax (VAT) is a consumption tax levied at each stage of production based on the value added to the product at that stage.

**Figure 6.1** Example of Data Collection Form for Water Tariff, ICP 2011

Collection Form of Water Tariff (All tariffs, charges, and fees in local currency)		
Country name:	USA	
Contact person details (Name and Email Address)	John Doe - jdoo@email.com	
Time period:	2012	
Volume measurement system (Metric/Imperial)	Imperial	
Measurement unit	1000 Gallons	
VAT rate on water (%):	0	
VAT rate on wastewater (%; if different):	0	
Sales tax on water (%):	0	
Sales tax on wastewater (%; if different):	0	
City name:	Rockville, Maryland	
Total population served:	200,000	
Utility company name:	WSSC - Washington Suburban Sanitary Commission	
Link to the tariff for water:	http://www.wsscwater.com/home/jsp/content/mainfeetable.faces	
<b>1</b>	<b>Management (Public/Private)</b>	<b>Public</b>
<b>2</b>	<b>Combined wastewater billing (Yes/No)?</b>	<b>Yes</b>
<b>3</b>	<b>Tariff structure type</b>	<b>Increasing-block tariffs (IBT Variable Band) Comment</b>
<b>31</b>	<b>The blocks tariff (water)</b>	
311	First block upper limit in m <sup>3</sup> per month	2.151111111
312	First block tariff per m <sup>3</sup> (Excluding VAT)	0.728305785
313	Second block upper limit in m <sup>3</sup> per month	4.302222222
314	Second block tariff per m <sup>3</sup> (Excluding VAT)	0.821280992
315	Third block upper limit in m <sup>3</sup> per month	6.453333333
316	Third block tariff per m <sup>3</sup> (Excluding VAT)	1.00464876
317	Other blocks (describe) <sup>1</sup>	See attached schedule picture
<b>32</b>	<b>The blocks tariff (wastewater)</b>	
321	First block upper limit in m <sup>3</sup> per month	2.151111111
322	First block tariff per m <sup>3</sup> (Excluding VAT)	0.844524793
323	Second block upper limit in m <sup>3</sup> per month	4.302222222
324	Second block tariff per m <sup>3</sup> (Excluding VAT)	0.983987603
325	Third block upper limit in m <sup>3</sup> per month	6.453333333
326	Third block tariff per m <sup>3</sup> (Excluding VAT)	1.154442149
327	Other blocks (describe) <sup>2</sup>	See attached schedule picture
<b>39</b>	<b>Other volumetric charges on water and wastewater</b>	
391	Other volumetric charges on water and wastewater	0
392	Other fixed charges (per month) on water and wastewater	Bay restoration fee: 2.50 Account maintenance fee: 3.66
393	Other percentage charges on water and wastewater	0
395	Other fees and taxes (describe)	0
<b>4</b>	<b>Water and wastewater/m<sup>3</sup> for 15m<sup>3</sup>/month use via most common pipe type</b>	
41	Specify pipe diameter (e.g. 5/8")	5/8"
42	Water charges/m <sup>3</sup> for 15m <sup>3</sup> /month use (Including taxes and fees)	1.12664876
43	Wastewater charges/m <sup>3</sup> for 15m <sup>3</sup> /month use (Including taxes and fees)	1.61872865
<b>Comments:</b>		
Notes: 1,2. Description if there are more blocks available in the countries. Please attach official tariff structure and sample bill.		

Source: ICP, <http://icp.worldbank.org/>.

Sales taxes are imposed by governments at the point of sale on retail goods and services and collected by retailers before they are passed on to the government. For water and wastewater, these taxes are set by the state or local government based on a percentage of the selling price.

Usually, water and wastewater companies charge either the VAT or sales taxes. However, the VAT and sales taxes are combined in some economies.

## SOURCES OF INFORMATION ON WATER TARIFFS

Economies participating in the ICP were expected to fill in the data collection form shown in figure 6.1, preferably using information from utility companies, water bills, and water sector studies in their economies. They were also required to specify the link (URL) and attach an official document of their water tariff on the form and provide scanned copies of actual bills.

## NOTE

1. The IBT with variable bands assesses the total volume consumed and then determines which bands system to use for the applicable rates. For example, a utility could use consumption levels of 0–10, 11–25, and 26–50 for consumption below 50 cubic meters and levels of 0–15, 16–40, 41–100, and 100+ for higher consumption. Inside each bracket, the per unit rate would

be constant per unit of consumption for each category, but the rates for the second category are usually higher than for the first one.

## REFERENCE

- UN Economic and Social Commission for Western Asia. 2005. "ESCWA: Valuing Water Resources—Training of Trainers on the Application of IWRM Guidelines in the Arab Region." Kuwait, May 14–18.



# Private Health: Approach and Data Requirements

This chapter provides specific instructions on the health component of the International Comparison Program (ICP). This component is classified as one of the comparison-resistant areas of household consumption, and thus special attention must be paid to comparisons of health-related products and services across the ICP participating economies.

## BASIC HEADINGS COVERED

The basic headings related to health products and services are split into household and government expenditures (see tables 7.1 and 7.2).

These guidelines cover those basic headings for which price surveys were conducted for ICP 2011. Chapter 24 is devoted to reference purchasing power parity (PPP) basic headings. Data collection related to compensation of employees is described in chapter 10 on government.

The importance of basic headings is measured by their expenditure shares of consumption. As for the approach to determining the importance of a product, the normal ICP 2011 routines are applicable to the basic headings and items covered in these guidelines. For additional information, see chapter 4 on household consumption.

## MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT

### Pharmaceutical Products

Pharmaceutical products constitute a large component of household consumption. This price survey is unique because it involves specifically trained staff, meticulously designed product specifications, monitoring of price variations over space and time, and a specific survey design. For ICP 2011, the survey was conducted quarterly.

The pharmaceutical products survey was designed by the ICP Global Office in cooperation with the ICP regional coordinating agencies (RCAs) and the World Bank's Health Department. An international list of 43 essential drugs was developed. This multilateral exercise sought consistency in commonly prescribed medicines to ensure comparability across ICP economies and regions. A description of the survey procedure follows.

### *Survey Design*

The ICP national coordinating agencies (NCAs) coordinate the survey at the economy level and liaise with the pharmaceutical products outlets (pharmacies). The outlets are selected from various locations representative of potential price heterogeneity in the economy. The more

**Table 7.1** Health Expenditure by Households, ICP 2011

Code	Aggregate or basic heading	Data source
110000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>	
110600	HEALTH	
110610	MEDICAL PRODUCTS, APPLIANCES, AND EQUIPMENT	
110611	<i>Pharmaceutical products</i>	
110611.1	Pharmaceutical products	Price survey
110612	<i>Other medical products</i>	
110612.1	Other medical products	Price survey
110613	<i>Therapeutic appliances and equipment</i>	
110613.1	Therapeutic appliances and equipment	Price survey
110620	OUTPATIENT SERVICES	
110621	<i>Medical services</i>	
110621.1	Medical services	Price survey
110622	<i>Dental services</i>	
110622.1	Dental services	Price survey
110623	<i>Paramedical services</i>	
110623.1	Paramedical services	Price survey
110630	HOSPITAL SERVICES	
110631	<i>Hospital services</i>	
110631.1	Hospital services	Reference PPP

Source: ICP, <http://icp/worldbank.org/>.

Note: PPP = purchasing power parity.

widely dispersed the outlets are in a data collection center the better is the quality of the prices. National statistical offices (NSOs) coordinate the price survey at the economy level.

Significant aspects of the survey are the representativity and importance of the items in the list. The selected outlets would comprise pharmacies in city centers, government administrative areas, residential areas, and, where appropriate, capitals of regions or big rural areas. It is recommended that the ICP NCAs target major cities that have a good distribution of pharmaceutical outlets. Resources permitting, prices for pharmaceutical products sold in rural areas and villages are also obtained. Prices are not collected from street stalls or mobile vendors unless such sales are legal and practiced on a large scale.

An important aspect to consider in designing the quarterly schedule of activities is the size of the relevant economies. In small economies, all the pharmacies can be surveyed in a short

time, whereas larger economies will require more organization. For example, the first month of the quarter could be used to collect the prices to be captured, validated, and transmitted in the second month to the ICP RCA. The third month could be used to address exceptional circumstances (e.g., remote survey area, seasonal drugstores, and survey forms from rural areas).

#### **Price Sources**

Preference is given to officially registered pharmacies in the capital and major cities of the economy. If the number of pharmacies is high and the outlets are well distributed over the locations, the NCA could conduct the survey in a sample of a representative set of pharmacies. In small cities, it is recommended that the data collection form be administered in all registered pharmacies. When mobile vendors or street stalls are important in the cities, prices can be collected from those outlets, but care must be taken to ensure the comparability of these prices.

**Table 7.2** Health Expenditure by Government, ICP 2011

Code	Aggregate or basic heading	Data source
130000	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>	
130200	HEALTH	
130210	HEALTH BENEFITS AND REIMBURSEMENTS	
130211	<i>Medical products, appliances, and equipment</i>	
130211.1	Pharmaceutical products	Reference PPP
130211.2	Other medical products	Reference PPP
130211.3	Therapeutic appliances and equipment	Reference PPP
130212	<i>Health services</i>	
130212.1	Outpatient medical services	Reference PPP
130212.2	Outpatient dental services	Reference PPP
130212.3	Outpatient paramedical services	Reference PPP
130212.4	Hospital services	Reference PPP
130220	PRODUCTION OF HEALTH SERVICES	
130221	<i>Compensation of employees</i>	
130221.1	Compensation of employees	Compensation data collection
130222	<i>Intermediate consumption</i>	
130222.1	Intermediate consumption	Reference PPP
130223	<i>Gross operating surplus</i>	
130223.1	Gross operating surplus	Reference PPP
130224	<i>Net taxes on production</i>	
130224.1	Net taxes on production	Reference PPP
130225	<i>Receipts from sales</i>	
130225.1	Receipts from sales	Reference PPP

Source: ICP, <http://icp/worldbank.org/>.

Note: PPP = purchasing power parity.

### ***Prices to Be Reported***

The outcome of the survey is a set of sound national average prices for pharmaceutical products. These prices are computed on the basis of a quarterly survey of individual price quotations for each active substance (product) in the list.

All prices reported for pharmaceutical products should be full market prices. The full market price is the total price for a specified drug, including all potential government subsidies. Full market prices are obtained by establishing the total amount received by the sellers. When data on the subsidies are not available for each specified drug, an estimated flat rate of subsidies is applied to the reported prices. It is essential that full market prices and subsidized prices not

be compared directly. The resulting PPPs would be heavily biased.

### ***Products to Be Priced***

The identification of pharmaceutical products is based on a definition of the active substance in each product and its strength. An additional dimension to be considered in pricing is that pharmaceuticals are available as branded, original, or generic products.

*Branded drugs* are medicines produced and sold by pharmaceutical companies. Normally, the drugs produced by large pharmaceutical companies that invest in research and development into new drugs are called *original* or brand-name medicines. When a pharmaceutical company initially develops and markets a

particular drug, that drug is usually under a patent that grants exclusive sales rights to the parent company.

*Generic drugs* are medicines that are identical, or bioequivalent, to an existing brand-name medicine in dosage form, safety, strength, mode of administration, quality, performance characteristics, and intended use. Although generic medicines are chemically identical to their branded counterparts, they are typically sold at prices lower than those for the branded product. The principal reason is that the drug has already been tested and approved—the cost of bioequivalence testing and the actual manufacturing will be only part of the original costs. In general, the only differences between the brand-name product and the generics are the price and the trade name.

In the context of the ICP *it is important not to compare price quotations for branded and generic drugs directly*. The resulting PPPs would be heavily biased. To avoid this quality problem and to ensure the comparability of the products priced, the global core list (GCL) of pharmaceutical products classifies each item as either a branded pharmaceutical product (called an "original" or "international brand" in the GCL) or a generic pharmaceutical product (called a "generic" or "generic brand" in the GCL).

It is crucial that this distinction be followed when the products are priced. Specialists—for example, pharmacists—are well informed about the brand status of available products. It is also important, especially for generic products, to indicate the observed name of the generic medicine. For branded medicines, it is essential to note the observed name of the product, especially when this name differs from the one on the survey form or in the product catalog.

It is strongly recommended that the distinction between branded and generic drugs also be followed for region-specific pharmaceutical items if these have been introduced.

Pharmaceutical products are identified in this survey according to their *active substance* (i.e., the active ingredient of the product). The dosage on the list is typical; when it differs from the observed one, this information should be reported as a deviation and noted in the data collection form. The person responsible for filling out the form should report prices for the

specified pharmaceutical form or presentation of the product (such as tablets, syrup, or powder) when available. In the typical pharmacies of administrative centers or residential areas, all the substances in the list are available in the given pharmaceutical form (pill, tablet, syrup, injection, powder, cream, etc.).

*Quantity* is important for comparability. The observed quantity does not have to be exactly the same as the preferred quantity specified in the list. Even if the quantity ranges, for example, from 5 tablets (observed) to 30 tablets (preferred) or vice versa, the prices are recalculated to the preferred quantity before the national averages are generated. The Global Office recommends obtaining sufficient quotations for each product at all outlets. One to four quotations could be a minimum, but it may be that such numbers are typical in some areas. At least one quotation is needed for each active ingredient available in the given pharmaceutical form (product presentation).

The *product example* given and *image* shown in the ICP product catalog are included simply to facilitate understanding the product description; they are not necessarily the actual samples to be surveyed. For example, Aspegic is not the only medicine representing acetylsalicylic acid (commonly known as aspirin) in the form of sachets of powder. Depending on the location of the pharmacy, an alternative brand name could be priced, but it is critical to adhere strictly to the prescribed pharmaceutical form—say, sachets of powder for Aspegic. Indeed, this survey works like a medical prescription in an international context. All the substances listed are required in the prescribed pharmaceutical form and brand. This confirms the indicative nature of the example given, especially in a context in which the economy has specific foreign trade relations that determine the availability of products in the marketplace.

In the case of Aspegic, the observed quantity may not be exactly 20 sachets as in the list, or the dosage may differ slightly. But if the substance is available in the pharmacy with the given dosage or the specified number of sachets, it should be priced and recorded.

Specifications may slightly differ from the standard specification provided in the product catalog, but specified and observed products

must be comparable. In case of doubt, the assistance of the pharmacist is crucial because he or she is knowledgeable about the drug and able to ensure comparability. Communication between the NCAs and pharmacists is essential for better coordination of price collection. Including the pharmacist's name and contact (phone number) on the data collection form will serve that purpose.

### **Other Medical Products and Therapeutic Appliances and Equipment**

The GCL includes nine items for the other medical products and therapeutic appliances and equipment basic headings.

For the two basic headings referring to medical products, the normal ICP routine is followed on the types of item definitions employed, the sampling of outlets, and price collection. However, the prices observed in types of outlets other than pharmacies (e.g., supermarkets, low-cost optician chains, Internet shops) should be reported in accordance with their share of sales volume. The shop sample has to be representative. Because significant price differences are expected, relying only on one or the other shop type would not give correct national average prices.

## **OUTPATIENT SERVICES**

The outpatient services group covers three basic headings: medical services, dental services, and paramedical services. The global core list includes 12 items for these basic headings.

### **Price Sources**

Prices for outpatient health services would be collected *only from private service providers* because a segment of the public service providers is covered by the basic headings related to the health expenditure by government. Different approaches to comparison are employed for these basic headings.

The principle for distinguishing between *private* and *public* service providers (a "market producer" and a "nonmarket producer" in national accounts terms) should be in line with the distinction applied in the System of

National Accounts (Commission of the European Communities et al. 2008):

**Market producers** are establishments whose output is all or mostly market production. To be considered as a market producer, a unit must provide all or most of its output to others at prices that are *economically significant*. Economically significant prices are prices that have a significant effect on the amounts that producers are willing to supply and on the amounts purchasers wish to buy. These prices normally result when:

The producer has an incentive to adjust supply either with the goal of making a profit in the long run or, at a minimum, covering capital and other costs; and

Consumers have the freedom to purchase or not purchase and make the choice on the basis of the prices charged.

Private providers for the health sector can for example be self-employed doctors, dentists, nurses, private clinics, private health centers, private laboratories, private X-ray centers, etc. **Nonmarket producers** consist of establishments owned by government units or NPISHs [nonprofit institutions serving households] that supply goods or services free, or at prices that are not economically significant, to households or the community as a whole. These producers may also have some sales of secondary market output whose prices are intended to cover their costs or earn a surplus: for example, sales of reproductions by non-market museums. Though government and NPISHs may have establishments undertaking market production, including own account capital construction, most of their activity will be undertaken on a non-market basis.

### **Prices to Be Reported**

All prices reported for the items under outpatient services group should be *full market prices*. The full market price is the *total amount* that the private service provider receives for supplying the health service specified. Special attention is required because this can be the sum of payments made by different actors:

- Households
- Government

- Private insurance companies
- Nongovernmental organizations (NGOs), NPISHs, or other health-related actors.

If the prices paid by households are not the full market prices, the shares paid by other actors should be obtained. Moreover, it should be noted that actors may pay different amounts for the same service because of differently granted conditions, special arrangements, or government-sponsored health campaigns that target specific diseases and provide free or subsidized medicines, while households purchase everything else.

The main issue is to ensure that all the relevant price information is collected during the survey in order to calculate and report the full market prices.

### Pricing Scenarios

Reporting full market prices in a situation in which payments can be made by different actors results in different pricing scenarios. Price information can be obtained from

- Private service providers
- Appropriate government authorities such as ministries of health
- Private insurers
- NGOs, NPISHs, or other health-related actors.

Generally, four pricing scenarios can be identified:

1. *Full payment by household at purchase.* Household pays the full market price to the private service provider. This is the price to be reported. The fact that the household may be subsequently reimbursed by the government or a health insurer is not relevant.
2. *Partial payment by household at purchase.* Household pays only part of the full market price to the private service provider, with the government, private health insurer, NGO, or NPISH paying the remaining part of the full market price directly to the private service provider. The price to be reported is the "composite price"—that is, the amount paid by the household to the private service provider plus the amount paid by the other actor(s) to the private service provider.

3. *Full payment by government at purchase.* Household pays nothing to the private service provider, and the government covers the entire market price. The price to be reported is the amount paid by the government to the private service provider.

4. *Full payment by private insurer, NGO, or NPISH at purchase.* Household pays nothing to the private service provider, and the private insurer, NGO, or NPISH pays the full market price. The price to be reported is the amount paid by the private insurer, NGO, or NPISH to the private service provider.

For the second and third scenarios, the prices have to be obtained both from the service provider and from the government, private insurer, NGO, or NPISH. Regarding the government, the national social security system usually has price lists for different health services, often with thresholds. However, price collection may not be as straightforward as just implied. In some economies, households do not pay anything to the private service provider, who is subsequently reimbursed by the social security system in accordance with a general agreement between the government and the private health service provider. In other words, it may happen that no actual price exists for a particular service, only a lump sum from the government to a private service provider. This sum can be calculated based on, for example, the total number of visits to a given clinic or the size of the population living in a given area. As for private insurers, NGOs, or NPISHs, the situation can be similar—that is, it may not be possible to obtain directly prices related to a certain individual service.

Because of the differences in the national health service systems, the NSOs should study specific cases and find the best approaches to establishing reliable full market prices for the specified health services.

### REFERENCE

Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, and World Bank. 2008. *System of National Accounts 2008*. <http://unstats.un.org/unsd/nationalaccount/SNA2008.pdf>.

# Private Education: Approach and Data Requirements

To measure the cost of private education across economies, the 2011 round of the International Comparison Program (ICP) implemented a special survey for private education. The approach used ensured comparability with the ICP 2005 results. Transparency was ensured by sharing and validating with the national and regional coordinating agencies all the data used and the computation undertaken. The costs of public education were collected by means of the government compensation survey. Table 8.1 summarizes the methods implemented to measure the two types of education, private and public.

This chapter is a guideline to the survey on *private education*. The costs of *public education* were collected through the government compensation survey, as described in table 8.1.

## SURVEY FRAME

The average price of a private education is the national average price (capital city, rural, urban). Also, the prices collected are intended to represent all types of private schools in the economy (low-cost schools, high-cost schools, etc.).

The survey is conducted nationwide, in the capital city and also in several other areas (urban and rural). In ICP 2011, data were collected from at least five schools in the capital city and at least one school per area.

## ITEM LIST AND SPECIFICATIONS

The global list for private education consists of the seven items shown in table 8.2. Prior to the survey, economies look carefully at the specifications in order to price the appropriate items. Items may be split into more specific levels if so deemed by the regional coordinating agencies.

## DATA REQUIREMENTS

For the 2011 round of the ICP, data for the reference year 2011 were collected using the private education survey questionnaire prepared by the Global Office (see table 8.3). Annex B provides details for item 3 in table 8.3, and annexes C and D provide the details for items 1 and 2.

- If the academic year differed from the calendar year, tuition for the previous academic year and the number of school days of the academic year that fell in 2011 were needed to calculate the annual tuition for 2011 (for more information, see the last section of this chapter on pricing rules). In addition to data and metadata, the following information was needed, depending on the situation: If educational materials and educational support services were included in the collected tuition, an estimate of those costs was provided.

**Table 8.1** ICP Survey Methods for Private and Public Education, ICP 2011

Private education	Public education
<ul style="list-style-type: none"> <li>Private education is under household consumption: collection of private tuition fees.</li> <li>Method involves data collection by the participating economy.</li> <li>Regional purchasing power parities (PPPs) are computed by the regional coordinating agencies and are then linked to the global PPPs.</li> </ul>	<ul style="list-style-type: none"> <li>Public education is under government: collection of compensation of employees working in the public education sector plus productivity adjustment.</li> <li>Nine government occupations are related to education, each with four levels of experience.<sup>a</sup></li> </ul>

Source: ICP, <http://icp.worldbank.org/>.

a. For documentation on government occupations, refer to <http://icp.worldbank.org/>.

**Table 8.2** Basic Heading, Private Education, ICP 2011

Code	Basic heading and product name
111011.1	Education
111011.11	Primary education (primary)
111011.12	Secondary education (lower secondary)
111011.13	Secondary education (upper secondary)
111011.14	Tertiary education (computer science degree)
111011.15	Tertiary education (degree in humanities or social science)
111011.16	Other education programs (foreign language course or lessons)
111011.17	Other education programs (private lessons in mathematics—outside school hours)

Source: ICP, <http://icp.worldbank.org/>.

Note: In ICP 2011, specifications for the recommended items were provided by the Global Office (see annex A). The private education items were mostly in line with the International Standard Classification of Education (ISCED) of the United Nations Education, Scientific, and Cultural Organization (UNESCO), although the coding system followed the ICP 2011 classification and so the items do not necessarily map one to one with the ISCED classification.

**Table 8.3** Data Requirements and Collection Forms, Private Education, ICP 2011

	Data requirement	Data collection forms
1.	Average annual tuition or average hourly fees of private schools	Sheets 3.1–3.7
2.	All raw data and metadata	Sheets 3.1–3.7
3.	General education indicators: the number of private and public education institutions and the number of students enrolled at each level	Sheet 1, "General Indicators"

Source: ICP, <http://icp.worldbank.org/>.

- If the computation method differed from the instructions provided in this chapter, an explanatory note describing the way in which the prices were computed was submitted.
- Internet searches and telephone interviews with schools and other educational institutions were conducted if necessary.

The validity of the information was checked with the related ministries.

## DATA SOURCES

For ICP 2011, the data were collected from various sources:

- Information on annual tuition and its metadata were collected at the school level.
- Information on the general indicators for the number of students and schools in the economy was collected at the ministry level.

## PRICING RULES

### Average Annual Tuition for "Primary, Secondary, and Tertiary Private Education"

#### Annual Tuition for Primary and Secondary Education

The actual cost of private education for calendar year 2011 was required. Therefore, if the 2011



academic year began and ended in 2011, the tuition fee for calendar year 2011 was as provided and did not require any further calculation or adjustment.

If the academic year differed from the calendar year, the tuition for calendar year 2011 was estimated according to the total number of school days in 2011. In this case, the tuition for an average school day was calculated and multiplied by the number of school days in calendar year 2011 (see figure 8.1).

In figure 8.1, academic year 2010/2011 runs from calendar year 2010 into 2011, and academic year 2011/2012 runs from a later time in 2011 into 2012. In the formula,  $a_2$  is the number of school days from January 1, 2011, to the end of the first academic year, and  $b_1$  is the number of school days from the beginning of the second academic year to December 2011. The respective tuition fees for the two academic years are  $A$  and  $B$ . The actual cost of education for calendar year 2011 is estimated by adding the portions of tuition fees  $A$  and  $B$  that correspond respectively to  $a_2$  and  $b_1$ . Therefore, tuition fees for 2011 would be equal to  $C$ :

$$C = \frac{a_2}{a_1 + a_2} A + \frac{b_1}{b_1 + b_2} B. \quad (8.1)$$

This approach is consistent with national accounts valuations of relevant expenditures.

What follows is a description of the process used for data collection. Each data collection form has two main parts: box A, national standard information for all the observations, and box B, information for each observation (see annex C).

The following steps are taken to estimate the tuition fees for calendar year 2011 for each educational level. First, complete box A:

- Obtain and enter the national standard number of school days for the first academic year and the part of it that falls under (or intersects with) calendar year 2011; any vacations, holidays, and breaks should be excluded from counting.
- Obtain and enter the national standard number of school days for the second academic year and the part of it that falls under (or intersects with) calendar year 2011.
- Enter the start and end dates of each academic year.

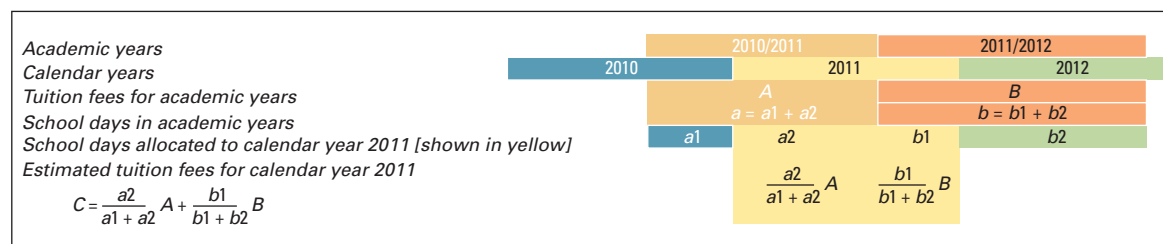
The number of school days is reported directly in box B in the appropriate cells for each observation. If for a particular school the

### Example of Box A Entry: Number of School Days in the School Year and in Calendar Year 2011

Academic year 1		Academic year 2	
(5) Number of school days <sup>a</sup>	(6) Number of school days that fall in calendar year 2011	(7) Number of school days <sup>a</sup>	(8) Number of school days that fall in calendar year 2011
202	<b>85</b>	200	<b>112</b>

a. Excluding all vacations and holidays. The number of school days should be the national standard number. It is automatically reflected in each observation in the table for observations. If the number is different for some observations, change items 5 and 6 of each observation (see example of box B entry that follows).

**Figure 8.1** Calculating Average Private School Tuition, 2010/2011 and 2011/2012, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

number of school days differs from the national standard, the actual number of school days for that observation is entered in box B.

Second, complete box B:

- Confirm that for a particular school the number of school days for the first or second academic year is the same as the national standard entered in box A. If it is different, enter the actual number of school days for that observation in the appropriate cell related
- For each observation, enter the number of school days of each academic year that intersects with calendar year 2011 if it is different from the national standard entered in box A.
- Enter the tuition for the first and the second academic years in the relevant cells.

### Example of Box B Entry: Sample Observation (Primary or Secondary)

Item #	Observation	Example	
1	Location (city, village, etc.)	Timber City (capital)	
2	School surveyed (name)	Oak Junior High	
3	Date of data collection (mm/dd/yyyy)	01/24/2012	
	Cost of private school	Academic year 1	Academic year 2
4	Tuition (course fee only)	11,600	12,200
5	Number of school days	202	200
6	Number of days that fall in calendar year 2011	85	115
7	<b>Annual tuition</b>	<b>11,896</b>	

Note: Suppose:

- The annual tuition for the 2010/2011 school year is 11,600 local currency units.
- The 2010/2011 school year has 202 school days of which 85 days fall in 2011.
- The 2011/2012 school year has 200 school days of which 115 days fall in 2011.
- The annual tuition for the 2011/2012 school year is 12,200 local currency units.

Thus the annual tuition for 2011 =  $(11,600/202) \times 85 + (12,200/200) \times 115 = 11,896$ .

The estimated tuition for calendar year 2011 is calculated automatically and reported by the system.

As explained in the data requirements section, if the method of calculating the annual tuition differs from the instruction provided here, an explanatory note is required in the box at the bottom of the survey forms.

If tuition is paid on a monthly basis, which could be the case in a high-inflation economy, the payments are added up to obtain the annual tuition, but the raw data (monthly data) should also be provided in the explanatory note:

### Example of Explanatory Note

<b>Explanatory note (if any):</b>	Tuition is on a monthly basis. We added up all the monthly tuitions in 2011 to get annual tuition. Feb: 1,300 Mar: 1,400 Apr: 1,500 May: 1,600 Aug: 1,700 Sep: 1,800 Oct: 1,900 Nov: 2,000 Dec: 2,100
-----------------------------------	--

### Annual Tuition for Tertiary Education

University tuition could be on an annual basis, a semester basis, or a credit basis. Therefore, it is much more difficult to measure the cost in the same unified way as that for a primary or secondary education. Because the purpose of data collection is to estimate the annual cost for 2011, if the academic system is organized on a semester basis the relevant tuitions would have to be added to obtain the annual cost. If tuition is based on the number of credits or

courses taken, one would have to estimate the average number of credits or courses taken by a standard student and then calculate an annual cost. If it is hard to estimate the average number of credits or courses, the minimum requirement needed for a full-time student should be used.

The forms also provide space to enter the number of days for which tuition is applied. This information is used to estimate tuition for the calendar year in an alternative way.

### Example of Observation for Tertiary 1, Case of Annual Tuition

Item #	Observation	Example	
1	Location (city, village, etc.)	Ocean district	
2	School surveyed (name)	Ocean Tech College	
3	Date of data collection (mm/dd/yyyy)	01/24/2012	
	Cost of private school	Academic year 1	Academic year 2
4	Tuition (course fee only)	15,800	
5	Number of school days	168	
6	Number of days that fall in calendar year 2011	168	
7	<b>Annual tuition</b>	<b>15,800</b>	

### Example of Observation for Tertiary 2, Case of Semester-Based Tuition

Item #	Observation	Example	
1	Location (city, village, etc.)	Timber City (capital)	
2	School surveyed (name)	Ebony University	
3	Date of data collection (mm/dd/yyyy)	01/24/2012	
	Cost of private school	Academic year 1	Academic year 2
4	Tuition (course fee only)	10,500	11,000
5	Number of school days	82	84
6	Number of days that fall in calendar year 2011	82	84
7	<b>Annual tuition</b>	<b>21,500</b>	

Note: Suppose:

- The first semester in 2011 lasts four months (82 days without holidays and weekends).
- The tuition for the first semester is 10,500 local currency units.
- The second semester in 2011 lasts four months (84 days without holidays and weekends).
- The tuition for the first semester is 11,000 local currency units.

Thus the tuition for the 2011 academic year is  $10,500 + 10,000 = 21,500$ .

### Example of Observation for Tertiary 3, Case of Tuition Based on Number of Credits or Courses

Item #	Observation	Example	
1	Location (city, village, etc.)	Ocean district	
2	School surveyed (name)	Ocean Tech College	
3	Date of data collection (mm/dd/yyyy)	01/24/2012	
	Cost of private school	Academic year 1	Academic year 2
4	Tuition (course fee only)	21,000	
5	Number of school days	160	
6	Number of days that fall in calendar year 2011	160	
7	<b>Annual tuition</b>	<b>21,000</b>	

Note: Suppose:

- One course (equal to three credits) costs 2,100 local currency units.
- The average number of courses taken by a student per year is 10 (equal to 30 credits).

Thus the tuition for the 2011 academic year is  $2,100 \times 10 = 21,000$ .

The explanatory note is fairly important in this case in order to validate the data.

#### *Average Annual Tuition*

After the data collection is finished and each observation has been adjusted and validated as

annual tuition, the simple arithmetic mean of all the observations for the item is calculated to obtain the average annual tuition. Each data collection sheet automatically counts the number of observations and calculates the average (see example).

### Example of Average Annual Tuition

(1) Number of observations	(2) Name of economy	(3) Average annual tuition	(4) Reported currency
<b>68</b>	Cedar Republic	<b>15,825</b>	Cedar dollar

### Average Hourly Fee for "Other Education Programs"

#### *Hourly Fee*

If a lesson lasts two hours at a cost of 80 local currency units, the hourly fee is  $(80/2 =) 40$ .

It is important to obtain the total number of hours for which the total fee is applied. The relevant calculation is carried out automatically on sheet 3 of the data collection form (*hourly*)—see annex D.

### Example of Observation for Other Educational Programs

Observation	1	2
Location (city, village, etc.)	Timber City	Ocean district
School surveyed (name)	John's Language School	Not applicable (home business)
Date of data collection (mm/dd/yyyy)	01/28/2012	01/28/2012
Cost of private school		
Fee (course fee only)	600	80
Number of class hours	12	2
<b>Hourly fee</b>	<b>50</b>	<b>40</b>

### Average Hourly Fee

After each observation is adjusted to be an hourly cost, the simple arithmetic mean of all the observations for the item should be calculated. On each data collection sheet, one can automatically count the number of observations and calculate the average.

### Cost for Education Only (Not Including Any Related Costs)

Both the average annual tuition and average hourly fee should not include payments for (1) educational materials such as textbooks and stationery and (2) educational support services such as health care services (e.g., vaccination),

transport services (e.g., school bus), catering services (e.g., meal fee), and accommodation services (e.g., boarding fee).

If and only if the total cost, including educational materials and educational support services, is available, one can estimate the cost of educational materials and support services and subtract them from the total cost in order to obtain the cost of the education.

As discussed earlier in the section on average annual tuition, the costs of educational materials and educational support services should be subtracted from the tuition of the appropriate school year before calculating annual tuition. These costs are also automatically calculated on each sheet of the data collection form.

### Example of Tuition, Including Educational Materials and Support Services

Item #	Observation	1	
1	Location (city, village, etc.)	Timber City (capital)	
2	School surveyed (name)	Oak Junior High	
3	Date of data collection (mm/dd/yyyy)	01/24/2012	
	Cost of private school	Academic year 1	Academic year 2
4	Tuition (course fee only)	19,200	21,600
5	Number of days in school	200	200
6	Number of days that fall in calendar year 2011	45	135
7	<b>Annual tuition</b>	<b>12,709</b>	
	Annual tuition should <i>exclude educational materials and support services</i> . If and only if they are included in the tuition, indicate (estimate) the amount below.	Estimate below only when the tuition includes educational materials and support services.	
8	Educational materials (books, stationery, etc.)		
9	Educational materials (books, stationery, etc.)	200	220
10	Educational support services		
11	Catering services (e.g., meal fee)	240	255
12	Accommodation services (e.g., boarding fee)	6,000	6,100
13	Transport services	200	220
14	Health care services	120	70
15	Other costs (e.g., association fee)	40	40
16	<b>Total for materials and services</b>	<b>6,800</b>	<b>6,905</b>

## Annex A

### Product Specifications, Education, ICP 2011

Structured product description						
Education						
Core list code	Product name	Number of units	Unit of measurement	Characteristic		
				Age of student	Type	Level of education
111011.11	Primary education	1	Year	6	Day school	
111011.12	Secondary education (lower secondary)	1	Year	11	Day school	Entry after completion of primary education
111011.13	Secondary education (upper secondary)	1	Year	15	Day school	General school leaving certificate giving access to university-level education
111011.14	Tertiary education (computer science degree)	1	Year	18–22	Full-time study	First degree (bachelor's, license, diploma, etc.)
111011.15	Tertiary education (humanities or social science degree)	1	Year	18–22	Full-time study	First degree (bachelor's, license, diploma, etc.)
111011.16	Other educational programs (foreign language course or lessons)	1	Hour	Any (not for small children)	Class lesson (10–20 students in a class)	Intermediate level at a language school
111011.17	Other educational programs (private lessons in mathematics—tutoring outside school hours)	1	Hour	15–16	Private tutoring (one student with one tutor)	Tutoring (secondary education level)

Education				
Core list code	Product name	Characteristic		Student
		Field of study	Language in class	
111011.11	Primary education		Official language	A resident (national of the economy concerned)
111011.12	Secondary education (lower secondary)		Official language	A resident (national of the economy concerned)
111011.13	Secondary education (upper secondary)		Official language	A resident (national of the economy concerned)
111011.14	Tertiary education (computer science degree)	Computer science	Official language	A resident (national of the economy concerned)
111011.15	Tertiary education (humanities or social science degree)	Humanities or social science (sociology recommended)	Official language	A resident (national of the economy concerned)
111011.16	Other educational programs (foreign language course or lessons)	English or French language (for non-native student)	English or French language (for nonnative student)	
111011.17	Other educational programs (private lessons in mathematics—tutoring outside school hours)	Mathematics	Official language	

**Annex A** (Continued)

Education				
Core list code	Product name	Characteristic		Comments
		Fee	Excluding	
111011.11	Primary education	Average annual tuition per student	Payments for educational materials and educational support services	
111011.12	Secondary education (lower secondary)	Average annual tuition per student	Payments for educational materials and educational support services	
111011.13	Secondary education (upper secondary)	Average annual tuition per student	Payments for educational materials and educational support services	
111011.14	Tertiary education (computer science degree)	Average annual tuition per student	Payments for educational materials and educational support services	
111011.15	Tertiary education (humanities or social science degree)	Average annual tuition per student	Payments for educational materials and educational support services	
111011.16	Other educational programs (foreign language course or lessons)	Average hourly fee per student	Payments for educational materials and educational support services	
111011.17	Other educational programs (private lessons in mathematics—tutoring outside school hours)	Average hourly fee per student	Payments for educational materials and educational support services	Qualified tutor

Source: ICP, <http://icp.worldbank.org/>.

## Annex B

### General Education Indicators, Private and Public Education, ICP 2011

	General education indicator (country level)	(thousands)
1	School-age population	
2	<i>Number of students in private school</i>	
3	Primary education	
4	Secondary education	
5	Lower secondary <sup>a</sup>	
6	Upper secondary <sup>a</sup>	
7	Tertiary education	
8	<i>Number of students in public school</i>	
9	Primary education	
10	Secondary education	
11	Lower secondary <sup>a</sup>	
12	Upper secondary <sup>a</sup>	
13	Tertiary education	
14	<i>Number of private schools</i>	
15	Primary education	
16	Secondary education	
17	Lower secondary <sup>a</sup>	
18	Upper secondary <sup>a</sup>	
19	Tertiary education	
20	<i>Number of public schools</i>	
21	Primary education	
22	Secondary education	
23	Lower secondary <sup>a</sup>	
24	Upper secondary <sup>a</sup>	
25	Tertiary education	
26	<i>Source of information</i>	

Source: ICP, <http://icp.worldbank.org/>.

a. If available.



## Annex C

### Data Collection Form, Private Education (Average Annual Tuition), ICP 2011

Data Collection Form 1 (Primary education)			
Box A: National standard information for primary education			
ICP code	ICP item name		Reference year
111011.1	Primary education		2011
(1) Number of observations	(2) Name of country	(3) Average annual tuition	(4) Reported currency
Academic year 1		Academic year 2	
(5) Number of school days <sup>a</sup>	(6) Number of school days that fall in calendar year 2011	(7) Number of school days <sup>a</sup>	(8) Number of school days that fall in calendar year 2011
(9) Start date (mm/dd/yyyy)	(10) End date (mm/dd/yyyy)	(11) Start date (mm/dd/yyyy)	(12) End date (mm/dd/yyyy)

a. Excluding all vacations and holidays. The number should be the national standard number. It will automatically be reflected in each observation below. If the number is different for certain observations, change items 5 and 6 for each observation. Any changes made will be highlighted.

Box B: Information for each observation					
Item #	Observation	Example		1	
1	Location (city, village, etc.)	Timber City (capital)			
2	School surveyed (name)	Forest Elementary			
3	Date of data collection (mm/dd/yyyy)	01/24/2012			
	Cost of private school	Academic year 1	Academic year 2	Academic year 1	Academic year 2
4	Tuition (course fee only)	19,200	21,600		
5	Number of school days	200	200		
6	Number of school days that fall in calendar year 2011	85	115		
7	Annual tuition	<b>20,580</b>			
Annual tuition should <i>exclude educational materials and educational support services</i> . If and only if they are included in the above tuition, please indicate (estimate) the amount below.				Only when the tuition above includes educational materials and educational support services, estimate below.	
8	Educational materials				
9	Educational materials (books, stationery, etc.)				
10	Educational support services				
11	Catering services (meal fee)				
12	Accommodation services (boarding fee)				
13	Transport services				
14	Health care services				
15	Other cost (e.g., association fee)				
16	Total for materials and services				
17	Explanatory note (if any):				

Source: ICP, <http://icp.worldbank.org/>.

## Annex D

### Data Collection Form, Private Education (Average Hourly Fee), ICP 2011

Data Collection Form 6 (Other education—foreign language—hourly fee)			
Box A: National standard information for other education—foreign language			
ICP code	ICP item name		Reference year
111011.16	Other educational programs (foreign language course or lessons)		2011
(1) Number of observations	(2) Name of country	(3) Average hourly fee	(4) Reported currency
Box B: Information for each observation			
	Observation	Example	1
1	Location (city, village, etc.)	Timber City (capital)	
2	School surveyed (name)	John's Language School	
3	Date of data collection (mm/dd/yyyy)	01/28/2012	
	<b>Cost of private school</b>		
4	Fee (course fee only)	600	
5	Number of class hours	12	
6	Hourly fee	50.0	
Hourly educational fees should exclude <i>educational materials and educational support services</i> . If and only if they are included in the above tuition, please indicate (estimate) the amount below.			Estimate the amount below only when the fee above includes educational materials and educational support services.
7	<b>Educational materials</b>		
8	Educational materials (books, stationery, etc.)		
9	<b>Educational support services</b>		
10	Catering services (e.g., meal fee)		
11	Accommodation services (e.g., boarding fee)		
12	Transport services		
13	Health care services		
14	Other costs (e.g., association fee)		
15	<b>Total for materials and services</b>		
16	<b>Explanatory note (if any):</b>		

Source: ICP, <http://icp.worldbank.org/>.

# Housing: Approach and Data Requirements

For the housing basic headings, like the other basic headings, two broad components must be addressed: (1) how to estimate household expenditures on dwelling services in the gross domestic product (GDP), and (2) how to calculate purchasing power parities (PPPs) in accordance. Before delving into the methodology, it is important that readers understand what needs to be computed for which basic headings.

According to the International Comparison Program (ICP) Classification, two categories<sup>1</sup> relate directly to dwelling services (see table 9.1). Under these two categories, two basic headings—110411.1, actual and imputed rentals for housing, and 130111.1, housing—require price data on rentals. For the rest of the basic headings, economies collect prices through the household final consumption survey. Because basic heading 130111.1, housing, under the government section uses the PPPs for 110411.1, actual and imputed rentals for housing, as reference PPPs, it is sufficient to focus on how to compute PPPs for actual and imputed rentals.

What distinguishes dwelling services from other segments of the ICP and makes them comparison-resistant is that the price collection method is not straightforward. To further explain, dwellings fall into two subsets—rented dwellings and owner-occupied dwellings. For rented housing, it is easier to tell how much tenants are paying for dwelling services, whereas owner-occupied housing is more complex.

Regardless, households' consumption expenditures should include both the actual expenditure by households on rents for dwellings and an estimate of how much owner-occupiers would have to pay if they had to pay rent for their dwellings instead of owning them, as defined in the System of National Accounts (SNA).

## DEFINITIONS OF HOUSING STOCKS

Definitions and stratifications of housing stocks differ significantly across economies. The ICP has adopted the structured product description (SPD) approach for the household final consumption survey. Definitions of housing stocks help ensure consistency of comparisons across economies and regions. The information in this section is intended to serve as a guideline; national coordinating agencies would clearly indicate where national usage differs from the guideline and specify their treatment in the national accounts.

### Dwelling Type

#### *Modern Dwellings*

Modern dwellings are generally built by professional building enterprises. The walls are made of durable materials such as concrete, ceramic bricks, cement blocks, plywood, or wooden planking, and the roofs are covered in tiles,

**Table 9.1** Housing Classification, ICP 2011

<b>110000</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS</b>
<b>110400</b>	HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS
<b>110410</b>	ACTUAL AND IMPUTED RENTALS FOR HOUSING
<b>110411</b>	<i>Actual and imputed rentals for housing</i>
<b>110411.1</b>	Actual and imputed rentals for housing
<b>110430</b>	MAINTENANCE AND REPAIR OF THE DWELLING
<b>110431</b>	<i>Maintenance and repair of the dwelling</i>
<b>110431.1</b>	Maintenance and repair of the dwelling
<b>110440</b>	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING
<b>110441</b>	<i>Water supply</i>
<b>110441.1</b>	Water supply
<b>110442</b>	<i>Miscellaneous services relating to the dwelling</i>
<b>110442.1</b>	Miscellaneous services relating to the dwelling
<b>110450</b>	ELECTRICITY, GAS, AND OTHER FUELS
<b>110451</b>	<i>Electricity</i>
<b>110451.1</b>	Electricity
<b>110452</b>	<i>Gas</i>
<b>110452.1</b>	Gas
<b>110453</b>	<i>Other fuels</i>
<b>110453.1</b>	Other fuels
<b>130000</b>	<b>INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT</b>
<b>130100</b>	HOUSING
<b>130110</b>	HOUSING
<b>130111</b>	<i>Housing</i>
<b>130111.1</b>	Housing

Source: ICP, <http://icp.worldbank.org/>.

wooden shingles, or metal sheeting. Such dwellings usually have facilities such as electricity, piped water, and indoor toilets. Most dwellings in urban areas are classified as modern.

Typically, modern dwellings are classified as houses or apartments. However, this breakdown is not always captured in dwelling stock enumerations or used in national account estimations.

A house stands alone in its own grounds, separated from other dwellings by at least half a meter (although a flat, such as a granny flat, may be attached to it or a converted garage).

Some economies may distinguish between a separate house and a semidetached, row, or terrace house or a townhouse that is attached to one or more similar dwellings, typically sharing a common wall or walls. These dwellings have their own private grounds and no other dwelling above or below them. The owners of such dwellings are responsible for maintaining and repairing the roof and exterior walls.

Flats, units, and apartments are dwellings that are usually multistory and do not have their own private grounds. Generally, they share a common entrance foyer or stairwell. Units in multistory buildings may also be owned as condominiums and cooperatives or rented. In either case, the maintenance costs for external and common areas are included in the rents or fees.

### **Traditional Dwellings**

Traditional dwellings are generally built by family members or other unpaid labor. The walls are made of less durable materials such as dried clay, bamboo, or latticework, and the roof is made of reeds, straw, or palm fronds. Traditional dwellings may or may not have electricity or piped water, let alone other facilities. These dwellings are generally located in rural areas. Some complications associated with this typology are the following:

- Many dwellings in or very near to large cities such as shanty towns or *favelas* meet the definition of a traditional dwelling. These may be rented or owner-occupied. If these dwellings are built of durable materials such as cinder blocks and have electricity and piped water, they should be classified as modern housing.
- Many dwellings in rural areas may be built with family labor but use cinder block or other durable wall and roof construction, often with at least piped water and electricity. Furthermore, self-built housing in urban areas may be of modern construction, often of high quality. Such dwellings should be classified as modern housing.
- Some economies characterize structures as of poor, fair, or good construction, which does not fit neatly into the modern-traditional dichotomy. However, poor construction in rural areas may safely be classified as traditional housing.

## Facilities

This section describes the types of facilities that may be found in a modern dwelling.

*Electricity* is usually the main electricity supplied by a generating company. However, electricity may also be generated by the household itself such as from a diesel or gasoline generator or wind power.

*Inside water* is either running water that is piped into the dwelling itself or water from an underground spring or well that is for the exclusive use of the household. A dwelling that takes water from a communal standpipe or well should not be counted as a dwelling with inside water.

A *private toilet* may be either a water-flushing WC-type toilet or a chemical toilet. It is for the exclusive use of the occupants of the dwelling unit and has running water. The toilet may be inside the dwelling or in a separate structure.

*Central heating, air-conditioning, or both* are found primarily in modern construction in urban areas. Because information about these facilities will be helpful in linking economies with different qualities of housing stock, the economies should provide whatever information is available. Air-conditioning may be a central system or room systems covering most of the living area.

## Living Space

Economies record living space in terms of number of rooms, square meters, or both. The rental survey (to be covered later) uses square meters as a measure; the dwelling services questionnaire also asks for number of rooms. In the calculations of PPPs, the unit of measure is the actual or imputed rent per square meter by dwelling type, size of dwelling, or in total. Economies that record only the number of rooms in their regular survey are asked to supply a rough estimate of the relationship of the number of square meters to the number of rooms, taking into account the definition of rooms. (Rooms include bedrooms, sitting rooms, dining rooms, study rooms, play rooms, and the like, but exclude kitchens, hallways, shower rooms, bathrooms, and toilets.)

Usable surface is the floor area of living rooms, kitchens, utility rooms, shower rooms, bathrooms, toilets, and hallways, minus the wall thickness and door and window recesses. Stairs, open balconies and terraces, and cellars and lofts (when not equipped as usable premises) are not included. For attics, only the section with a ceiling height of at least 1.7 meters is included. In practice, few economies have housing statistics that use this exact definition, but approximations are accepted.

## Location

There is no standard international definition of *urban* and *rural*. Economies should use their own definitions of large and small urban and classify all other areas as rural.

## ESTIMATING HOUSEHOLD EXPENDITURES ON DWELLING SERVICES

According to the System of National Accounts, household consumption expenditures should include both the actual expenditures by households on rents for dwellings and an estimate of how much owner-occupiers would have paid in rent if they had to rent their dwellings instead of own them.

This estimate is referred to as an "imputation," and the SNA suggests that the best way to make the imputation is to use the rents actually paid for similar dwellings. Thus, for example, the rent of an owner-occupier living in her own two-story, six-room detached house with 200 square meters of floor space in a suburb of the capital city is to be imputed at the average rent actually paid for a similar dwelling in a similar location.

To make these imputations, the national accounts compiler will need information on the rents being paid for different kinds of houses and apartments in different parts of the economy.

In many economies, however, dwellings are only available for rent in a few locations, and the few that are available for rent may not be typical of the majority of dwellings in the economy. For example, they may be only luxury dwellings for the highly paid expatriate

managers of foreign-owned companies, or they may be basic dwellings with few amenities for low-paid migrant workers.

Also in many developing economies, people in rural areas construct their own houses using traditional materials such as bamboo, mud, wattle, thatch, or palm leaves, and these buildings are almost never rented.

Because of these problems, the estimates in the national accounts for dwellings are very often understated in many economies. Some economies make no imputation for rents of owner-occupied dwellings, and others impute only rents for owner-occupied dwellings in urban areas and do not make any imputation for traditional dwellings in rural areas.

## CALCULATING PPPs FOR DWELLING SERVICES

This section reviews two methods for calculating PPPs for dwelling services: the standard method and the quantity method.

### Standard Method

The standard method for calculating PPPs for dwelling services is exactly the same as that for any other service: PPPs are obtained by averaging price relatives (in this case rent relatives) for identical, or very similar, dwelling services in each economy. This method has been found to work well in economies in which the dwellings actually rented are representative of the stock of dwellings as a whole and in which the statistical agencies collect information on rents paid for the different kinds of dwellings that are rented in most parts of the economy.

For ICP 2011, all economies were asked to provide information on rents for dwellings using the rental survey questionnaire prepared by the Global Office. This questionnaire asked economies to report the average rents paid for several different types of dwellings (e.g., houses and apartments) with several different kinds of amenities (e.g., electricity and private toilet).

Rents were to be reported separately for dwellings in rural and urban areas. Information from the rental survey was used to calculate PPPs for dwelling services for those economies

able to complete all or most of this questionnaire. These are economies in which many different kinds of dwellings are rented and in which the statistical office has a national rental survey. These economies can then calculate the average rents for the dwelling specified in the questionnaire.

Many economies may have been able to complete only a few parts of the questionnaire, but all economies were asked to try to complete as much as possible. For example, it is often possible to use even limited rental surveys for selected areas, such as major urban centers, as a useful check on rental PPPs derived from the quantity approach (see next section). The global rental specifications for the standard method of surveying dwelling services appear in table 9.2.

For ICP 2011, eight criteria were used to classify dwellings, including traditional dwellings, into 64 categories: (1) dwelling type, (2) size, (3) electricity, (4) inside water, (5) private toilet, (6) private kitchen, (7) air-conditioning or central heating, and (8) structure age (see table 9.2). The "reference size" was the size for which average rents were to be provided if possible, but rents for dwellings falling within the ranges shown in the preceding column could also be accepted. Very few characteristics were used because economies would not be able to supply the information if a more detailed classification were included. Nevertheless, the classification theoretically covered the large majority of dwellings in the economies taking part in the comparisons.

Location—a key characteristic in determining rents—is not specified as a part of SPDs; it is a separate column to be filled in by the national coordinating agencies. Ideally, economies would be able to provide averages of the rents paid in all locations. However, because of data availability in most cases, what economies have been able to provide may not take into account the differences in rents that arise because dwellings are in more or less desirable locations.

When employers provide their employees with free or inexpensive accommodations, these rents must be adjusted to market levels in calculating the final expenditure on dwelling services. Thus the rents paid by such employees should not be used in estimating rents for specified types of dwellings unless they can be adjusted to full market prices. The same

**Table 9.2** Global Rental Specifications, ICP 2011

Dwelling type	Size (m <sup>2</sup> )	Approx. size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity	Inside water	Private toilet	Private kitchen	A/C or central heating	Structure age
Villa/ single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	Yes	<5 years
Villa/ single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	Yes	>5 years
Villa/ single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	No	<5 years
Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	No	>5 years
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	Yes	<5 years
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	Yes	>5 years
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	No	<5 years
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	No	>5 years
Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes	Yes	Yes	Yes	Yes	<5 years
Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes	Yes	Yes	Yes	Yes	>5 years

Source: ICP, <http://icp.worldbank.org/>.

Note: A/C = air-conditioning.

consideration applies to rents that are subsidized by government. Subsidized rents should not be reported as rents for specified types of dwellings unless they can be adjusted to full market prices (i.e., the rent actually paid plus the subsidy).

Rental surveys can be carried out in different ways. In some economies, they are based on household budget/expenditure surveys, but more commonly the information on rents is derived from inquiries addressed to real estate agents. It is also possible to use information from classified advertisements in the general press or specialized publications. If an economy does not already have an ongoing rental survey that provides comprehensive information on rents, it cannot use the standard approach; it must use the quantity method.

### Quantity Method

The ICP 2005 round revealed that many economies cannot supply information on rents that can be used to calculate PPPs by the standard method. When economies are able to complete only a few parts of the dwelling services questionnaire (as was the case with some economies in ICP 2005), an alternative method of calculating PPPs is applied—the quantity method. This approach involves calculating volumes of housing services in each economy and requires completion of the dwelling services questionnaire.

For each pair of economies, bilateral PPPs are obtained by dividing the ratios of the volumes

of dwelling services into their "expenditures relatives"; these relatives are the ratios of the two economies' expenditures on actual and imputed rents for dwellings taken from the national accounts.

The volume of dwelling services is obtained in two stages. First, the quantity of dwelling services is calculated using a simple measure: either the floor space or the number of rooms in a dwelling. Quality indicators referring to amenities such as electricity and running water are then used when these quantity measures are converted into volume measures. In the ICP 2011 round, all economies were required to complete the dwelling services questionnaire, which collects the information needed to calculate these volume measures. Economies able to calculate PPPs directly using rent statistics were also requested to complete the dwelling services questionnaire for linking purposes. Comparison of the PPPs for the economies from the standard method and the quantity method is a useful validation step.

The accuracy of the PPPs obtained using the quantity method depends on the accuracy of both the volume ratios and the expenditure ratios. This is an additional reason why economies should improve their estimates of expenditures on rents using the user cost method. If the expenditure ratios are wrong, the indirect PPPs obtained will also be wrong in the same way that indirectly obtained quantities obtained from direct rental PPPs will be inaccurate if the

expenditures are not measured correctly (see chapter 9 for the user cost method).

The key points when constructing the volume index (note that the quantity approach uses both quantitative and qualitative data) are as follows:

- The quantitative data are, in order of preference, the usable surface of dwellings, the number of rooms, and the number of dwellings. One of these quantity measures is taken as the quantity index.
- The qualitative data are the percentages of dwellings with facilities such as electricity, an inside water supply, private toilets, and air-conditioning or central heating. The percentages of dwellings with these various facilities are averaged to produce a quality index.
- The quantity index is multiplied by the quality index to obtain the volume index, which in turn is used to measure the relative volumes of dwelling services provided in each economy.

The mechanics of the quantity approach are explained by means of the worked example in table 9.3. In this example, the quantity index is the usable surface of the dwelling and the quality index is the average of the percentages of dwellings that have one of the three facilities shown—electricity, inside water, and inside toilet.

As shown in table 9.3, the volume index of the dwelling stock is obtained by multiplying

the quantity index by the quality index. Note that although economy B has a much larger usable surface of dwellings than economy A, in this example, the quality of economy B's dwellings is lower than that of economy A. When the amount of floor space is adjusted for differences in quality, the volume of dwelling services in the two economies is nearly the same. Although the worked example is for two economies, the volume measures derived would be made transitive in a multilateral comparison.

## RENTAL SPECIFICATIONS

To select the dwelling types for the rental survey, the Global Office began by formulating a list of rental specifications based on research findings and international classifications, including those compiled by the United Nations (2008, 209–11) and by the Eurostat–Organisation for Economic Co-operation and Development (OECD). The initial list was then modified based on the ICP 2005 experience in several regions in order to better serve regional needs. Proposed dwelling services were presented, discussed, and endorsed in meetings of the ICP's Technical Advisory Group (TAG) and regional coordinating agencies. The rental specifications for dwelling services appear in table 9.4.

**Table 9.3** Worked Example of the Quantity Approach, ICP 2011

1. Estimation of <b>quantity index</b> for economy B relative to economy A	Usable surface of dwellings in economy A: 240 million m <sup>2</sup>					
	Usable surface of dwellings in economy B: 375 million m <sup>2</sup>					
	Quantity index for economy B relative to economy A: $375/240 = 1.56$					
2. Estimation of <b>quality index</b> for economy B relative to economy A	Facility	No. of dwellings with given facility (thousands)		Weight	Share of dwellings with given facility (%)	
		Economy A	Economy B		Economy A	Economy B
	Electricity	2,900	6,411	0.333	100	84
	Inside water	2,863	4,503	0.333	99	59
	Inside toilet	2,729	3,739	0.333	94	49
	Total	2,900	7,632	1.000	98	64
	Quality index for economy B relative to economy A: $64/98 = 0.65$					
3. Estimation of <b>volume index</b> for economy B relative to economy A	Volume index equals quantity index times quality index: $1.56 \times 0.65 = 1.01$					

Source: ICP, <http://icp/worldbank.org/>.



**Table 9.4** Global Rental Specifications, Dwelling Services, ICP 2011

GLOBAL SPECIFICATIONS											OBSERVATIONS		
Dwelling type	Size (m <sup>2</sup> )	Approx. size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity	Inside water	Private toilet	Private kitchen	A/C or central heating	Structure age	Yearly rent (LCU)	Location (urban/rural)	Comments
Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	Yes	< 5 years			
Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	Yes	> 5 years			
Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	No	< 5 years			
Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	No	> 5 years			
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	Yes	< 5 years			
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	Yes	> 5 years			
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	No	< 5 years			
Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes	Yes	Yes	Yes	No	> 5 years			
Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes	Yes	Yes	Yes	Yes	< 5 years			
Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes	Yes	Yes	Yes	Yes	> 5 years			
Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes	Yes	Yes	Yes	No	< 5 years			
Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes	Yes	Yes	Yes	No	> 5 years			
Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes	Yes	Yes	Yes	Yes	< 5 years			
Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes	Yes	Yes	Yes	Yes	> 5 years			
Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes	Yes	Yes	Yes	No	< 5 years			
Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes	Yes	Yes	Yes	No	> 5 years			
Attached house/row house	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	Yes	< 5 years			
Attached house/row house	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	Yes	> 5 years			
Attached house/row house	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	No	< 5 years			
Attached house/row house	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	No	> 5 years			

*table continues next page*

**Table 9.4** (Continued)

GLOBAL SPECIFICATIONS											OBSERVATIONS		
Dwelling type	Size (m <sup>2</sup> )	Approx. size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity	Inside water	Private toilet	Private kitchen	A/C or central heating	Structure age	Yearly rent (LCU)	Location (urban/rural)	Comments
Attached house/row house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	Yes	< 5 years			
Attached house/row house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	Yes	> 5 years			
Attached house/row house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	No	< 5 years			
Attached house/row house	120–180	1,300–1,950	150	1,600	Yes	Yes	Yes	Yes	No	> 5 years			
Attached house/row house	180–240	1,950–2,600	210	2,200	Yes	Yes	Yes	Yes	Yes	< 5 years			
Attached house/row house	180–240	1,950–2,600	210	2,200	Yes	Yes	Yes	Yes	Yes	> 5 years			
Attached house/row house	180–240	1,950–2,600	210	2,200	Yes	Yes	Yes	Yes	No	< 5 years			
Attached house/row house	180–240	1,950–2,600	210	2,200	Yes	Yes	Yes	Yes	No	> 5 years			
Studio apartment	15–35	160–380	25	270	Yes	Yes	Yes	Yes	Yes	< 5 years			
Studio apartment	15–35	160–380	25	270	Yes	Yes	Yes	Yes	Yes	> 5 years			
Studio apartment	15–35	160–380	25	270	Yes	Yes	Yes	Yes	No	< 5 years			
Studio apartment	15–35	160–380	25	270	Yes	Yes	Yes	Yes	No	> 5 years			
Studio apartment	35–60	380–650	45	480	Yes	Yes	Yes	Yes	Yes	< 5 years			
Studio apartment	35–60	380–650	45	480	Yes	Yes	Yes	Yes	Yes	> 5 years			
Studio apartment	35–60	380–650	45	480	Yes	Yes	Yes	Yes	No	< 5 years			
Studio apartment	35–60	380–650	45	480	Yes	Yes	Yes	Yes	No	> 5 years			
One-bedroom apartment	40–60	430–650	50	540	Yes	Yes	Yes	Yes	Yes	< 5 years			
One-bedroom apartment	40–60	430–650	50	540	Yes	Yes	Yes	Yes	Yes	> 5 years			

**Table 9.4** (Continued)

GLOBAL SPECIFICATIONS											OBSERVATIONS		
Dwelling type	Size (m <sup>2</sup> )	Approx. size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity	Inside water	Private toilet	Private kitchen	A/C or central heating	Structure age	Yearly rent (LCU)	Location (urban/rural)	Comments
One-bedroom apartment	40–60	430–650	50	540	Yes	Yes	Yes	Yes	No	< 5 years			
One-bedroom apartment	40–60	430–650	50	540	Yes	Yes	Yes	Yes	No	> 5 years			
One-bedroom apartment	60–80	650–850	70	750	Yes	Yes	Yes	Yes	Yes	< 5 years			
One-bedroom apartment	60–80	650–850	70	750	Yes	Yes	Yes	Yes	Yes	> 5 years			
One-bedroom apartment	60–80	650–850	70	750	Yes	Yes	Yes	Yes	No	< 5 years			
One-bedroom apartment	60–80	650–850	70	750	Yes	Yes	Yes	Yes	No	> 5 years			
Two-bedroom apartment	60–80	540–850	70	750	Yes	Yes	Yes	Yes	Yes	< 5 years			
Two-bedroom apartment	60–80	540–850	70	750	Yes	Yes	Yes	Yes	Yes	> 5 years			
Two-bedroom apartment	60–80	540–850	70	750	Yes	Yes	Yes	Yes	No	< 5 years			
Two-bedroom apartment	60–80	540–850	70	750	Yes	Yes	Yes	Yes	No	> 5 years			
Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	Yes	< 5 years			
Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	Yes	> 5 years			
Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	No	< 5 years			
Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	No	> 5 years			
Typical/traditional dwelling	25–75	270–800	50	540	Yes	Yes	Yes	Yes	No	< 5 years			
Typical/traditional dwelling	25–75	270–800	50	540	Yes	Yes	Yes	Yes	No	> 5 years			
Typical/traditional dwelling	25–75	270–800	50	540	Yes	Yes	No	No	No	< 5 years			
Typical/traditional dwelling	25–75	270–800	50	540	Yes	Yes	No	No	No	> 5 years			
Typical/traditional dwelling	25–75	270–800	50	540	No	No	No	No	No	< 5 years			

table continues next page

**Table 9.4** (Continued)

GLOBAL SPECIFICATIONS											OBSERVATIONS		
Dwelling type	Size (m <sup>2</sup> )	Approx. size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity	Inside water	Private toilet	Private kitchen	A/C or central heating	Structure age	Yearly rent (LCU)	Location (urban/rural)	Comments
Typical/traditional dwelling	25–75	270–800	50	540	No	No	No	No	No	> 5 years			
Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	No	< 5 years			
Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes	Yes	Yes	Yes	No	> 5 years			
Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes	Yes	No	No	No	< 5 years			
Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes	Yes	No	No	No	> 5 years			
Typical/traditional dwelling	80–120	850–1,300	100	1,000	No	No	No	No	No	< 5 years			
Typical/traditional dwelling	80–120	850–1,300	100	1,000	No	No	No	No	No	> 5 years			

Source: ICP, <http://icp.worldbank.org/>.

Note: A/C = air conditioning; LCU = local currency unit. In the table, the following clarifications about global specifications apply:

- Global specifications must be reviewed by the regional coordinating agencies (much as in the core list review process). The regional coordinating agencies pick from this list of specifications those that are relevant to their regions.
- For each specification, economies can record multiple observations for different geographic locations. An average yearly rent is calculated for urban, rural, and national.
- Urban and rural: there are no standard international definitions of *urban* and *rural*. Economies should use their own definitions of large and small urban and classify all other areas as rural.
- Prices should be based on market rents. Subsidized rents such as those paid by employees living in dwellings owned by their employers or by tenants in low-rent public housing are not market rents and should not be reported on this questionnaire. The market rents actually paid are collected by means of a price survey—the rental survey—for a selection of well-defined products—or dwellings—and the PPPs are calculated from the prices collected.
- Size refers to the inside usable surface of each dwelling. Usable surface is the floor area of living rooms, kitchens, utility rooms, shower rooms, bathrooms, toilets, and hallways, minus the wall thickness and door and window recesses. Stairs, open balconies and terraces, and cellars and lofts (when not equipped as usable premises) are not included. For attics, only the section with a ceiling height of at least 1.7 meters is included. In practice, few economies have housing statistics that use this exact definition, but near approximations can be accepted.
- Traditional dwellings are generally built by family members. The walls are made of less durable materials such as dried clay, bamboo, or latticework, and the roofs are made of reeds, straw, or palm fronds. Traditional dwellings do not usually have amenities.
- Electricity is usually the main electricity supplied by a generating company. Electricity may also be generated by the household itself from a diesel or gasoline generator, solar panels, or wind power.
- Inside water is either running water that is piped into the dwelling itself or water from an underground spring or well that is for the exclusive use of the household. A dwelling that takes water from a communal standpipe or well should not be counted as a dwelling with inside water.
- Private toilets are for the exclusive use of the occupants of the dwelling unit and have running water. The toilet may be inside the dwelling or in a separate structure.

The criterion of five years for the age of dwellings was proposed after discussions during the TAG meetings. TAG members noted that age structure was a price-determining characteristic and that new buildings were generally less than five years of age. However, this criterion can be adjusted by regions

according to their own situations. In other words, these are global specifications that should be reviewed by the regional coordinating agencies. For example, one region can contemplate distinguishing between dwellings less than 10 years of age and those more than 10 years of age. The regional coordinating

**Table 9.5** Weight in Total Rental Stock, ICP 2011

Dwelling type	Percentage weight in total rental stock
Villa/single-family house	
Attached house/row house	
Apartment	
Typical/traditional house	

Source: ICP, <http://icp.worldbank.org/>.

Note: The weight in total rental stock for the broad dwelling types should be reported by each economy when available.

agencies can pick from this list of specifications those that are relevant to their regions. They can also customize the definitions and descriptions of rental dwellings. Because these rental data will not be used for linking, they can be region specific.

The rental specifications form includes the yearly rent in local currency and the percentage weight in total rental stock for each type of dwelling (table 9.5).

Possible sources for estimating weights in total rental stock are the consumer price index (CPI), household expenditure survey, population and housing censuses, and rental surveys. Sources may vary by region. They are not mandatory but are useful if available. They can be used to compute the weighted country product dummy (CPD-W) in the region.

## ICP DWELLING SERVICES QUESTIONNAIRE

The ICP dwelling services questionnaire used for the quantity method appears in table 9.6.

## GUIDELINES FOR APPLYING THE USER COST METHOD TO CALCULATE RENTS FOR OWNER-OCCUPIED HOUSING

The user cost method is recommended in economies where so few dwellings are rented that the rents actually paid cannot be regarded as typical. For example, in some economies most of the dwellings available for rent are occupied by foreigners or by employees of government or large public enterprises at rents that cannot be regarded as representative, whereas in other

economies dwellings may be available for rent only in the capital city or other principal urban areas.

Three main rules should be put in place to help economies decide when the standard method should not be used:

- Less than 25 percent of all dwellings in the economy are actually rented.
- More than half of the rented dwellings are occupied by foreigners paying high rents or by government or other employees paying low rents.
- Rented dwellings are not evenly distributed over all parts of the economy.

The user cost method consists of estimating each of the costs that owners of dwellings would need to take into account in fixing a market rent if they decided to rent their dwellings to other people rather than live in them themselves. These costs (with 1993 SNA codes in parentheses) are as follows:

- Intermediate consumption (P2)
- Other taxes on production (D29)
- Consumption of fixed capital (K1)
- Real net operating surplus (B2).

Table 9.7 lists the various data items required to impute expenditures on owner-occupied dwelling services by the user cost method. It is completed for each type of owner-occupied dwelling that can be separately distinguished in the housing statistics available in each economy. At a very minimum, it would be desirable to distinguish between

- Single-family dwellings (houses or villas)
- Apartments with less than a certain floor space (such as less than 30 square meters)
- Apartments with more than a certain floor space (such as 30 square meters or more).

Several difficulties are encountered in applying the user cost method as outlined in worksheet 1:

- Estimating the stock of owner-occupied dwellings, which is required to calculate both consumption of fixed capital (UC09) and the net operating surplus (UC14)
- Calculating the consumption of fixed capital (UC09) once the stock has been estimated

**Table 9.6** Dwelling Services Questionnaire, Form A, ICP 2011

FORM A. ICP DWELLING SERVICES QUESTIONNAIRE: VOLUME OF HOUSING IN 2011

Country:

Year (if data are not available for 2011):

	All dwellings			Type of construction				Location of dwellings			
	Houses	Flats	Total	Modern construction		Traditional construction	Total	Urban areas		Rural	Total
				Houses	Flats			Large urban	Small urban		
Number of dwelling units ('000s)											
Number of rooms ('000s)											
Usable surface area in thousand square meters (specify other unit _____)											
Number of occupants ('000s)											
Land area occupied by dwellings in thousand square meters (specify other unit _____)											
<b>Number of dwelling units with ...</b>											
Electricity ('000s)											
Inside water ('000s)											
Private toilet ('000s)											
Central heating											
Air-conditioning											
<b>Percentage of dwelling units ...</b>											
Rented											
Owner-occupied											

**Instructions:**

*Reporting year.* Please provide information for 2011 or for the nearest year for which information is available.

*Rooms* include bedrooms, sitting rooms, dining rooms, study rooms, play rooms, and kitchens that also serve as dining rooms, but exclude hallways, utility rooms, shower rooms, bathrooms, toilets, and kitchens that are only used for cooking.

*Usable surface* is the floor area of living rooms, kitchens, utility rooms, shower rooms, bathrooms, toilets, and hallways, minus the wall thickness and door and window recesses. Stairs, open balconies and terraces, and cellars and lofts (when not equipped as usable premises) are not included. For attics, only the section with a ceiling height of at least 1.7 meters is included. In practice, few economies have housing statistics that use this exact definition, but near approximations can be accepted. You are requested to provide information on the usable surface area of dwellings in square meters. You may also report in square feet or some other measure, but if so, please specify the unit on the questionnaire.

*Houses and flats.* Houses include villas, detached houses, and semidetached, terraced, and town houses. Flats (or apartments) are subdivisions of dwelling units, and the occupants are collectively responsible for the upkeep of the exterior of the building.

*Type of construction.* Modern dwellings are generally built by professional building enterprises. The walls are made of durable materials such as concrete, ceramic brick, cement blocks, plywood, or wooden planking, and the roofs are covered in tiles, wooden shingles, or metal sheeting. Modern dwellings usually have facilities such as electricity, piped water, and inside toilets. Most dwellings in urban areas will be classified as modern.

*Traditional dwellings* are generally built by family members. The walls are made of less durable materials such as dried clay, sun-dried bricks, bamboo, or latticework, and the roofs are made of reeds, straw, or palm fronds. Traditional dwellings do not usually have amenities.

**Table 9.6 (Continued)**

*Urban and rural.* There are no standard international definitions of *urban* and *rural*. Economies should use their own definitions of large and small urban and classify all other areas as rural.

*Number of occupants.* The number of occupants in all dwellings is equal to the total population.

*Electricity* will usually be the main electricity supplied by a generating company. Electricity may also be generated by the household itself from a diesel or gasoline generator, solar panels, or wind power.

*Inside water* is either running water piped into the dwelling itself or water from an underground spring or well that is for the exclusive use of the household. A dwelling that takes water from a communal standpipe or well should not be counted as a dwelling with inside water.

*Private toilets* are for the exclusive use of the occupants of the dwelling unit and have running water. The toilet may be inside the dwelling or in a separate structure.

Source: ICP, <http://icp.worldbank.org/>.

**Table 9.7** Data Required to Estimate Expenditures on Owner-Occupied Dwelling Services: Worksheet 1, ICP 2011

Worksheet 1. Estimating expenditure on owner-occupied dwelling services			
Item no.	Description of item	Associated formula	Value
<i>Intermediate consumption</i>			
UC01	Expenditure on maintenance and repair of owner-occupied dwellings	NONE	
UC02	Gross insurance premiums paid on owner-occupied dwellings	NONE	
UC03	Insurance claims paid to owners (minus)	NONE	
UC04	Net insurance premiums paid by owners	UC02–UC03	
UC05	Total intermediate consumption	UC01 + UC04	
<i>Other taxes on production</i>			
UC06	Taxes paid by owners on dwelling services	NONE	
UC07	Taxes paid by owners on the value of owner-occupied dwellings and their associated land	NONE	
UC08	Total taxes paid by owners	UC06 + UC07	
<i>Consumption of fixed capital</i>			
UC09	Consumption of fixed capital on owner-occupied dwellings at current prices (excluding land)	NONE	
<i>Net operating surplus</i>			
UC10	Current market value of the stock of owner-occupied dwellings at beginning of year (including land)	NONE	
UC11	Current market value of the stock of owner-occupied dwellings at end of year (including land)	NONE	
UC12	Current market value of the stock of owner-occupied dwellings at midyear (including land)	(UC10 + UC11)/2 or (K6 + K8)	
UC13	Real rate of return on owner-occupied dwellings (including land) in percent per annum	NONE	
UC14	Real net operating surplus	(UC12 × UC13)/100	
<i>Expenditure on owner-occupied dwelling services</i>			
UC15	Expenditure on owner-occupied dwellings services	UC05 + UC08 + UC09 + UC14	

Source: ICP, <http://icp.worldbank.org/>.

Note: See table 9.8 for descriptions of K6 and K8.

- Choosing the real rate of return (UC13) to be applied to the current value of the stock of owner-occupied dwellings (UC 12) to calculate the net operating surplus (UC 14). Box 9.1 explains what is meant by a real rate

of return and why a real rather than a nominal rate is used.

The following sections address these difficulties in more detail.

## BOX 9.1

### Why the Real Rate of Return Is Needed for the User Cost Method

Landlords usually expect the value of the dwellings they own to rise in line with the overall rate of inflation. This rise in the value of dwellings is a nominal holding gain for landlords, and it allows them to set the rent lower than they would have otherwise. Thus the user cost method should be written in full as

$$\begin{aligned} \text{user cost} = & \text{intermediate consumption} \\ & + \text{other taxes net of subsidies on production} \\ & + \text{consumption of fixed capital} + \text{nominal} \\ & \text{operating surplus} - \text{nominal holding gain.} \end{aligned}$$

The nominal operating surplus is calculated as the value of the dwelling multiplied by the nominal rate of interest.

The nominal holding gain is calculated as the value of the dwelling multiplied by the overall rate of inflation. Thus the last two terms in the above equation can be calculated in a single step by multiplying the

value of the dwelling by the nominal rate of interest minus the rate of inflation—that is, multiplying the value of the dwelling by the real rate of interest.

Thus, provided that a real rate of interest is used, the estimated rent is corrected for holding gains. It is lower than it would have been had there been no inflation and therefore no nominal holding gains for the landlord.

Both nominal interest rates and rates of inflation can be quite volatile from year to year, so that if the real rate of return each year is calculated, the estimated rent will also be volatile. In practice, however, rents tend to be rather stable from year to year because they are mostly based on long-term contracts that prevent sharp falls or increases. For this reason, it is better to use a real interest rate calculated as a long-term average of nominal interest rates minus long-term inflation rates.

### Estimating the Stock of Owner-Occupied Dwellings

The standard procedure for estimating the stock of a capital asset is the perpetual inventory method (PIM). PIM requires long time series on gross fixed capital formation (GFCF) and on the prices of capital assets, as well as assumptions about the average service lives of assets and about how retirements of assets are distributed around this average. Most economies, however, do not have capital stock estimates or the means to derive them using PIM, and so an alternative method is needed.

Worksheet 2 (table 9.8) can be used to estimate the value at current market prices of the stock of each type of owner-occupied dwelling. It is designed for economies that have only information from a recent population census on the number of owner-occupied dwellings

classified by a few broad types of dwellings. Two steps should be followed:

- Draw up a classification of dwellings that distinguishes between the main types of owner-occupied dwellings in the economy.
- Estimate the stocks of owner-occupied dwellings separately for each type. A simple three-way classification—single-family dwellings (houses or villas) and two size classes of apartments—was suggested earlier.

More explanation of the items shown in table 9.8 follows:

- *K1*. Population censuses invariably collect some information on dwellings—at a minimum the number of owner-occupied dwellings, with some indications of their physical characteristics. The more recent the census, the better will be the estimate of the



**Table 9.8** Data Required to Estimate Stock of Dwellings at Current Market Prices: Worksheet 2, ICP 2011

Worksheet 2. Estimating the stock of dwellings at current market prices			
Item no.	Description of item	Associated formula	Value
K1	Number of owner-occupied dwelling units at time of most recent census	NONE	
K2	Growth rate of owner-occupied dwellings between last census and middle of current year	NONE	
K3	Estimated number of owner-occupied dwellings in middle of current year	$K1 \times K2$	
K4	Average price of newly constructed dwellings, excluding land, in current year	NONE	
K5	Average net value (i.e., after deducting accumulated depreciation) of a dwelling, excluding land, in current year	$K4 \times (1 - A/L)$	
K6	Value at current market prices of the stock of owner-occupied dwellings, excluding land	$K3 \times K5$	
K7	Ratio of value of land to average net value of dwellings (excluding land) in current year	NONE	
K8	Value at current market prices of land underlying dwellings	$K6 \times K7$	

Source: ICP, <http://icp.worldbank.org/>.

stock of dwellings for the current year. Many economies also carry out some kind of living standards survey, and these surveys usually collect detailed statistics on the types of structure and the facilities in dwellings.

- *K2*. The growth rate in the number of owner-occupied dwellings since the last census could be derived from a number of sources. These include gross fixed capital formation statistics, data on the number of building permits issued, and administrative data on the completion and destruction of buildings. In the absence of information of this kind, it is reasonable to assume that the stock of owner-occupied dwellings grows at the same rate as the population.
- *K3*. The estimated number of owner-occupied dwellings in the middle of the year is obtained by multiplying the most recent number of owner-occupied dwelling units (*K1*) by the growth rate of owner-occupied dwellings between the last census and the one in the middle of the current year (*K2*).
- *K4*. Information on prices can be obtained from various sources, including real estate agents, property developers, and advertisements in journals and magazines that specialize in sales of dwellings. If these sources are used, the prices must be adjusted downward by subtracting the value of the land on which the buildings are situated, because the prices must refer only to the physical structure. An alternative is to obtain information on the

costs of new buildings from construction companies or from "public works" departments that in some economies build dwellings for government employees. If a cost method is used, the cost figure will have to be adjusted to market prices by adding the estimated profit margins. The advantage, however, is that the cost estimates will refer only to the physical structure and will exclude the cost of the underlying land.

- *K5*. Because *K4* refers to the price of a newly constructed dwelling, this price must be adjusted downward so that it approximates the price of a dwelling of average age. To do this, it is necessary to make an assumption about how the price of a dwelling declines as it ages. The simplest assumption, and the one recommended here, is to assume that the price of a dwelling declines by the same amount each year, reaching zero in the last year of its life. With this assumption, the price of a dwelling of average age (*P average*) will equal the new price (*P new*) times the ratio of the remaining years that the dwelling of average age (*A*) will continue to exist to the expected service life (*L*).

Intuitively, one would expect that if the stock of dwellings is constant because the number of new dwellings constructed each year equals the number of old dwellings demolished each year, the average age will be half of the average service life—that is, (*P average*) will be

half of ( $P_{new}$ ). Normally, however, stocks of dwellings are not constant. When stocks are growing or falling, the average age of the dwellings in a stock ( $A$ ) can be written as

$$A = \frac{\sum_i^L i(1+r)^{L-i}}{\sum_i^L (1+r)^{L-i}}, \quad (9.1)$$

where  $L$  is the average service life of dwellings;  $r$  is the annual rate of growth in the stock of dwellings; and  $i$  is the age of dwellings constructed in a given year and takes the values of 1, 2, 3, . . . ,  $L$ .

Note that when a stock of dwellings is stable (i.e., when  $r = 0$ ), the numerator is the sum of the first  $L$  digits—that is,  $L(L + 1)/2$ —and the denominator is  $L$ , so that  $A$  in (9.1) reduces to  $(L + 1)/2$ . This is the midpoint of the digits from 1 to  $L$  and confirms the intuitive result just mentioned.

If the stock is growing, the average age will be less than the midpoint because the number of younger dwellings will exceed the number of older dwellings (and vice versa if the stock is declining).

When the percentage of new dwellings is growing, the average price will also rise (and vice versa if the percentage of older dwellings is rising).

When the stock of dwellings is thought to be growing, the value of  $A$  should be calculated with  $r$  set at the rate used to calculate  $K2$ , and  $L$  set at the estimated average service life of dwellings. The value of the stock of dwellings ( $K6$ ) is then obtained as (number of dwellings in the stock ( $K3$ ))  $\times$  (price of a newly constructed dwelling ( $K4$ ))  $\times$   $(1 - A/L)$ .

Worksheet 3 (table 9.9) gives the values of the adjustment factor,  $(1 - A/L)$ , for values of  $L$  commonly assumed for dwellings and rates of annual growth in the housing stock from  $-1$  percent to  $+3$  percent.

**Table 9.9** Values of  $(1 - A/L)$ : Worksheet 3, ICP 2011

Life ( $L$ )	Annual growth rate of the stock of $r$				
	-1%	0%	1%	2%	3%
60	0.4417	0.4918	0.5411	0.5884	0.6322
70	0.4347	0.4929	0.5504	0.6048	0.6541
80	0.4275	0.4938	0.5594	0.6205	0.6746

Source: ICP, <http://icp.worldbank.org/>.

- $K6$ . The value at current market prices of the stock of owner-occupied dwellings is equal to the estimated number of owner-occupied dwellings in middle of the current year ( $K3$ ) times the net value of the average dwelling for the current year ( $K5$ ).
- $K7$ . In order to calculate the consumption of fixed capital, the estimated value of the stock of dwellings must exclude the value of the land on which the dwellings are situated because no consumption of fixed capital is calculated with respect to land. However, in calculating the net operating surplus, it is necessary to include the value of both the land and the dwellings because the owner's total investment covers both. For this reason, two estimates of the stock of dwellings are required: one with and one without the value of the land.

Estimates of the average ratio of the value of land to the average value of dwellings (excluding land) can be obtained from sources such as realtors (estate agents) or the official records of land values. Some economies may be able to use ratios estimated by neighboring economies that have similar population densities and housing structures.

In the United States, land values represent about one-third of the value of the building itself. Ratios are higher in Western Europe where the amount of land available for constructing dwellings is more limited, but they are likely to be lower than one-third in less densely populated economies. In some economies, land cannot be owned, and plots are granted to families to construct their dwellings. In such cases, the land value is zero because it cannot be traded and so has no commercial value to the owner of the dwelling.

- $K8$ . The value at current market prices of land is obtained by multiplying the value at current market prices of the stock of owner-occupied dwellings ( $K6$ ) by the ratio of the value of land to the average net value of dwellings in the current year ( $K7$ ).

### Calculating the Consumption of Fixed Capital

Economies that estimate stocks of dwellings using PIM will already have estimates of consumption of fixed capital. In economies that do

not do so, some other method must be used, and two alternative methods are described in this section.

### ***Straight-Line Depreciation with a Bell-Shaped Mortality Function***

When PIM is used, the commonest way of calculating consumption of fixed capital is to assume straight-line depreciation—that is, an equal fall in the value of the asset for each year of its service life—and to assume that retirements of assets are distributed around the average service life according to a bell-shaped mortality function. This method of calculating the consumption of fixed capital can be described as a straight-line depreciation with a bell-shaped mortality function.

### ***Geometric Depreciation with No Mortality Function***

This method can be approximated by a simpler procedure in which the annual consumption of fixed capital is calculated as a constant fraction of the value of the stock of dwellings at current market prices. This method of calculating consumption of fixed capital is described as a geometric depreciation with no mortality function.

Although it is only an approximation of straight-line depreciation with a bell-shaped mortality function, geometric depreciation with no mortality function offers the important advantage of not requiring economies to have a long time series of gross fixed capital formation in order to calculate the mortality function.

For economies that have used the method described in worksheet 2 to estimate the stock of owner-occupied dwellings, geometric depreciation with no mortality function is the only

feasible method. Consumption of fixed capital (CFC) is obtained by multiplying the midyear value of the net capital stock by the depreciation rate. The depreciation rate used for geometric depreciation is usually written as  $D/L$ , where  $D$  is the declining balance rate and  $L$  is the average service life of the assets.  $D$  is usually assumed to lie between 1 and 3, and it has been found that for dwellings in Europe and North America a value of 1.6 produces estimates of consumption of fixed capital that are similar to those obtained using straight-line depreciation with a bell-shaped mortality function. In the absence of information to the contrary, it is recommended here that  $D$  be set at 1.6. Thus, for example, if the midyear net value of the stock of a particular type of owner-occupied dwelling is 4,000 local currency units, and if the average service life for that type of dwelling is 70 years, the CFC is obtained as follows:  $4,000 \times (1.6/70) = 91$ .

Worksheet 4 (table 9.10) is used to calculate the CFC. As explained earlier about the stock of owner-occupied dwellings, the calculations are made separately for each type of dwelling for which separate information is available. In calculating the consumption of fixed capital, the capital stock must exclude the value of the land underlying dwellings.

More explanation of the items shown in table 9.10 follows:

- *CFC1*. The current market value of the stock of owner-occupied dwellings is taken from K6 in table 9.8. K6 is the value of the dwelling stock, excluding the value of the underlying land.
- *CFC2*. The average service life is the number of years that dwellings of this type are expected to remain in use from the year of

**Table 9.10** Estimating Consumption of Fixed Capital of Owner-Occupied Dwellings: Worksheet 4, ICP 2011

Worksheet 4. Estimating consumption of fixed capital of owner-occupied dwellings			
Item no.	Description of item	Associated formula	Value
CFC1	Midyear current market value of the stock of owner-occupied dwellings, excluding land	K6	
CFC2	Estimated service life of owner-occupied dwellings (in years)	NONE	
CFC3	Depreciation rate of owner-occupied dwellings	$1.6/CFC2$	
CFC4	Consumption of fixed capital formation of owner-occupied dwellings in current market prices	$CFC1 \times CFC3$	

Source: ICP, <http://icp.worldbank.org/>.

construction until the dwelling is demolished. The estimate of the average service life is important because it effectively determines the depreciation rate. Estimates of the service life of dwellings vary widely. European economies have generally used a service life of between 50 and 90 years. In the absence of any reliable information, an average service life of 70 years can be used.

Population censuses usually collect information on the age of dwellings, and this information can be used to estimate life expectancies.

- *CFC3*. A declining balance rate of 1.6 should be used so that the depreciation rate is  $1.6/(CFC2)$ . As noted earlier, a value of 1.6 has been found to be a plausible pattern of CFC for dwellings in Europe and North America. With a declining balance rate of 1.6 and an average service life of 70 years, the depreciation rate will be  $1.6/70 = 0.023$ , so that the CFC can be calculated as 0.023 times the current market value of the stock of owner-occupied dwellings.

### **Choosing the Real Rate of Return Used to Estimate the Net Operating Surplus**

Economists assume that people acquire capital assets because the net operating surplus they expect to earn is at least as high as the interest they could earn by investing in a financial asset. It has been suggested that the interest rate on a relatively safe long-term bond is the appropriate nominal rate to use. An example might be the rate of return on a 10-year government bond. An alternative approach is to assume that home

owners aim to recover the interest they have to pay on any housing loans they may have taken out. In this case, the rate of housing loans could be used as the nominal rate of return.

Whatever rate is used as the nominal rate, it has to be reduced to a real rate by subtracting the overall rate of inflation (the reason for this is explained in box 9.1). The overall rate of inflation could be measured either by the GDP deflator or by the all-items consumer price index.

In economies in which financial markets are not well developed, neither of these alternatives may be feasible for estimating the nominal rate of return. In these circumstances, it is recommended that a standard real rate of 2.5 percent be used. This means that the real net operating surplus will be calculated as 0.025 times the current market value of the stock of owner-occupied dwellings.

### **NOTE**

1. The ICP Classification follows the order of GDP: aggregate–category–group–class–basic heading.

### **REFERENCES**

- Eurostat–Organisation for Economic Co-operation and Development. 2005. *Eurostat-OECD Methodological Manual on Purchasing Power Parities*. Luxembourg: Publications Office of the European Union.
- United Nations. 2008. "Principles and Recommendations for Population and Housing Censuses, Revision 2." United Nations, New York.

# Government: Approach and Data Requirements

This chapter provides specific instructions on how to administer the questionnaires on government expenditures that were used in the 2011 round of the International Comparison Program (ICP). The instructions were designed to serve as a practical guideline for economies as they collected government expenditure data in line with the required approach and procedures.

## INFORMATION REQUIRED ON GOVERNMENT

In the ICP 2011 round, the participating economies were required to complete questionnaires on both government compensation of employees and government expenditures, and to provide additional data on pay and employment indicators. Detailed information on each of the 37 government occupations appears in annex A of this chapter. An example of a data collection form appears in annex B.

### Questionnaire on Compensation of Government Employees

This questionnaire collects information on the compensation of government employees in 37 typical occupations (see annexes A and B).

#### *Government Occupations and Pay Scale*

Table 10.1 classifies these government occupations by function (health, education, collective).

The table covers occupations in government hospitals and clinics and in government schools, colleges, and universities—that is, the individual services provided by government. The list also includes occupations in collective services such as ministries of finance, economic planning, statistical offices, and foreign affairs. Some of the occupations are common to both collective and individual services.

Not all occupations are relevant in all economies. For example, today it is quite common for occupations such as driver and cook to be outsourced and these jobs carried out by a private company on contract to the government. In this case, economies would not be able to report the compensation of government employees in these occupations. They would, however, be encouraged to complete the government compensation questionnaire for as many of the 37 occupations as possible.

Economies are asked to provide the details of employee compensation as defined in their national accounts (see the questionnaire in annex B). These definitions should be broadly in line with the definitions given in the 1993 version of the System of National Accounts (Commission of the European Communities et al. 1993).

Compensation of employees includes basic pay, cash allowances, income in kind, and employers' social security contributions on behalf of government employees. When, as is

**Table 10.1** Government Occupations by Function, ICP 2011

ICP description	ISCO code and description	Health	Education	Collective
Senior government official	1112: Senior government officials			X
Hospital manager	1120: Managing directors and chief executives	X		
Data processing manager	1330: Information and communications technology service managers			X
Secondary school principal	1345: Education managers		X	
Government statistician	2120: Mathematicians, actuaries, and statisticians			X
Hospital doctor	2211: Generalist medical practitioners	X		
Specialist doctor	2212: Specialist medical practitioners	X		
Hospital nurse	2221: Nursing professionals	X		
University teacher	2310: University and higher education teachers		X	
Vocational education teacher	2320: Vocational education teachers		X	
Primary school teacher	2341: Primary education teachers		X	
Secondary school teacher	2330: Secondary education teachers		X	
Government accountant	2411: Accountants			X
Human resources professional	2423: Personnel and careers professionals			X
Database administrator	2521: Database designers and administrators			X
Judge	2612: Judges			X
Government economist	2631: Economists			X
Laboratory assistant	3212: Medical and pathology laboratory technicians	X		
Auxiliary nurse	3221: Nursing associate professionals	X		
Medical records clerk	3252: Medical records and health information technicians	X		
Office supervisor	3341: Office supervisors			X
Medical secretary (hospital)	3344: Medical secretaries	X		
Customs inspector	3351: Customs and border inspectors			X
Computer operator	3511: Information and communications technology operations technicians			X
Secretary (not medical)	4120: Secretaries		X	X
Accounting and bookkeeping clerks	4311: Accounting and bookkeeping clerks			X
Payroll clerk	4313: Payroll clerks			X
Cook	5120: Cooks			X
Building caretaker	5153: Building caretakers	X	X	X
Teacher's aide	5312: Teacher's aides		X	
Firefighter	5411: Firefighters			X
Policeman/policewoman	5412: Police officers			X
Prison guard	5413: Prison guards			X
Driver (general-duty)	8322: Car, taxi, and van drivers			X
Office cleaner	9112: Cleaners and helpers in offices, hotels, and other establishments	X	X	X
Kitchen helper	9412: Kitchen helpers			X
Messenger	9621: Messengers			X
Total		10	9	23

Source: ICP, <http://icp.worldbank.org/>.

Note: ISCO = International Standard Classification of Occupations.

often the case, the government does not place social security payments in a separate fund for its employees, economies are asked to report the imputed contribution calculated in the same way as in their regular national accounts.

For the 2005 round of the ICP, economies were asked to provide compensation data for employees with five years of experience in each occupation. However, often the outcome was not satisfactory, and so for ICP 2011 economies were asked to supply compensation data for employees at four stages of their careers: starting level, after 5 years, after 10 years, and after 20 years. Thus if economies were able to complete questionnaires for all 37 occupations, they returned 148 (37 × 4) separate questionnaires.

So that government compensation in different economies can be compared properly, economies are also expected to provide information on the number of hours worked by government employees. Questions 22–26 of the questionnaire in annex B ask for information about the number of hours worked. Question 26 asks about the number of hours *actually* worked. It is a common practice in economies in which government salaries are very low to allow employees to take time off for a second job. This might include anything from operating a kiosk or taxi service to giving tutorials or teaching in a

university. It is important that economies make their best estimate of the hours actually worked by deducting from the official hours time that is regularly taken off by government employees.

The information on government compensation should be taken from national official government pay scales (see table 10.2).

Employees in public administration are usually paid on the basis of a salary scale such as the government pay scale shown in table 10.2. The scale is divided into grades—P, T, and W. Grades generally correspond to levels of education or skills.<sup>1</sup>

Within grades there are *categories* (four in this example), and each category is itself divided into *steps* (1–7 in this example). Each step is usually 12 months, although steps of 18 or 24 months are not uncommon.

The personnel recruitment office will know the usual entry level for each occupation. Suppose, for example, that the entry level for ICP occupation 33, prison guard, is step 1 of category T2. The base pay of an entry-level prison guard would thus be 35,500, and the base pay for a prison guard with five years of seniority would be 40,300 (equivalent to five steps). But if each step is 18 or 24 months, five years of seniority would be equivalent to four steps and a salary of 39,100 for 18-month steps

**Table 10.2** Government Pay Scales, ICP 2011

*local currency units*

Grade and category	Step						
	1	2	3	4	5	6	7
P4	88,900	91,400	93,900	96,400	98,900	101,400	103,900
P3	76,800	78,800	80,800	82,800	84,800	86,800	89,000
P2	66,100	67,900	69,700	71,500	73,300	75,100	76,900
P1	53,600	55,000	56,400	57,800	59,200	60,600	62,000
T4	47,900	49,500	51,100	52,700	54,300	55,900	57,500
T3	41,200	42,600	44,000	45,400	46,800	48,200	49,600
T2	35,500	36,700	37,900	39,100	40,300	41,500	42,700
T1	31,100	32,100	33,100	34,100	35,100	36,100	37,100
W4	34,700	35,700	36,700	36,800	36,900	37,000	37,100
W3	31,300	32,300	33,300	34,300	35,300	36,300	37,300
W2	28,400	29,200	30,000	30,800	31,600	32,400	33,200
W1	25,700	26,500	27,300	28,100	28,900	29,700	30,050

Source: ICP, <http://ICP.worldbank.org/>.

and to three steps and a salary of 37,900 for 24-month steps. The base pay obtained from the salary scales would be converted to compensation of employees by adding in any cash allowances, income in kind, and employers' actual or imputed contributions relevant for a prison guard at this level of the pay scale.

### **National Annual Average**

The governments of most economies have official unified national pay scales for the general government, which consists of central, regional, state, and local government units. In this case, the number of observations for each occupation is one because the government sector bases its compensation on the unified pay scale. In those economies that do not have a unified national pay scale, there are different pay scales for different levels of government. In this case, multiple observations would be needed to obtain the national average remuneration.

When calculating the average of different pay scales, it is recommended that the number of employees under each pay scale be used as weights to calculate the weighted average. Three ways (cases) of obtaining the weighted average—all of which depend on the availability of information on the number of employees—are presented in tables 10.3, 10.4, and 10.5.

Table 10.3 shows the case in which the number of employees under each occupation for each pay scale is available. In this case, observations for an occupation are weight-averaged, using the number of employees *for each occupation* to obtain its average remuneration. For example, in table 10.3 the average remuneration of occupation 1 is obtained using 1,000 and

500 as weights; 1,200 and 450 are the weights for occupation 2. Thus,

$$\begin{aligned} \text{average} \\ \text{remuneration for} \\ \text{occupation 1} &= (65,000 \times 1,000 \\ &\quad + 72,000 \times 500)/(1,000 \\ &\quad + 500) = 67,333 \end{aligned}$$

$$\begin{aligned} \text{and} \\ \text{average} \\ \text{remuneration for} \\ \text{occupation 2} &= (48,000 \times 1,200 \\ &\quad + 54,000 \times 450)/(1,200 \\ &\quad + 450) = 49,636. \end{aligned}$$

When the number of employees for each occupation under each pay scale is not available, the number of employees under each basic heading (education, health, and collective services) can be used as an approximate weight. In table 10.4, no information is available on the number of employees for each occupation. Thus the total number of employees under the basic heading education is applied to all occupations under the basic heading. For example, the remunerations of occupations 1, 2, and 3 are averaged, respectively, using 5,200 and 2,800 as the approximate weights for each occupation. Therefore,

$$\begin{aligned} \text{average} \\ \text{remuneration} \\ \text{for occupation 1} &= (65,000 \times 5,200 \\ &\quad + 72,000 \times 2,800)/ \\ &\quad (5,200 + 2,800) = 67,450 \end{aligned}$$

$$\begin{aligned} \text{and} \\ \text{average} \\ \text{remuneration} \\ \text{for occupation 2} &= (48,000 \times 5,200 \\ &\quad + 54,000 \times 2,800)/(5,200 \\ &\quad + 2,800) = 50,100. \end{aligned}$$

**Table 10.3** Case 1 (Number of Employees for Each Occupation Is Available), ICP 2011

	Weight = number of employees		Remuneration (local currency units)		National average
	Pay scale A	Pay scale B	Pay scale A	Pay scale B	
Total employees	34,000	12,000			
Education	5,200	2,800			
Occupation 1	1,000	500	65,000	72,000	67,333
Occupation 2	1,200	450	48,000	54,000	49,636
Occupation 3	1,500	380	58,000	56,000	57,596
...	...	...	...	...	...

Source: ICP, <http://ICP.worldbank.org/>.



**Table 10.4** Case 2 (Number of Employees under Each Basic Heading Is Available), ICP 2011

	Weight = number of employees		Remuneration (local currency units)		National average
	Pay scale A	Pay scale B	Pay scale A	Pay scale B	
Total employees	34,000	12,000			
Education	5,200	2,800			
Occupation 1	—	—	65,000	72,000	67,450
Occupation 2	—	—	48,000	54,000	50,100
Occupation 3	—	—	58,000	56,000	57,300
...	...	...	...	...	...

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available.

**Table 10.5** Case 3 (Only the Total Number of Employees under the Pay Scale Is Available), ICP 2011

	Weight = number of employees		Remuneration (local currency units)		National average
	Pay scale A	Pay scale B	Pay scale A	Pay scale B	
Total employees	34,000	12,000			
Education	—	—			
Occupation 1	—	—	65,000	72,000	66,826
Occupation 2	—	—	48,000	54,000	49,565
Occupation 3	—	—	58,000	56,000	57,478
...	...	...	...	...	...

Source: ICP, <http://ICP.worldbank.org/>.

Note: — = not available.

If no breakdown of number of employees is available—that is, if only the total number of employees under each pay scale is available, as shown in the example in table 10.5—then the total number of employees under the pay scale can be used as a rough estimation of the weights for each occupation. Although this method is not recommended, it would still yield a better estimation than the unweighted average. In table 10.5, the total number of employees under each pay scale is 34,000 and 12,000, respectively. Thus

average

remuneration

$$\text{for occupation 1} = (65,000 \times 34,000 + 72,000 \times 12,000) / (34,000 + 12,000) = 66,826$$

and

average

remuneration

$$\text{for occupation 2} = (48,000 \times 34,000 + 54,000 \times 12,000) / (34,000 + 12,000) = 49,565.$$

Some economies have different pay scales for nationals and residents (or foreigners living in the economy). In this case, pay scales for both nationals and residents need to be taken into consideration—that is, they need to be weight-averaged using the number of employees under each pay scale as their weights. If information is available only for nationals, it can be used as a national pay scale for approximation purposes.

### Questionnaires on Government Expenditures

These questionnaires ask for information on current and capital government expenditures. General government includes all levels of government such as federal, central, provincial, state, municipal, and local government agencies. Economies are asked to report expenditures separately for the central or federal government and for all other levels of government combined. All government functions are addressed by the three questionnaires on government

expenditures, which cover health, education, and collective services (see annex C).

The information that economies provide in these questionnaires should be based on a set of final government accounts.

### Pay and Employment Data Structure Indicators

For data checking and validation, additional data are collected for a tier of aggregate indicators, including: (1) gross domestic product (GDP), (2) total population, (3) school-age population, and (4) total labor force. In addition to providing these indicators, economies are asked to submit government recurrent expenditure indicators and wage bill and employment indicators. A detailed summary with a description of each indicator appears in annex D.

Additional ratios are automatically computed based on the aggregate indicators such as general government wage bill per GDP and subnational government wage bill per total recurrent expenditure. Computed indicators include compression ratios and public sector remuneration per GDP per capita and employment ratios. More information on computed indicators is provided in annex E.

### Productivity Adjustments

Measuring the compensation of government employees is a difficult area for the ICP because labor productivity in government varies markedly among economies. For ICP 2011, detailed specifications were provided for each occupation, including required level of education and experience. Factors such as the difference in the quality of education and the availability of equipment such as computers between countries are key elements of such differences in productivity. It was essential to adjust for productivity differences between economies because not adjusting for them in some regions would have significantly distorted the estimates of real expenditures for government. In some cases, the distortions would have been so large that they would have affected comparisons of real expenditures on GDP. If no productivity adjustments were made, economies in which government salaries were very low would have had very high real consumption of

government services compared with the high-income economies in the region in which government salaries were relatively much higher. The global-level application is explained in chapter 26 in relation to global linking.

### Productivity Adjustment Factors

Productivity adjustments were calculated using capital-labor estimates for each economy.<sup>2</sup> It was not possible to estimate productivity adjustments directly for the government sector, and so they were based on comparisons of economy-wide capital-labor estimates. Productivity estimates were imputed for economies that had insufficient data to calculate such estimates. The estimates were based on those for similar types of economies in their region.

The capital/worker adjustment is straightforward conceptually because it answers the question of how much higher labor productivity would be if workers in the country of concern had the same level of capital as the base country. The production function framework that was used in ICP 2005 was applied, assuming that output is produced by means of two inputs: labor and capital (World Bank 2008; Heston 2013). It is assumed that output of government services  $Y$  is produced using capital  $K$  and labor  $L$  with efficiency level  $A$ :

$$Y = f(K, L, A). \quad (10.1)$$

Assuming the production function has constant returns to scale and exhibits Hicks-neutral efficiency, (10.1) can be rewritten as

$$\frac{Y}{L} = A \left( \frac{K}{L} \right)^\alpha \Leftrightarrow y = AK^\alpha, \quad (10.2)$$

where  $\alpha$  is the output elasticity of capital.

The aim is to compare labor productivity  $y$  between any given pair of countries  $i$  and  $j$  (multilateral comparisons). Each country could be at a different point on the production function and thus could have a different output elasticity of capital. The standard approach to this problem is to define a hypothetical "average" country, with variables denoted by an upper bar, and compare each country to this average. This procedure is akin to the Gini-Éltető-Köves-Szulc (GEKS) index number approach, but is based on the Törnqvist index instead of the Fisher index. Relative labor

productivity between country  $i$  and the average country is then equal to

$$\ln\left(\frac{Y_i}{\bar{Y}}\right) = \left(\frac{A_i}{\bar{A}}\right) + \frac{1}{2}(\alpha_i + \bar{\alpha})\ln\left(\frac{K_i}{\bar{K}}\right). \quad (10.3)$$

Following the earlier work on this approach, it is assumed that efficiency in the use of inputs is the same across countries. Once the necessary data are available, adjustment factors for the relative wages ( $F$ ) can be computed. These are based on capital input (relative to the average country) for country  $i$  compared with capital input for base country  $b$  in each region:

$$F_{i,b} = 1/e^{(p_i - p_b)}, \quad (10.4)$$

where  $p_i = (\alpha_i + \bar{\alpha})\ln\left(\frac{K_i}{\bar{K}}\right)$  and similarly for base country  $b$ .

The adjustment factors, as defined in equation (10.4), are used to adjust the PPP for wages in country  $i$  relative to base country  $b$  for productivity differences:

$$\widehat{PPP}_{i,b}^w = PPP_{i,b}^w * F_{i,b}. \quad (10.5)$$

Because this model implies that a government worker is less productive in a country with less capital per worker, that worker's productivity-adjusted wage should be higher, which leads to higher input purchasing power parities (PPPs) and thus lower relative output volumes. Another element that would normally lead to cross-country differences in labor productivity, and thus wages, is differences in levels of schooling. Because the ICP wages are collected for precisely specified categories of workers, also distinguished by their educational qualifications, it is assumed that no further adjustments are required. The productivity adjustment would be applied across all categories of workers.

The key input in implementing a capital-based productivity adjustment is an estimate of capital stocks at current national prices. Capital stocks are estimated using the perpetual inventory method (PIM) and data on investment by asset. In contrast to the approach followed in the ICP 2005 round, in the 2011 round capital-labor ratios were calculated based on country-specific data on capital stocks and capital elasticities. For some countries, time series of investment by assets were readily available from national accounts sources. For countries

in which this was not the case, the starting point was the ICP investment by asset data. For countries that participated in an ICP comparison before 2011, the benchmark investment shares were used in combination with the commodity flow method (CFM) to estimate the share of each asset in total investment over time. The CFM uses changes in the total supply (imports + production – exports) of a commodity to approximate the change in investment. For countries that were newcomers in ICP 2011, it was assumed that their 2011 asset investment pattern was constant over time.

The investment PPPs from ICP 2011 were available at a more detailed level than was required for the productivity adjustment. As a first step, they were aggregated to six assets using a within-region GEKS procedure and investment shares as weights. As long as the depreciation rates within each of the six assets are approximately the same, this simplification does not lead to a bias in the final PPP. In the second step, the six asset PPPs were combined into an overall capital stock PPP using a within-region GEKS procedure and the capital stocks at current national prices as weights.

The second type of national data needed for a capital-based productivity adjustment is the marginal productivity of capital as reflected in the output elasticity of capital. This is not directly observable, but a common approach is to assume perfect competition in the labor and product markets so that the revenue share of capital can be used instead. In ICP 2011, no information about the revenue share of capital for government services was available, and so the capital share in overall GDP was used instead. It also allowed consistency with the capital stock measures.

Implementing equation (10.4) also requires data on employment. Employment data were taken from the Conference Board's Total Economy Database, supplemented by data from the International Labour Organization (ILO) and the World Bank's World Development Indicators. For countries for which these sources did not provide enough information—in particular in the Caribbean region—the average employment to population ratio of the region was used. Adjustments for productivity differences were made to the real expenditure

estimates for government in the Africa, Asia and the Pacific, Latin America, and Caribbean regions. No productivity adjustments were applied within the Eurostat-OECD, Commonwealth of Independent States, and Western Asia regions because differences in labor productivity within each of those regions were considered to be relatively small. However, productivity adjustments were made to all regions when the interregional linking factors were estimated to maintain consistency in the global comparison.

Productivity adjustments were calculated using capital-labor estimates for each economy. It was not possible to estimate productivity adjustments directly for the government sector, and so they were based on comparisons of economy-wide capital-labor estimates. Productivity estimates were imputed for economies that had insufficient data to calculate such estimates. They were based on the productivity

estimates for similar types of economies in their region.

### ***Application of Productivity Adjustment Factors at the Regional Level***

After the basic heading PPPs were calculated, the productivity adjustment factors obtained through the above process were applied when necessary to the final regional basic heading PPPs for all the participating countries in the regions for the three government compensation basic headings: 130221.1, compensation of employees (health services); 130421.1, compensation of employees (education services); 140111.1, compensation of employees (collective services).

When the adjustment factors are applied, the base country for the adjustment factors should be the same country as the base country of the regional PPPs (see box 10.1). If not, the adjustment factors need to be rebased so that the adjustment factor of the base country is 1. After

## **BOX 10.1**

### **Example of the Application of Productivity Adjustment (PA) Factors**

What follows is an example of the application of productivity adjustment factors in which the base country for the adjustment factors is different from the base country for the PPPs. In this case, the adjustment factors need to be rebased before application so that they and the PPPs have the same base country.

#### **PPPs and PA factors with different countries as base**

	Country				
	A	B	C	D	E
PPPs	12.8	1.7	47.0 (base)	1.0	0.6
PA factors	1.0 (base)	0.2	1.1	0.4	0.7

If country C is the base country for the calculation of PPPs and country A is the base for PA factors, the PA factors cannot be applied as they are. They need to be rebased to make country C the base.

#### **PPPs and PA factors with the same country as base**

	Country				
	A	B	C	D	E
PPPs	12.8	1.7	47.0 (base)	1.0	0.6
Rebased PA factors	0.9	0.2	1.0 (base)	0.4	0.6

Now the base is country C for both PPPs and PA factors. It can be applied to obtain productivity-adjusted PPPs:

productivity-adjusted PPPs = regional PPP × PA factor.

#### **Productivity-adjusted PPPs**

	Country				
	A	B	C	D	E
Productivity-adjusted PPPs	11.52	0.34	47.00	0.40	0.36

having the same base country for both PPPs and productivity adjustment factors, the PPPs were multiplied by the adjustment factors to make the PPPs comparable.

The productivity adjustment factors are expressed in relation to the productivity of a regional base country, and the adjustment factor for the base country is expressed as 1. If the adjustment factor is smaller than 1 for

a country, it means the productivity of the country is estimated to be higher than that of the base country. If it is larger than 1, the productivity of the country is estimated to be lower than that of the base country.

After the productivity adjustment factors are applied to the regional PPPs, the adjusted PPPs should be validated as described in chapter 22 on PPP validation.

## Annex A

### Government Occupations, ICP 2011

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
1	Senior government official	The senior government official referred to here is a permanent civil servant who is one level below a minister and who may be described as a permanent secretary, deputy minister, director general, and so forth. This senior government official reports directly to the minister.	Advising ministers on policy matters and exercising overall management of a ministry or department of state	These senior government officials may be working in any central or federal government ministry or department such as finance, agriculture, trade, industry, commerce, foreign affairs, transport, tourism, health, education, and foreign affairs.	1112: Senior government officials
2	Hospital manager	Hospital managers formulate and review policies and plan, direct, coordinate, and evaluate the overall activities of government-funded hospitals, clinics, and similar establishments.	Planning, directing, and coordinating the general functioning of a hospital, clinic, or similar establishment  Reviewing the operations and results of the facility and reporting to boards of directors and governing bodies		1120: Managing directors and chief executives
3	Data processing manager	Data processing managers plan, direct, and coordinate the acquisition, development, maintenance, and use of computer and telecommunications systems.	Consulting with users, management, vendors, and technicians to assess computing needs and system requirements and specifying technology to meet those needs  Formulating and directing information and communications technology (ICT) policy within a government ministry or department		1330: Information and communications technology service managers
4	Secondary school principal	Secondary school principals plan, direct, coordinate, and evaluate the educational and administrative aspects of secondary schools.	Determining educational programs based on frameworks established by educational authorities and governing bodies  Implementing systems and procedures to monitor school performance and student enrollments  Directing the administrative aspects of secondary schools, including teachers' assignments, and setting school rules for conduct and discipline and management of auxiliary staff	Principals are also referred to as head masters, head mistresses, and head teachers.	1345: Education managers

**Annex A (Continued)**

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
5	Government statistician	Government statisticians collect, edit, tabulate, and publish economic, demographic, and social statistics.  Government statisticians will have a professional, tertiary-level qualification in statistics or a related field such as mathematics or demography.	Designing statistical samples, questionnaires, and survey procedures  Editing, checking, processing, and tabulating statistics so that they can be released to the general public in printed or electronic publications  Secondary processing of statistics to generate statistical indicators such as GDP, price indexes, and leading economic indicators	In many statistical offices, there is a hierarchy of professional statistician grades such as assistant statistician, statistician, principal statistician, and senior statistician. Details on compensation should be provided for the grade that includes the largest number of statisticians.	2120: Mathematicians, actuaries, and statisticians
6	Hospital doctor	Medical doctors study, diagnose, treat, and prevent illness, disease, injury, and other physical and mental impairments in humans through the application of the principles and procedures of modern medicine.	Conducting physical examinations of patients and interviewing them and their families to determine their health status  Ordering diagnostic tests and analyzing findings  Prescribing and administering curative treatments		2211: Generalist medical practitioners
7	Specialist doctor	Specialist doctors study, diagnose, treat, and prevent illness, disease, injury, and other physical and mental impairments in humans. They specialize in certain disease categories, types of patient, or methods of treatment, and may conduct medical education and research in their chosen areas of specialization.	Conducting physical examinations of patients and interviewing them and their families to determine their health status  Ordering diagnostic tests, analyzing findings, as well as prescribing and administering curative treatments	Examples of a specialist doctor are pediatrician; dermatologist; gynecologist; orthopedic specialist; rheumatologist; cancer specialist; ear, nose, and throat specialist; cardiologist; gerontologist; ophthalmologist; and urologist.	2212: Specialist medical practitioners
8	Hospital nurse	Hospital nurses provide treatment, support, and care services for people who are in need of nursing care because of the effects of aging, injury, and illness or other physical or mental impairments, or potential risks to health. They carry out their tasks under the supervision of doctors or senior nurses.	Providing nursing care for patients according to the practice and standards of modern nursing  Coordinating the care of patients in consultation with other health professionals and members of health teams	Hospital nurses will have had formal training for at least one year and will have a nationally recognized nursing qualification. Level and length of training depend on the standards applied in each economy.	2221: Nursing professionals

*table continues next page*

**Annex A (Continued)**

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
9	University teacher	University and higher education teachers prepare and deliver lectures and conduct tutorials in one or more subjects within a prescribed course of study at a university or other higher educational institution. They conduct research and prepare scholarly papers for publication in peer-reviewed journals.	<p>Designing and modifying curricula and preparing courses of study in accordance with requirements</p> <p>Preparing and delivering lectures and conducting tutorials, seminars, and laboratory experiments</p> <p>Stimulating discussion and setting and marking papers for students</p>		2310: University and higher education teachers
10	Vocational education teacher	Vocational education teachers teach vocational or occupational subjects to adults in continuing education institutions and to senior students in secondary schools and colleges. They prepare students for employment in specific occupations.	<p>Designing and modifying curricula and preparing educational courses of study in accordance with curriculum guidelines</p> <p>Establishing and enforcing rules for behavior and procedures for maintaining order among students</p>		2320: Vocational education teachers
11	Primary school teacher	Primary school teachers teach a range of subjects at the primary education level.	<p>Preparing daily and longer-term lesson plans in accordance with curriculum guidelines</p> <p>Instructing children individually and in groups, using various teaching methods and materials (e.g., computers, books, games)</p>		2341: Primary education teachers
12	Secondary school teacher	Secondary school teachers teach one or more subjects at the secondary education level, excluding subjects intended to prepare students for employment in specific occupational areas.	<p>Preparing daily and longer-term lesson plans in accordance with curriculum guidelines</p> <p>Instructing pupils individually and in groups, using various teaching methods and materials</p> <p>Setting and marking coursework and homework and assessing student performance</p>		2330: Secondary education teachers
13	Government accountant	Government accountants plan, organize, and administer accounting systems for government ministries, departments, and other agencies. They verify that the revenue and expenditure records maintained by government agencies are accurate and in compliance with current legislation.	<p>Developing financial plans and investment strategies for government agencies</p> <p>Advising government officials on financial legislation</p> <p>Preparing or supervising the preparation of quarterly or annual income and expenditure statements for government departments and ministries</p>	Government accountants will have a recognized qualification in accounting, which is usually acquired at the tertiary or post-tertiary education level.	2411: Accountants



**Annex A (Continued)**

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
14	Human resources professional	Human resources professionals work in personnel or human resources departments either in government ministries or in a department/ministry dedicated to recruitment and personnel management.	<p>Developing standards for recruitment to various "job families" such as secretarial, technical, and professional occupations</p> <p>Advising on pay scales and terms of employment for different occupations</p> <p>Ensuring that recruitment practices are in line with government regulations regarding gender, ethnicity, physical disabilities, and so forth</p>		2423: Personnel and careers professionals
15	Database administrator	Database administrators develop, control, and maintain one or more databases in a government ministry or department.	<p>Selecting the variables to be included in the database in consultation with users</p> <p>Drawing up rules for updating, editing, and quality control of the database</p> <p>Preparing analytical reports on recent trends, correlations, and forecasts from the database</p>		2521: Database designers and administrators
16	Judge	Judges preside over civil and criminal proceedings in courts of law.	<p>Judges preside over civil and criminal proceedings in courts of law, determining the guilt or innocence of defendants either alone or in consultation with other judges.</p> <p>Deciding on the appropriate penalty in the event of a guilty verdict</p> <p>Hearing appeals against verdicts passed by other judges</p>	Judges will have qualifications in the practice of law at the tertiary level or higher and will be entitled to try both civil and criminal cases.	2612: Judges
17	Government economist	Government economists conduct research, monitor data, analyze information, and prepare reports and plans to resolve the economic and financial problems of government.	<p>Monitoring and reporting on recent economic trends</p> <p>Analyzing the economic impact of government legislation</p> <p>Forecasting government revenues and expenditures</p> <p>Preparing development plans for particular industries or the nation as a whole</p>	The government economist for whom compensation details are required should be working in a ministry of finance/economy.	2631: Economists
18	Laboratory assistant	Laboratory assistants perform technical tasks in hospital laboratories to help medical staff determine the causes of diseases and monitor the effectiveness of treatments.	<p>Preparing materials and equipment for experiments, tests, and analyses</p> <p>Collecting and preparing specimens such as plant, animal, or human cells, and tissues or parts or organs for experiments and analyses</p> <p>Assisting with and performing experiments and analyses</p>		3212: Medical and pathology laboratory technicians

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**Annex A** (Continued)

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
19	Auxiliary nurse	Auxiliary nurses assist medical, nursing, and midwifery professionals in their duties.	<p>Preparing patients for examination or treatment</p> <p>Changing bed linen and helping patients with their toilet</p> <p>Providing hot-water bottles and other comforts for patients</p> <p>Serving and collecting food trays and feeding patients needing help</p> <p>Sterilizing surgical and other instruments and equipment</p>	Nursing auxiliaries may or may not have a recognized medical qualification.	3221: Nursing associate professionals
20	Medical records clerk	Medical records clerks maintain the health records of patients. They are responsible for the storage and retrieval of these records in government medical facilities and other health care facilities.	<p>Entering relevant information on new patients</p> <p>Maintaining records of the treatment received and of the outcomes of such treatments</p>		3252: Medical records and health information technicians
21	Office supervisor	Office supervisors supervise and coordinate the activities of clerical support workers.	Among other things, coordinating, assigning, and reviewing the work of clerks engaged in duties such as word processing, record keeping and filing, operating telephones and switchboards, data entry, desktop publishing, and similar activities		3341: Office supervisors
22	Medical secretary (hospital)	Medical secretaries (hospital), using specialized knowledge of medical terminology and health care delivery procedures, assist health professionals and other workers by performing a variety of communication, documentation, administrative, and internal coordination functions.	<p>Scheduling and confirming medical appointments and communicating messages for medical staff and patients</p> <p>Compiling, recording, and reviewing medical charts, reports, documents, and correspondence</p> <p>Interviewing patients to confirm their medical history, personal identification, civil status, and next of kin</p>		3344: Medical secretaries
23	Customs inspector	Customs inspectors examine goods crossing international land, sea, or air borders to determine whether import or export is allowed and to assess the customs duties payable.	<p>Examining goods entering or leaving the economy by land, sea, or air to determine whether they are being legitimately imported or exported</p> <p>Assessing the customs duties that should be paid on imported or exported goods</p>		3351: Customs and border inspectors

**Annex A (Continued)**

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
24	Computer operator	Computer operators maintain networks and other data communications systems.	<p>Operating, maintaining, and troubleshooting network systems</p> <p>Operating and maintaining data communications systems other than networks</p> <p>Assisting users with network and data communications problems</p> <p>Providing "help desk" services</p>		3511: Information and communications technology operations technicians
25	Secretary (not medical)	Secretaries (not medical) use word-processing equipment to transcribe correspondence and other documents, check and format documents prepared by other staff, deal with incoming and outgoing mail, and screen requests for meetings with senior staff.	<p>Checking, formatting, and transcribing correspondence, minutes, and reports from dictation, electronic documents, or written documents using word-processing equipment</p> <p>Establishing and maintaining filing systems to classify documents by subject or chronological order</p> <p>Distributing incoming mail to intended recipients and screening requests for meetings with senior staff</p>		4120: Secretaries
26	Accounting and bookkeeping clerks	Accounting and bookkeeping clerks compute, classify, and record numerical data to keep financial records complete. They perform any combination of routine calculating, posting, and verifying duties to obtain primary financial data for use in maintaining records on receipts and expenditures.	<p>Checking figures, postings, and documents for correct entry, mathematical accuracy, and proper codes</p> <p>Operating computers programmed with accounting software to record, store, and analyze information</p> <p>Classifying and recording receipts and expenditures and other relevant financial transactions</p>		4311: Accounting and bookkeeping clerks
27	Payroll clerk	Payroll clerks collect, verify, and process payroll information and compute pay and benefit entitlements for government employees working in one or more government ministries.	<p>Maintaining records of employee attendance, leave, and overtime to calculate pay and benefit entitlements, using manual or computerized systems</p> <p>Preparing and verifying statements of earnings for employees, indicating gross and net income</p>		4313: Payroll clerks
28	Cook	Cooks plan, organize, prepare, and cook meals in canteens and other eating places in schools, universities, hospitals, and government offices.	<p>Planning meals and preparing and cooking foodstuffs</p> <p>Planning, supervising, and coordinating the work of kitchen helpers</p> <p>Checking the quality of food</p> <p>Weighing, measuring, and mixing ingredients according to recipes</p>		5120: Cooks

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**Annex A** (Continued)

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
29	Building caretaker	Building caretakers maintain schools, hospitals, university buildings, and government offices and their associated grounds in a clean and orderly condition.	Supervising the work of cleaning, housekeeping, and building maintenance staff and contractors Participating in the cleaning, simple repairs, and maintenance of building interiors Tending furnaces and boilers Providing services such as accepting deliveries or providing requested information to callers	Other terms used for building caretaker are concierge and janitor.	5153: Building caretakers
30	Teacher's aide	Teacher's aides perform nonteaching duties to assist teaching staff and provide care and supervision for children in schools and preschools	Demonstrating, supervising, and participating in activities that enhance the physical, social, emotional, and intellectual development of children in schools and preschools Preparing indoor and outdoor areas for learning and recreational activities		5312: Teacher's aides
31	Firefighter	Firefighters respond to calls to extinguish fires and to deal with other civil emergencies.	Responding to fire alarms and other calls for assistance such as automobile and industrial accidents, bomb threats, and other emergencies Controlling and extinguishing fires using manual and power equipment and firefighting chemicals Preventing or limiting the spread of dangerous substances in case of fires or accidents Informing the public about fire prevention		5411: Firefighters
32	Policeman or policewoman	Policemen/policewomen maintain law and order and enforce laws and regulations. Work typically involves gaining familiarity with an area and the persons living in it, noting suspicious activities, patrolling the assigned area, rendering first aid, making investigations, maintaining logs of their activities, and giving evidence in legal proceedings. They generally work under the supervision of police inspectors or detectives.	Maintaining law and order Protecting persons and property from hazards and unlawful acts Arresting persons for contraventions of the law Directing traffic and assuming authority in the case of accidents Giving evidence in court	Examples of the occupations classified here include constable, patrolman/patrolwoman, police officer, river or harbor policeman/policewoman	5412: Police officers

**Annex A** (Continued)

#	ICP occupation	Description	Tasks	Additional information	ISCO code and job title
33	Prison guard	Prison guards watch over and maintain discipline among inmates of prisons, reformatories, and penitentiaries.	Searching arriving prisoners, putting their valuables in safekeeping, escorting prisoners to cells, and locking them in  Making periodic inspection tours of cells  Supervising prisoners at work, meals, or during walks and patrolling prison areas to prevent escape		5413: Prison guards
34	Driver (general-duty)	Drivers drive motorcars and vans to transport passengers, mail, or goods. They maintain their vehicles in a clean, roadworthy condition.	Driving delivery vans or passenger cars  Maintaining their vehicles in a clean, roadworthy condition  Assisting passengers with handling of luggage		8322: Car, taxi, and van drivers
35	Office cleaner	Office cleaners perform the various tasks needed to keep the interiors and fixtures of government offices clean and tidy.	Among other things, sweeping or vacuum cleaning and washing and polishing floors, windows, furniture, and other fixtures in government offices		9112: Cleaners and helpers in offices, hotels, and other establishments
36	Kitchen helper	Kitchen helpers clear tables, clean kitchen areas, wash dishes, prepare ingredients, and perform other duties to assist workers who prepare or serve food and beverages.	Cleaning kitchens, food preparation areas, and service areas  Assisting cooks and chefs in the preparation of food by washing, peeling, chopping, cutting up, measuring, and mixing ingredients	Kitchen helpers work in canteens and restaurants in schools, universities, hospitals, and government ministries and departments.	9412: Kitchen helpers
37	Messenger	Messengers carry and deliver messages, packages, and other items within an establishment or between establishments. They deliver messages either on foot or using vehicles such as bicycles and motor scooters.	Mainly delivering items as requested by employer, but they may carry out other errands. They may keep records and obtain receipts for articles delivered.		9621: Messengers

Source: ICP, <http://icp.worldbank.org/>.

Note: ISCO = International Standard Classification of Occupations.

## Annex B

### Questionnaire on Compensation of Government Employees, ICP 2011

Item no.	Information to be supplied on compensation of employees in selected occupations	Example
1	Date of collection	03/24/2011 (mm/dd/yyyy)
2	Year for which data are reported	2011 (yyyy)
3	ICP occupation code	
4	ICP occupation name	Hospital nurse
5	ISCO code and job title	2221: Nursing professionals
6	Reported currency	Dollar
7	Level	Entry level
8	Cash remuneration:	
9	Base pay	40,000
10	Allowances and other additions to base pay:	
11	Housing	6,000
12	Transportation	3,000
13	Food and meals	1,000
14	Other allowances	2,000
15	Employer's social security contributions:	
16	Actual contributions	Not applicable
17	Imputed contributions	3,000
18	In-kind remuneration:	
19	Housing	3,000
20	Transportation	1,000
21	Food and meals	1,400
22	Other in-kind remuneration	1,000
23	Total remuneration	61,400
24	Number of <i>regular (official)</i> work hours per week	36
25	Number of <i>actual</i> hours worked per week	40
26	Number of days of annual leave per year	20
27	Number of work-days per week	5
28	Number of public holidays per year	15
	Explanatory notes	
9	Base pay is the annual salary according to the government pay scale.	
11–14	These are cash payments received by employees in addition to their base pay. "Other allowances" include housing allowances, electricity and water allowances, expatriation allowances, home leave allowances, bonus payments if these are made to all employees regardless of their performance, payments for travel to their home town for annual leave, "hard living" allowances for staff posted to distant or dangerous areas, and any other similar type of payment in cash.	
16 and 17	In most economies, government employees are affiliated with some kind of social security scheme that provides retirement pensions, health insurance, and so forth. The government may make regular payments into a social security fund for its employees, and in this case enter the amount paid each year in line 16. In many economies, governments provide social security benefits to their employees but do not make payments into a social security fund. In this case, enter an "imputed" contribution in line 17. This should be calculated in the same way that imputed social security contributions are calculated for the national accounts.	

## Annex B (Continued)

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19–22	In-kind remuneration is the value of goods and services provided to government employees free of charge. In some economies, school teachers and hospital staff are provided with free or subsidized accommodation. Raw food and cooked meals may also be provided, as well as free or subsidized transport by bus or train. In-kind remuneration should be valued at the cost to the government of supplying these goods or services.
25	Report here the number of hours per week that the employee is expected to work according to government regulations.
26	In many economies, it is accepted practice that government employees work less than the regular (official) hours per week. They may have a second job as teachers, accountants, and the like. Report here a best estimate of the hours per week actually worked by employees in this occupation.

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Source: ICP, <http://icp.worldbank.org/>.

Note: ISCO = International Standard Classification of Occupations.

## Annex C

### Questionnaires on Government Expenditures, ICP 2011

Questionnaire on government expenditures: health				
Enter amounts in national currency. Specify units.		Reference year		
Item no.	Description of item	Level of government		
		Central or federal (1)	Other levels (2) <sup>a</sup>	General (1) + (2)
1	Wages and salaries in cash			
2	Employer's contribution to social security funds			
3	Actual			
4	Imputed			
5	Benefits in kind			
6	Housing			
7	Transportation			
8	Food and meals			
9	Other in-kind benefits			
10	Intermediate consumption expenditure			
11	Other taxes (less subsidies) on production			
12	Consumption of fixed capital			
13	Net operating surplus			
14	Sales and fees (minus)			
15	Gross fixed capital formation			

Questionnaire on government expenditures: education				
Enter amounts in national currency. Specify units.		Reference year		
Item no.	Description of item	Level of government		
		Central or federal (1)	Other levels (2) <sup>a</sup>	General (1) + (2)
1	Wages and salaries in cash			
2	Employer's contribution to social security funds			
3	Actual			
4	Imputed			
5	Benefits in kind			
6	Housing			
7	Transportation			
8	Food and meals			
9	Other in-kind benefits			
10	Intermediate consumption expenditure			
11	Other taxes (less subsidies) on production			
12	Consumption of fixed capital			
13	Net operating surplus			
14	Sales and fees (minus)			
15	Gross fixed capital formation			



**Annex C (Continued)**

<b>Questionnaire on government expenditures: collective services</b>				
<b>Enter amounts in national currency. Specify units.</b>		<b>Reference year</b>		
<b>Item no.</b>	<b>Description of item</b>	<b>Level of government</b>		
		<b>Central or federal (1)</b>	<b>Other levels (2)<sup>a</sup></b>	<b>General (1) + (2)</b>
1	Wages and salaries in cash			
2	Employer's contribution to social security funds			
3	Actual			
4	Imputed			
5	Benefits in kind			
6	Housing			
7	Transportation			
8	Food and meals			
9	Other in-kind benefits			
10	Intermediate consumption expenditure			
11	Other taxes (less subsidies) on production			
12	Consumption of fixed capital			
13	Net operating surplus			
14	Sales and fees (minus)			
15	Gross fixed capital formation			

<b>Questionnaire on total government expenditures</b>				
<b>Enter amounts in national currency. Specify units.</b>		<b>Reference year</b>		
<b>Item no.</b>	<b>Description of item</b>	<b>Level of government</b>		
		<b>Central or federal (1)</b>	<b>Other levels (2)<sup>a</sup></b>	<b>General (1) + (2)</b>
1	Wages and salaries in cash			
2	Employer's contribution to social security funds			
3	Actual			
4	Imputed			
5	Benefits in kind			
6	Housing			
7	Transportation			
8	Food and meals			
9	Other in-kind benefits			
10	Intermediate consumption expenditure			
11	Other taxes (less subsidies) on production			
12	Consumption of fixed capital			
13	Net operating surplus			
14	Sales and fees (minus)			
15	Gross fixed capital formation			

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## Annex C (Continued)

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Source: ICP, <http://icp.worldbank.org/>.

Note: The definitions of the items in the questionnaires on government expenditures are as follows:

- *Item 1. Wages and salaries in cash.* This item covers all cash payments to government workers and includes overtime payments, performance bonuses, leave allowances, family allowances, cost of living allowances, and similar payments in addition to regular wages and salaries.
- *Item 2. Employer's contribution to social security funds.* If the government contributes to a social security fund in behalf of its employees, the economy is asked to enter the total amount of these contributions under item 3, actual. Many governments do not contribute to a fund, but they do provide their employees with pensions and health and other benefits. In this case, the System of National Accounts (SNA) requires economies to estimate what the contribution would have been if these benefits were being paid for from a social security fund. In item 4, economies should enter the estimate shown in their national accounts.
- *Item 5. Benefits in kind.* This item covers all benefits such as provision of free or subsidized food or meals, free or subsidized accommodation, and free or subsidized transport. All benefits in kind should be valued at the cost to government of providing them to its employees.
- *Item 10. Intermediate consumption expenditure.* This item consists of the goods and services purchased by government to provide health, education, defense, and all other services. This item may include rent, electricity, office supplies, teaching materials, and medical goods. It excludes any of the goods and services included as benefits in kind under item 5.
- *Item 11. Other taxes (less subsidies) on production.* These include employment taxes and taxes on property. Governments rarely impose taxes on themselves, and this item will be zero in most economies.
- *Item 12. Consumption of fixed capital.* This item should be based on capital stock estimates valued at current market prices. In practice, not many economies have these estimates and can only report depreciation based on historic (or "acquisition") values.
- *Item 13. Net operating surplus.* "Net" means that the operating surplus is calculated after deducting consumption of fixed capital. It is very rare that government agencies earn a net operating surplus, but it can happen that local authorities may earn a net operating surplus from a local bus or tram service, for example. For most economies, this item is zero.
- *Item 14. Sales and fees.* Sales and fees are "negative" consumption and must be deducted. They may include things such as museum entrance charges, passport fees, and licenses to own pets or firearms.
- *Item 15. Gross fixed capital formation.* This item consists mainly of government expenditures on plants and machinery, buildings, roads, bridges, and other structures. Expenditures on mineral exploration, development of orchards, timber tracts, land improvement, computer software, and databases are also included.

In these questionnaires, data should be supplied for the most recent year for which final estimates of government expenditures are available.

a. Other levels include state, municipal, and local governments.

## Annex D

### Aggregate Indicators, Pay and Employment Data, ICP 2011

Indicator	Metric	Value	Reference year	Definition/reference
<i>General indicators</i>				
GDP	Millions (local currency)			Total final expenditures at purchasers' prices, including the f.o.b. (free on board) value of exports of goods and services, less the f.o.b. value of imports of goods and services (World Bank 2008, 204)
Total population	Thousands			Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship—except for refugees not permanently settled in the economy of asylum, who are generally considered part of the population of their economy of origin (definition from WDI).
School-age population	Thousands			Population of the age group by level of education defined by economy's school system
Total labor force (LF)	Thousands			Persons ages 15 and older who are currently employed and persons who are unemployed but seeking work, as well as first-time job seekers
<i>Government recurrent expenditure indicators</i>				
Total general government recurrent expenditures	Millions (local currency)			Sum of "Compensation of employees" ( <i>GFS Manual 2001</i> , para. 4.26) and "Use of goods and services" ( <i>GFS Manual 2001</i> , para. 4.27) by "General Government" ( <i>GFS Manual 2001</i> , pp. 10–14)
Total central government recurrent expenditures	Millions (local currency)			Sum of "Compensation of employees" ( <i>GFS Manual 2001</i> , para. 4.26) and "Use of goods and services" ( <i>GFS Manual 2001</i> , para. 4.27) by "Central Government" ( <i>GFS Manual 2001</i> , pp. 10–14)
Total central civilian government recurrent expenditures	Millions (local currency)			Sum of "Compensation of employees" ( <i>GFS Manual 2001</i> , para. 4.26) and "Use of goods and services" ( <i>GFS Manual 2001</i> , para. 4.27) by "Central Civilian Government" ( <i>GFS Manual 2001</i> , pp. 10–14)
Total subnational government recurrent expenditures	Millions (local currency)			Sum of "Compensation of employees" ( <i>GFS Manual 2001</i> , para. 4.26) and "Use of goods and services" ( <i>GFS Manual 2001</i> , para. 4.27) by "Subnational Government" ( <i>GFS Manual 2001</i> , pp. 10–14)
<i>Wage bill indicators</i>				
General government wage bill	Local currency			General government is the <i>GFS Manual 2001</i> definition of "General Government" (pp. 10–14). Wage bill is total general government expenditures on "compensation of employees," as defined in <i>GFS Manual 2001</i> (p. 40, para. 4.26).
Central government wage bill	Local currency			Central government is the <i>GFS Manual 2001</i> definition of "Central Government" (p. 13, paras. 2.48–2.50). Wage bill is total central government expenditures on "compensation of employees," as defined in <i>GFS Manual 2001</i> (p. 40, para. 4.26).
Central civilian government wage bill	Local currency			Central civilian government is defined as "Central Government" net of defense. "Defense" is defined as in <i>GFS Manual 2001</i> , "Classification of Expense by Function of Government" (chap. 6 and annex to chap. 6). Wage bill is total central civilian government expenditures on "compensation of employees," as defined in <i>GFS Manual 2001</i> (p. 40, para. 4.26).
Subnational government wage bill	Local currency			Subnational government is defined as the sum of "State, provincial or regional government" and "Local government," as defined in <i>GFS Manual 2001</i> (pp. 13–14, paras. 2.51–2.58). Wage bill is total subnational government expenditures on "compensation of employees," as defined in <i>GFS Manual 2001</i> (p. 40, para. 4.26).

table continues next page

## Annex D (Continued)

Indicator	Metric	Value	Reference year	Definition/reference
<i>Employment indicators</i>				Employment is defined as total number of employees (within the specified subset of the public sector) on the payroll on a specified date (e.g., April 15, 20xx). Alternatively, the Full Time Equivalent (FTE) definition could be employed, but almost no governments actually track that. Thus the payroll definition is probably the most sensible one to employ.
<i>Number of employees</i>				
Total public sector	Thousands			Sum of public corporations and general government (see below)
Public corporations	Thousands			Defined as in <i>GFS Manual 2001</i> (pp. 14–15, paras. 2.59–2.63)
General government	Thousands			Defined as in <i>GFS Manual 2001</i> (pp. 10–14)
Central government	Thousands			Defined as in <i>GFS Manual 2001</i> (p. 13, paras. 2.48–2.50)
Defense	Thousands			<i>GFS Manual 2001</i> , Functional classification 702 (defense)
Central civilian government	Thousands			Defined as "Central Government" net of defense (see above)
Central civilian government exclusive of education, health, and police	Thousands			Central civilian government net of education, health, and police (see definitions below)
Education	Thousands			<i>GFS Manual 2001</i> , Functional classification 709
Primary	Thousands			<i>GFS Manual 2001</i> , Functional classification 7091 (pre-primary and primary education)
Secondary	Thousands			<i>GFS Manual 2001</i> , Functional classification 7092 (secondary education)
Postsecondary nontertiary	Thousands			<i>GFS Manual 2001</i> , Functional classification 7093 (postsecondary nontertiary education)
Tertiary	Thousands			<i>GFS Manual 2001</i> , Functional classification 7094 (tertiary education)
Health	Thousands			<i>GFS Manual 2001</i> , Functional classification 707 (health)
Police	Thousands			<i>GFS Manual 2001</i> , Functional classification 7031 (police services)
Subnational government	Thousands			Sum of "State, provincial or regional government" and "Local government," as defined in <i>GFS Manual 2001</i> (pp. 13–14, paras. 2.51–2.58)

Source: ICP, <http://icp.worldbank.org/>.

Note: *GFS Manual 2001* refers to the *Government Finance Statistics Manual 2001* (IMF 2001); WDI refers to the World Bank's World Development Indicators database, <http://data.worldbank.org/data-catalog/world-development-indicators>.

## Annex E

### Computed Indicators, Pay and Employment Data, ICP 2011

Indicator	Metric	Calculated value	Definition
<i>Wage bill indicators</i>			
General government wage bill per gross domestic product (GDP)	% of GDP		Ratio of general government wage bill to GDP
General government wage bill/total recurrent expenditures	% of total recurrent expenditures		Ratio of general government wage bill to total general government recurrent expenditures
Central government wage bill per GDP	% of GDP		Ratio of central government wage bill to GDP
Central government wage bill/total recurrent expenditures	% of total recurrent expenditures		Ratio of central government wage bill to total central government recurrent expenditures
Central civilian government wage bill per GDP	% of GDP		Ratio of central civilian government wage bill to GDP
Central civilian government wage bill/total recurrent expenditures	% of total recurrent expenditures		Ratio of central civilian government wage bill to total central civilian government recurrent expenditures
Subnational government wage bill per GDP	% of GDP		Ratio of subnational government wage bill to GDP
Subnational government wage bill/total recurrent expenditures	% of total recurrent expenditures		Ratio of subnational government wage bill to total subnational government recurrent expenditures
<i>Compression ratios</i>			
<i>Health services</i>			
Managerial-professional	Ratio		Ratio of average total remuneration for "1112: Senior government official " with 20 years of experience to average total remuneration for "2211: Generalist medical practitioner," entry level
Managerial-clerical	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to average total remuneration for "4313: Payroll clerk," entry level
<i>Collective services</i>			
Managerial-professional	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to average total remuneration for "2631: Economist," entry level
Managerial-clerical	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to average total remuneration for "4313: Payroll clerk," entry level
Managerial-elementary	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to average total remuneration for "9112: Cleaners and helpers in offices, hotels, and other establishments," entry level
<i>Education services</i>			
Managerial-professional	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to average total remuneration for "2341: Primary education teacher," entry level

table continues next page

## Annex E (Continued)

Indicator	Metric	Calculated value	Definition
Managerial-clerical	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to average total remuneration for "4313: Payroll clerk," entry level
<i>Public sector remuneration per GDP per capita</i>			
<i>Health services</i>			
Managerial	Ratio		Ratio of average total remuneration for "1120: Managing directors and chief executives" with 20 years of experience to GDP per capita
Professional	Ratio		Ratio of average total remuneration for "2211: Generalist medical practitioner" with 10 years of experience to GDP per capita
Clerical	Ratio		Ratio of average total remuneration for "4313: Payroll clerk" with five years of experience to GDP per capita
<i>Collective services</i>			
Managerial	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to GDP per capita
Professional	Ratio		Ratio of average total remuneration for "2631: Economist" with 10 years of experience to GDP per capita
Clerical	Ratio		Ratio of average total remuneration for "4313: Payroll clerk" with five years of experience to GDP per capita
Elementary	Ratio		Ratio of average total remuneration for "9112: Cleaners and helpers in offices, hotels, and other establishments," entry level, to GDP per capita
<i>Education services</i>			
Managerial	Ratio		Ratio of average total remuneration for "1112: Senior government official" with 20 years of experience to GDP per capita
Professional	Ratio		Ratio of average total remuneration for "2341: Primary education teacher" with 10 years of experience to GDP per capita
Clerical	Ratio		Ratio of average total remuneration for "4313: Payroll clerk" with five years of experience to GDP per capita
<i>Employment indicators</i>			
<i>Employment per capita</i>			
Total public sector per capita	Ratio		Ratio of total public sector to population
Public corporations per capita	Ratio		Ratio of public corporations to population
General government per capita	Ratio		Ratio of general government to population
Central government per capita	Ratio		Ratio of central government to population
Armed forces per capita	Ratio		Ratio of armed forces to population
Central civilian government per capita	Ratio		Ratio of central civilian government to population
Central civilian government exclusive of education, health, and police per capita	Ratio		Ratio of central civilian government exclusive of education, health, and police to population
Education/school-age population	Ratio		Ratio of education to school-age population

## Annex E (Continued)

Indicator	Metric	Calculated value	Definition
Primary/school-age population	Ratio		Ratio of primary to school-age population
Secondary/school-age population	Ratio		Ratio of secondary to school-age population
Postsecondary nontertiary/school-age population	Ratio		Ratio of postsecondary nontertiary to school-age population
Tertiary/school-age population	Ratio		Ratio of tertiary to school-age population
Health per capita	Ratio		Ratio of health to population
Police per capita	Ratio		Ratio of police to population
Subnational government per capita	Ratio		Ratio of subnational government to population
<i>Employment per labor force (LF)</i>			
General government/LF	Ratio		Ratio of general government to LF
Central government/LF	Ratio		Ratio of central government to LF
Armed forces/LF	Ratio		Ratio of armed forces to LF
Central civilian government/LF	Ratio		Ratio of central civilian government to LF
Central civilian government exclusive of education, health, and police/LF	Ratio		Ratio of central civilian government exclusive of education, health, and police to LF
Education/LF	Ratio		Ratio of education to LF
Primary/LF	Ratio		Ratio of primary to LF
Secondary/LF	Ratio		Ratio of secondary to LF
Postsecondary nontertiary/LF	Ratio		Ratio of postsecondary nontertiary to LF
Tertiary/LF	Ratio		Ratio of tertiary to LF
Health/LF	Ratio		Ratio of health to LF
Police/LF	Ratio		Ratio of police to LF
Subnational government/LF	Ratio		Ratio of subnational government to LF

Source: ICP, <http://icp.worldbank.org/>.

## NOTES

1. In some economies, pay scales for the police are based not only on position but also on rank. If this is the case, one would have to approximate the average ranks for the position and the average number of years required to be promoted to the position. Four levels of experience expressed in years would not be applicable. Instead, one would associate the remuneration of the position with one of four levels of experience based on how long it takes to reach a position corresponding to the average.
2. This section is based on an unpublished working paper, "Productivity Adjustment for Government Services PPPs: Alternatives and Proposal for ICP 2011," by Inklaar and Timmer (2013).

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# Machinery and Equipment: Approach and Data Requirements

This chapter provides guidelines, specific instructions, and practical tools for implementing the price survey on machinery and equipment goods across different economies with divergent economic structures.

## CATEGORIES OF MACHINERY AND EQUIPMENT ITEMS

In the International Comparison Program (ICP) classification, the category machinery and equipment is broken down into two groups: (1) metal products and equipment and (2) transport equipment. These groups are further disaggregated into eight basic headings. Economies are required to collect the prices of several specified items within most of these basic headings.

The five basic headings related to metal products and equipment are (1) fabricated metal products except machinery and equipment; (2) general-purpose machinery; (3) special-purpose machinery; (4) electrical and optical equipment; and (5) other manufactured goods not elsewhere classified (n.e.c.). The remaining three basic headings for transport equipment are (1) motor vehicles, trailers, and semitrailers; (2) other road transport; and (3) other transport equipment.

It is important to elaborate on the different products in each of the basic headings:

- Fabricated metal products, except machinery and equipment, include prefabricated buildings of metal; bridges, bridge sections, towers, and lattice masts of iron or steel; and reservoirs, tanks, vats, and similar containers of iron, steel, or aluminum for all materials.
- General-purpose machinery includes engines and turbines except aircraft, vehicle, and cycle engines; pumps and compressors; ovens other than bakery ovens; and furnaces, furnace burners, and incinerators.
- Special-purpose machinery is intended for specific industries such as agricultural and forestry metallurgy, mining, quarrying, and construction.
- Electrical and optical equipment includes word processing machines, printing machinery, computers and related equipment, electric motors, lighting equipment, and radio and television equipment.
- Other manufactured goods n.e.c. include office, shop, and hotel furniture.
- Motor vehicles, trailers, and semitrailers range from passenger cars, taxicabs, vans, buses, and coaches, to specialized parts and engines.

- Other road transport includes motorcycles, sidecars, scooters, bicycles, and invalid carriages, including their specialized parts and engines.
- Other products include computer software that a registered company expects to use in production for more than one year.

Structured product descriptions (SPDs) are developed for each equipment item. The technical characteristics that determine the performance of a machine or piece of equipment are very important in the product specifications.

## SUMMARY OF PILOT STUDY

The 2011 round of the ICP began with a pilot study. It was the first in a number of steps that culminated in the launch of the main survey. The pilot study was based on an initial list of investment products drawn from the results of similar exercises in different parts of the world. The list comprised products and items that were divided into two main parts, generic and specified.

Prior to the pilot study, all items in the list were checked and determined to be current based on various sources. However, the availability of products could vary across economies—for example, new models could be introduced at different times in different economies.

The pilot study, carried out in nine economies, was a research exercise aimed at determining the availability of the products and items on the list. After the pilot study, the objective was to analyze the results and then prepare a global core list (GCL) that would reflect—as much possible—markets in all the participating economies.

## PRODUCT LIST

The principal document of the price survey on machinery and equipment was the product list, which is described here. A summary of the list appears in table 11.1.

As indicated earlier, the list comprises eight different product groups called basic headings (1–8). Each basic heading is divided into products that are in turn split into generic and specified items. A *product* is a group of specific pieces of machinery or equipment. An *item* is a subdivision and a variation of a product (e.g., a particular make or model of a product). A *generic product or item* is one for which the specification gives a set of parameters that will define it but without a make or model. A *specific product or item* is one for which the specification includes the make and model.

The list is composed of 77 products and 177 items. Each item is assigned one Excel sheet that gives details, including the technical parameters. These are contained in the ICP Kit, which was distributed to participating economies.

**Table 11.1** Product List, Machinery and Equipment, ICP 2011 Survey

Product group	Code	Basic heading	Products, total	Items		
				Generic	Specific	Total
1	150111.1	Fabricated metal products, except machinery and equipment	5	6	3	9
2	150112.1	General-purpose machinery	9	6	14	20
3	150113.1	Special-purpose machinery	24	17	33	50
4	150114.1	Electrical and optical equipment	25	15	41	56
5	150115.1	Other manufactured goods n.e.c.	4	3	5	8
6	150121.1	Motor vehicles, trailers, and semitrailers	5	4	13	17
7	150121.2	Other road transport	1	1	2	3
8	150311.1	Other products	4	0	14	14
Total			77	52	125	177

Source: ICP, <http://icp.worldbank.org/>.

## OBJECTIVE OF THE PRICE SURVEY

The main objective of the survey is to find and price as many of the products and items on the list as possible. In addition, the number of identical and important items priced on the list is expected to be maximized. When products are not identical but are similar to the given specifications, they are to be priced and classified as equivalent.

## WORKING METHODS

### Definitions and Concepts in the Machinery and Equipment Goods Survey

*What is meant by "specified" versus "unspecified"?*

- A specified item is an item in the global core list for which all specifications are fully stated in the structured product description, including name, brand, model, and an extract of up to 12 of the most important elements of the item specifications sheet, usually provided by the manufacturer.
- An unspecified item will have the same specifications as an existing item (whether or not on the global core list) except for the brand or model name.

The ICP catalog for machinery and equipment goods contains samples of structured product descriptions for specified and unspecified items.

*What are the differences among the concepts of comparability, equivalence, and identity for specified items?*

- An item in the national or regional market is deemed *comparable* to a given specified item if it has the same (or very close) specifications as the specified item except for the make or model. The notion of close specifications is based on the judgments of machinery and equipment goods experts, building on their experience, but, more important, on the relevant manufacturers' marketing strategies. In general, in this industry a company would conduct research and development activities, design an item, produce a prototype, market it, start commercial production, and develop a marketing strategy aimed at

turning the item into profitable activities as soon as possible. Sometime later, a competitor would appear on the market, producing a close copy for a better (but perhaps not significantly different) price.

- An item is deemed *equivalent* to a specified item on the GCL when it has the same purpose, use, and usually a comparable physical appearance (but not necessarily), and when it meets well-known international standards and norms and has quality and specifications comparable to those of the specified item. The same company may have delocalized the production of one (or some) of its products to another area of the world and assigned an identical (or regional) model number to the product. It may even shift from an existing model to a newer equivalent one. These are usually the items most equivalent to a given set of specifications. A competitor may also provide a comparable item sold at better market conditions.
- Finally, an *identical* item meets and matches exactly the prescribed SPD specifications. It is also referred to as an "exact match."

The priced items should be recorded on the technical sheets in the ICP Kit. For generic items, products matching as closely as possible the given technical specifications should be selected and priced. For specific items, the exact product and model should be researched and priced. Also for specific items, an alternative method is to choose an equivalent (i.e., an item of the same make but a different model) if the exact make and model are not found. A different make and model may also be selected if it matches the particular specification.

### Generic Items

The objective of referring to generic items in the machinery and equipment goods survey is to identify items that nearly match the given specification. Makes and models of generic products should be provided, and the technical parameters should be completed. The parameters are ranked according to their importance.

For most generic items, the technical specifications are based on a specific make and model.

If a particular item exactly matches the technical parameters given, it is classified as identical. If differences exist, then the item is classified as equivalent.

When a priced product matches both the make and model of a specific item, it is recorded as either generic or specific.

Because it is generally better to price well-known makes of products, the makes and models most commonly used for the specific type of product should be priced.

### **Specific Items**

Items that match the exact make and model are classified as identical. In some instances, although the make and model are the same, differences may exist in the technical parameters (e.g., because of national rules and regulations). Therefore, such items are classified as equivalent. If the same make is identified but there is a difference in the model, the item is submitted as equivalent.

### **What Do Experts Say about These Concepts?**

Expert views are an interesting introduction to understanding the specificities of machinery and equipment goods, but a common understanding is also needed of the concepts and terminologies used in the survey guidelines. This is crucial during data collection to identify comparable items and during data validation to map price quotations and related items to the right product in the list. What follows are some useful insights from global experts in the industry about these concepts:

- Some items have stable standard specifications and price structures across the world. One example is Apple products, whether hardware or software. To some extent, the prices of these types of items are easily predictable both geographically and over time.
- Some items are unique because they are designed to fit the need of the customer, but they should meet international standards in terms of selected characteristics such as size, components, and security features. Examples are fuel tanks and selected health- and security-related items. These customized

items usually show regional patterns in terms of both product identification and price formation.

- The comparability of some items requires meeting all the specifications, whereas carefully selected specifications will be enough to identify comparable items in participating ICP regions. Usually brand and model (even name) can contribute to identifying a specified item, but for unspecified items comparable products would have most of the key requirements in terms of specification.
- Equivalent items have the same specifications. Some of them have the same brand but are different models, while others have different brands. Because of close competition, major manufacturers of machinery would develop equivalent products and sell them at slightly different prices around the world. In the search for equivalent items, it is important to select brands within the same category. For example, although four manufacturers—Caterpillar, John Deere, Hitachi, and Kumatsu—may produce equivalent items, Caterpillar and John Deere products are closer to each other, on the one hand, and Hitachi and Kumatsu, on the other.

## **STANDARD METHOD FOR PRICING EQUIPMENT GOODS**

The standard method for pricing equipment goods is similar to that followed for consumer goods and services; economies collect prices for identical or very similar products—sometimes referred to as specification pricing.

### **Pricing Rules**

For consistency with national accounts, economies are required to provide prices for equipment goods that are consistent with the valuation of those goods as fixed capital assets in the national accounts. Thus the prices must include the import duties and other product taxes actually paid by the purchaser, the costs of transporting the asset to the place where it will be used, and any charges for installing the asset

so it will be ready for use in production. Deducted from the price are any of the discounts generally available to most producers.

The following rules are to be observed in reporting prices for equipment goods:

- *Transport costs.* When the prices of equipment goods do not include transport costs, these costs should be estimated by economies. They would determine the average distance over which the items are transported from the factory where they are made or, for imports, the port of entry.
- *Installation costs.* Costs are usually associated with the installation of fixed equipment, and these costs are included in the gross fixed capital formation (GFCF) in national accounts. Installation charges include not only those paid by the purchaser for physical installation of an item at a factory or other site, but also any charges for testing or calibrating the equipment. In the case of transport equipment, there are usually no installation costs.
- *Product taxes.* The price should include only nondeductible product taxes. Economies that levy a value added tax (VAT) normally allow purchasers to deduct the full amount of the tax on capital goods. Sales and other product taxes, and sometimes import duties, may also be fully or partially deductible on capital goods.
- *Discounts.* The price should refer to the purchase of a single item so that it is not affected by discounts that may be available for large orders. The price of the single item should be reported after deducting any discount that is customarily available to most purchasers and that is available for most of the year.

The national average prices are required. Country experts should follow two guidelines in deciding how these prices are to be collected. First, in some small economies it may be sufficient to collect prices in only a single location such as the capital city or the largest industrial or commercial town. Second, in larger economies that have several centers of significant industrial and commercial activity, prices will have to be collected in several of these centers in order to calculate a national average price.

The prices reported should be the average prices for the reference year—that is, they should be the average of the prices collected at regular intervals throughout the year. However, experience shows that if all economies price equipment goods during the same period, there is no need to collect prices throughout the year. Price collection at midyear was recommended for ICP 2011.

### **Second-Hand Items**

A significant proportion of the GFCF in equipment goods in some economies consists of imports of second-hand goods, some of which may have been reconditioned. Second-hand goods comparable for pricing purposes are difficult to find. Substantial quality adjustments may be necessary to make the prices comparable, and such quality adjustments are presently not feasible. Thus in ICP 2005, price collection was confined to new equipment goods. The prices of second-hand equipment goods were not used even when those goods were actually more representative than new goods. Second-hand goods were also omitted from pricing in ICP 2011.

### **Sources of Price Information**

The prices of equipment goods can be obtained directly from producers, importers, or distributors, or from their catalogs. Prices are collected by the method or combination of methods that economies deem the most convenient such as personal visit, telephone, letter, or Internet. However, the prices have to be adjusted to conform to the valuation principles in terms of taking into account transport charges, installation costs, product taxes, and discounts.

The sources most often used for collecting price information are the following:

- *National statistical office.* Those who compile a producer price or an import price index are likely to be the most familiar with the types of goods being compared for these basic headings. For some items such as automobiles and computers, the comparisons used for household consumption are

also relevant to equipment, although the prices collected for the household consumption expenditure have to be adjusted by subtracting the value added taxes and other product taxes that are payable by households but usually can be deducted by enterprises.

- *Dealers within the economy.* Equipment distributors and dealers know which models are available, their detailed characteristics, and their prices. When prices are obtained from dealers, economies have to ensure that all product taxes and installation charges are included.

Government departments purchase transport and other equipment on a regular basis. Such purchases are often centralized under a public works or central supply department. They may buy directly from manufacturers, but often they also use local dealers and distributors.

- *Internet.* The specialized websites of equipment goods manufacturers are very useful. They often also provide the names and contact information for dealers and distributors. However, the price information obtained from websites has to be adjusted to conform to the valuation principles just outlined for taking into account transport charges, installation costs, product taxes, and discounts.

## PRICING GUIDELINES

Prices reported by economies are required to be (1) purchasers' prices (without the VAT), (2) national average prices, and (3) prices observed during the survey data collection period.

Purchasers' prices should include trade margins, transport and delivery costs, assembly and installation costs, and general discounts. The VAT should not be included. However, other nondeductible taxes are to be included in the purchasers' prices. They may be special national taxes on certain equipment (e.g., for environmental reasons or to protect national producers of equipment goods).

National average prices should reflect the national average and not just certain locations or suppliers.

Finally, the reported prices should be the ones observed during the survey period. No adjustments to the annual average prices are required.

In addition to the list prices of items, other relevant components of the cost should be considered such as additional delivery and installation costs. These components will be added to the list price of items. Similarly, there may be applicable discounts that should be taken off the list price. These aspects are taken into account in the ICP Kit.

Additional aspects to be considered include the following:

- *Used equipment.* All the products specified for this survey are for new items. In some economies, however, a significant proportion of investment equipment consists of imports of second-hand goods, some of which may have been reconditioned. Experimental pricing of second-hand equipment goods shows that there is considerable variation in the quality of the goods priced by different economies. It is very difficult to find second-hand goods that are comparable for pricing purposes. Substantial quality adjustments may be necessary to make the prices comparable, but such quality adjustments are not feasible in practice at the present time. Therefore, as noted earlier, this survey is confined to new equipment goods. Prices of second-hand equipment goods are not acceptable even when the second-hand goods are more widely used than new goods.
- *Number of price observations.* In many economies, a single dealer will have the right to sell the specified type of equipment, and in this case a single price observation will be sufficient. In other economies, however, there may be several distributors of the specified type of equipment. Therefore, several price observations are required to establish the national average price. The decision on whether one or more price observations are necessary is left to the national experts.

## Collecting and Recording Data

Annex A, the registration form, and annex B, the machinery and equipment data collection form, are the two main forms that economies are required to employ when collecting and recording data. The various points that follow are directly related to the parameters in the specification sheets in the ICP Kit:

- *Economy.* The economy box will be completed automatically by the ICP Kit when the introductory questions are completed in the setup box.
  - *Make and model.* When the data collectors have found and priced an item, these details should be inserted. For some generic items, there will be no model; in this instance, the data collectors are advised to insert "unspecified."
  - *Technical parameters.* The technical parameters for an item should be completed using the list in the specification sheet. The parameters can be completed in either metric or imperial units, depending on the choice made in the setup box in the ICP Kit. Data collectors are also asked to provide the technical parameters for all items, even when they are identical to the given ones.
  - *Order quantity.* Normally, the order quantity for an item is one. However, for some items it will be realistic to order more than one. For example, it is not standard to order just one fire extinguisher. In commercial situations, an order of 10 is a normal occurrence. Naturally, this aspect can reduce slightly the unit price.
  - *Currency.* The currency box is completed automatically by the ICP Kit after the economies complete the introductory questions in the setup box.
  - *Unit price.* The unit price should be submitted, regardless of the order quantity.
  - *Installation costs.* For some items, it may be relevant to include installation costs. Installation charges include not only any charges that the purchaser pays in order to have the item physically installed at the factory or other site, but also any costs for testing, running-in, or calibrating the equipment. Transport equipment usually incurs no installation costs. This aspect is covered further in the ICP Kit.
- *Transport and delivery costs.* As a component of the total price the delivery cost should be included. For some items, the cost will be included in the price. For others, an allowance should be taken into account. When items do not include transport and delivery costs, these costs should be estimated by economies by selecting the average distance over which the items are transported and delivered. This aspect is also covered in the ICP Kit.
  - *Discounts.* The price should refer to the purchase of a single item so it is not affected by discounts that may be available for large orders. However, the price of the single item should be reported after deducting any discount that is customarily available to most purchasers and that is available for most of the year.
  - *Non deductible taxes.* As noted, the price should include only non deductible product taxes. Economies that levy value added taxes normally allow purchasers to deduct the full amount of the tax on capital goods. Sales and other product taxes and sometimes import duties may also be fully or partly deductible on capital goods.
  - *Importance.* Economies are asked to classify each priced item as either important or less important. This process can be challenging because a certain degree of subjectivity is involved in assigning importance. However, if this factor is not taken into account when calculating the purchasing power parities (PPPs) for a basic heading, the PPPs will be biased.

Importance is a concept that relates to individual products within a basic heading. It should be introduced because no expenditure weights are provided below the basic heading level with which to determine the relative importance of the various products

priced within a basic heading. To ensure that a sufficient number of prices are collected for comparison between economies, the participating economies are required to price both important and less important products within each basic heading. Important products normally have a lower price level than less important products. An important item should be typical within the market for that product in a given economy. For example, consider a fire extinguisher, a common item because it is widely used globally. As a result, it is an important product within its basic heading. In addition, a particular make and model of fire extinguisher may be purchased more than other brands, and it is therefore classified as typical in the particular market. Such an item can be considered important.

- *Comparability.* Economies are asked to price products that are either identical or equivalent to the one requested. If economies identify the exact item listed in the specification, then the item will most likely be classified as identical. When a similar but not an exact item is priced, then it will most likely be classified as equivalent.

However, economies may find that even when the make and model are identical to the listed ones, there may be differences in the technical parameters. If these differences are minor and are not believed to be price determinants, the items can still be classified as identical. It is important that economies be flexible in dealing with this kind of issue because often decisions on how to classify products will be based on judgment.

### **Regional Strategies for Collecting Data on Machinery and Equipment Goods**

Although some national statistical offices may choose to assign their staff to conducting part of the machinery and equipment goods surveys, the Global Office reiterates the need to entrust knowledgeable experts with this work under the supervision of the national statistical office in order to maximize data quality and coverage of the national/regional market of these goods. Another strategy might be for

national statistical offices to collect prices for the easiest part of the list and defer to national/regional experts for more specialized items.

Some items in the list of machinery and equipment goods are also included in the household consumption survey, which may prompt some economies to borrow price quotations from the latter survey. This should not be done for the following reasons:

- The types of prices to be reported are different.
- Tax structures and levels are different.
- Delivery costs or discounts may apply for machinery and equipment goods.

The approach of "comparing like with like" seems to place more emphasis on matching items rather than capturing the full picture of the economy through the notion of comparability. Regions could take some measures to mitigate this risk. For example, they may decide to expand the list in order to have an exact match for each specified item and equivalent or comparable products for unspecified items. The Global Office and regional coordinating agencies could use this approach during data validation.

### **Dealing with Discontinued Products**

Changes in technology and economic conditions may convince some manufacturers of machinery and equipment goods to discontinue the production of some items in selected regions or worldwide. Usually, a new product is proposed to replace the previous one because the demand for the functionalities of the product still exists. When a product is discontinued by the manufacturer, data collectors are asked to check whether the product is still available on the market. When it is, they should collect prices in spite of the discontinuation by the manufacturer.

If the product is no longer available on the market, data collectors are asked to determine whether an equivalent or comparable item in the list could be priced instead of the one that was discontinued. Also, collectors should note on their collection forms that the prescribed item was discontinued.



## Annex A

### Registration Form, ICP 2011

#### Registration Form

Designated staff or consultant	Name*:	
	Email address*:	
	Phone number:	
Company	Name*:	
	Address1:	
	Address2:	
	City/town:	
	State/province:	
	Country*:	
Country and local currency unit (LCU) for data entry*:		

Source: ICP, <http://icp.worldbank.org/>.

Note: An asterisk (\*) indicates a required field. The machinery and equipment data collection form (including the registration form as a component) are also available in French, Spanish, and Arabic.

**Annex B**  
**Machinery and Equipment Data Collection Form, ICP 2011**

**Data Collection Form**

		Proposed		Observed	
Product Code	Product Name	Make (and nationality)			
		Model			

**Prices**

				Total unit price (LCU)
Unit base price <sup>δ</sup>		*	Installation cost <sup>δ</sup>	*
Order quantity <sup>δδ</sup>		*	Other costs (please specify) <sup>δ</sup>	
Delivery cost <sup>°</sup>		*	Discount <sup>δ</sup>	

**Specifications**

Specification		Metric	Imperial	Observed
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				

Notice: Fill in all required cells, Options and Notes, then proceed to "Add record to / Update database" below.

Options/Additional Specifications

Notes

Source: ICP, <http://icp.worldbank.org/>.

Note:  $\delta$  = Per unit amount, if not included in Equipment unit price

$\delta\delta$  = Number of units for one purchase

<sup>°</sup> = Per unit cost, if not included in Equipment unit price. This data collection form is also available in French, Spanish, and Arabic. More information on machinery and equipment is available on the ICP website at <http://icp.worldbank.org/>. LCU = local currency unit.

# Construction: Approach and Data Requirements

The International Comparison Program (ICP) is responsible for the production of purchasing power parities (PPPs) for both the national gross domestic product (GDP) and its subcomponents. Alternatives to market exchange rates, PPPs are intended to reflect price level differences across economies more accurately. Construction is one of the three categories under the gross fixed capital formation (GFCF) aggregate. Construction PPPs are currency converters that permit comparisons of construction volumes across economies.

In the report on the ICP 2005 results (World Bank 2008), construction is described as "comparison-resistant." It is difficult to identify a range of comparable and representative construction products or projects across all economies. As a result, the methods adopted for the calculation of PPPs are largely based on theoretical products or projects and require adjustments to bring them to a common basis. Designing the data collection, collecting the price data, and processing them therefore require special skills and knowledge.

The approach outlined in this chapter and used in ICP 2011 applies to construction work undertaken by formal construction contractors using modern materials; informal construction<sup>1</sup> is not part of the standard ICP price survey. Like the calculation of other price indicators, the calculation of PPPs requires a list (or lists) of items, prices for these items, and weights.

## APPROACH IN BRIEF

The construction category under GFCF is broken down into three groups, classes, and basic headings (BHs), as shown in table 12.1. The objective of the construction and civil engineering survey is to estimate PPPs for the three BHs and to further aggregate these up to the construction category.

The construction and civil engineering survey is based on an input approach in which economies price 50 basic and common resources for construction work that are selected to correspond with the main inputs to national construction output. In addition, respondents to a national survey provide information on relevance, resource mixes, typical markups and professional fees, and approximate project prices. These data are used to calculate and validate the construction and civil engineering PPPs.

The 50 basic and common construction resources are grouped into three subheadings:

- Materials: 38 material inputs
- Equipment: 5 types of equipment (hire rates with and without operator)
- Labor: 7 categories of construction labor.

The 38 material resources are allocated to the three basic headings (residential buildings, non-residential buildings, and civil engineering

**Table 12.1** Construction Expenditure, ICP 2011

Level	ICP code	Heading
Aggregate	150000	GROSS FIXED CAPITAL FORMATION
Category	150200	CONSTRUCTION
Group	150210	RESIDENTIAL BUILDINGS
Class	150211	<i>Residential buildings</i>
BH	150211.1	Residential buildings
Group	150220	NONRESIDENTIAL BUILDINGS
Class	150221	<i>Nonresidential buildings</i>
BH	150221.1	Nonresidential buildings
Group	150230	CIVIL ENGINEERING WORKS
Class	150231	<i>Civil engineering works</i>
BH	150231.1	Civil engineering works

Source: ICP, <http://icp.worldbank.org/>.

works). Therefore, items such as concrete and steel reinforcement appear in all three BHs, while other items, such as sheet roofing and sanitary ware, appear only in the residential and nonresidential buildings BHs. National experts are required to indicate whether a material is commonly used—in other words, whether the material in question is relevant for each type of construction. This process is carried out by deeming materials either relevant or not relevant for each basic heading.

Each basic heading has three subheading PPPs: materials, equipment, and labor. An unweighted country product dummy (CPD) is used to calculate PPPs for these subheadings. Aggregation of the subheading PPPs to the BH-level PPPs requires subheading expenditure data. These are calculated by breaking down the BH total expenditures over each subheading, using resource mixes as weights. After the subheading weights are established, the subheading PPPs can be aggregated to basic heading, class, group, and finally up to the level of construction category, using the selected aggregating method.

## REVIEW OF ALTERNATIVES

Various methods for deriving construction PPPs have been developed over the years. Some are still in use, and some have been abandoned.

But all of them, including the ICP 2011 approach described here, have shortcomings. This section briefly reviews the main features of the following methods:

- The project (bill of quantity)-based approaches are used by Eurostat and the Organisation for Economic Co-operation and Development (OECD) and have been adopted by member, associate, and candidate economies of the European Union and member and associate economies of the OECD. There are issues about the representativity of the projects selected and the extent to which all construction is represented, but the main concern is probably about the cost of the exercise.
- The method used by the Commonwealth of Independent States (CIS) involves collecting unit prices for construction inputs, which are then applied to model projects, with quantity weights for materials and products and labor (but not for equipment). The models are representative of "standard" project types, although they are less complete than the Eurostat-OECD bills of quantities. The projects are then weighted to represent basic headings and all construction output.
- The basket of construction components (BOCC) approach used in the ICP 2005 round involves a combination of basic inputs and more complex work items that were to be weighted on the advice of local experts. But there were difficulties with the establishment of weights and confusion over the mix of basic and complex items.
- Unit rates are estimates of the total price of projects expressed as an amount per square meter of built floor area for buildings and square meters or linear meters for civil engineering works. There is, however, uncertainty across economies about the rules of floor area measurement and what is included and excluded in the rates.

The CIS method is closest to the ICP 2011 approach, but it is less explicit about resource mixes and markups. Implementation of the Eurostat-OECD method involves a substantial effort and cost, and for that reason alone

probably was not considered for the ICP survey. The BOCC method was unsuccessful in 2005 largely because the relationship between simple and complex items was unclear, and it was not possible to obtain reliable system weights. Square meter rates are useful but inadequate as a basis for the calculation of PPPs. All of the project-based methods have the problem of reflecting tender rather than outturn prices, and the extent of "cost drift" varies significantly across economies. The main advantages of the ICP 2011 approach are that it is relatively simple to collect the necessary price and supporting data, and it is relatively inexpensive to implement.

The construction output, or tender or bid, prices reflect construction prices at a point in the future when the resources will be purchased and the work undertaken. They are, therefore, price forecasts—the actual base date depends on the duration and nature of the project. Resource prices—the prices collected in the proposed approach—are current as of the date they are collected.

## SELECTING ITEMS

As with other PPP calculations, this exercise requires that a set of "product baskets" be identified to serve as the basis for weights and prices. The criteria for selection of material and product items in the baskets are as follows:

- Common across most economies in terms of use in construction
- Significant in terms of value used in construction in most economies
- Simple to describe and likely to be understood in most economies.

Numbers of items and individual items are selected by reference to input-output tables and lists of items used in published construction price features.

The table in annex A sets out the three categories of items selected for construction materials and products, equipment, and labor. Items in the table marked with an asterisk are identical to the basic items in the 2005 ICP BOCC survey documentation. This approach allows an

"overlap" with the 2005 method. The table in annex B allocates materials and products to basic headings on the basis of their likely use in that type of construction work.

## ESTABLISHING WEIGHTS

Two types of weights have to be considered:

- Weights for the subheadings—that is, the resource mixes (materials, equipment, and labor) in each basic heading. These are reported by the respondents to the construction survey or are determined centrally for groups of economies by the Global Office or regional coordinating agencies.
- Weights that represent national accounts expenditure values for each basic heading. These are provided by the national statistical offices as part of their national accounts expenditure data reporting to the ICP.

Resource mixes of materials, equipment, and labor for the three basic headings in different groups of economies depend on the skills and technology available in an economy and other factors. Average values can vary from economy to economy and, within economies, across types of work. There can be trade-offs between the skill levels and the price of labor (highly skilled labor is usually expensive, but the quantity of workers required is relatively low, and vice versa), but that is not always the case. There are also trade-offs between labor and equipment inputs (capital/labor substitution), but there is relatively little information on that in most economies.

In most economies and in most types of work (although not necessarily in civil engineering works), materials represent the greatest proportion of construction value (typically, 50–75 percent); labor the next greatest (20–40 percent); and equipment the smallest proportion (5–20 percent). In civil engineering works, the relative significance of labor and equipment can be reversed, and materials may not be the most significant component.

The value of construction work in each basic heading varies from economy to economy and from year to year. In larger, more mature economies, there may be long-term

regular patterns in construction investment, whereas in smaller and less developed economies the mix can vary substantially from year to year. Of the three basic headings, civil engineering works tends to be the most variable, particularly in smaller or less developed economies, where a dominant type of work can influence the mix in any year. For example, roads and tunneling have a relatively low material mix, but are not likely to be undertaken every year. Economies go through phases of construction investment, depending on some combination of the state of the general economy, government policy, the volume and nature of development aid programs, and other factors.

## PRICING RULES

The prices provided should be those paid by construction contractors to their suppliers. For materials and products, these are typically the prices paid, after discounts, to manufacturers or intermediaries (agents or merchants), including all nonrecoverable taxes and excluding all recoverable taxes such as the value added tax (VAT). For equipment, prices should be the rental charges paid to hire companies or internal hire rates, and for labor the cost to the contractor of employing workers. Informal payment arrangements for labor are common in construction—for example, some payment is in the form of wages, subject to taxes and on which employers' costs are incurred, and other payments are in cash (and respondents to the construction survey should bear this in mind when determining what an "average" wage is).

Prices should be provided for items that are commonly available and commonly used in the economy. They should not be provided for items that match the item description precisely if that involves pricing a "special" item either not generally available in the economy or available only at a premium price.

Economies are asked to provide annual and national "average" prices in national currency. Annual averages are prices that are an average over the survey year (midyear prices are acceptable) and that average different price levels

across the economy and across different types and sizes of projects. While striving to select the appropriate average prices, economy respondents should remain mindful of the following rules:

- *Geographical location.* Construction prices can vary across economies (particularly large ones) because of factors such as local resource and distribution costs; geographic, seismic, or climatic conditions; and local market conditions. Indeed, sometimes these variations can be significant. Respondents should consider the extent of geographical variations when pricing items and make a judgment on what is a realistic national average.
- *Site context.* Construction prices can vary, depending on site conditions. Examples are constrained city center sites, greenfield sites adjacent to urban areas, and remote sites that are difficult to access. When pricing items, respondents should assume reasonable site contexts with good access.
- *Size of projects.* The size of projects can influence the cost of resources, particularly materials and equipment. For example, large quantities and long periods of hire can reduce unit costs and vice versa. Prices should be provided for medium-size projects—that is, projects that are not unusually small or large.

Purchasers' prices for materials and products, equipment hire, and labor are sought from expert construction respondents in each economy. A single average price is sought for each item. Respondents are also asked to provide markups for each of the basic headings to cover general and preliminary items and contractors' overheads and profit and an allowance for professional fees for each of the basic headings.

In addition to input prices, markups, and allowances for professional fees, the survey form asks for unit output prices for different types of work representing the three basic headings. These are used as checks on the main survey data. Respondents are also asked to indicate the importance of each material or product in each basic heading in their economy.

## PRICING OF EQUIVALENT MATERIALS

Materials included in the construction and civil engineering survey are selected on the basis of their common use across economies. However, listed materials are not always available or used in all economies, and in some cases equivalent materials must be selected and priced.

When equivalent materials are being priced, it should always be clearly indicated in the survey questionnaire. For example, when economies do not have clay and use alternative materials for bricks, prices for the alternative bricks should be provided and the alternative description noted. However, when economies do not use bricks at all but only use concrete blocks, prices for concrete blocks should not be provided because they cannot be treated as equivalent to bricks. In this case, then, the brick item would not be priced. Another example is that in some economies, copper pipe is not used; steel and plastic pipes are used instead. In this case, steel pipe can be treated as equivalent to copper pipe, and the respective prices would be provided and the alternative description noted. Plastic pipes are not considered equivalent to copper or steel pipes.

## RELEVANCE

Classification of items as relevant or not relevant should take into account the following points:

- If a material is available and commonly used in *all three basic headings*, it should be priced and classified as relevant by inserting "1" in each BH's relevance column.
- If a material is available and commonly used in *only some basic headings*, it should be priced and classified as relevant (1) for those BHs for which the material is relevant and not relevant (0) for those BHs for which the material is not relevant.
- If a material is available but not relevant for *any of the basic headings*, a price should be provided, but the material should be classified as not relevant (0) for all BHs.
- If a material is not available and not used, it should not be priced, and it should be classified as not relevant (0) for all BHs.

## PROJECT PRICES

Construction PPPs should be calculated using input prices for material prices, equipment hire rates, and costs of labor. Project prices, if and when reported, are used as a validation check for the input-based PPPs.

All reported prices should be annual average prices. Midyear prices can be treated as annual averages. The questionnaire on project prices also refers to a midpoint in a range of prices. This means that if an economy has a range of midyear prices for a given project, the middle price would be selected and reported. In practice, it may be useful to ask economies to provide several prices per location and then take the midpoint (or average) per location, which would then be used to determine the national midpoint or national average.

Reported project prices should be those charged by construction contractors and paid by purchasers such as housing developers. Reported prices should not include costs related to external works. External works are the construction works often included in contracts but outside the external walls of the building concerned. Examples are boundary walls, footpaths, landscaping, car parking, and utilities outside the building. They are excluded because they are site-dependent and extremely variable in scope.

## IMPLEMENTATION

Those implementing the ICP 2011 construction and civil engineering survey received a specific Excel questionnaire. The following materials were also available for conducting the survey:<sup>2</sup>

- This chapter and chapter 19, Validation of Construction and Civil Engineering Data, of this volume
- Construction materials catalog
- Additional guidance for the conduct of the survey
- "Construction Survey: Notes on Selection Criteria for National Experts"
- "Presentation on Construction and Civil Engineering: Operational Aspects."

The ICP 2011 construction and civil engineering questionnaire provided item specifications for the 50 basic and common resources for construction work and templates for the price and metadata collection. The questionnaire had seven worksheets:

1. *Introduction*: To report general information on the respondent, base date for prices, and geographical base of the national average price level
2. *Notes*: Notes and guidance for the conduct of the survey
3. *Materials*: To provide unit prices for the material inputs, importance information, and comments
4. *Equipment*: To provide unit prices for the equipment hire and comments

5. *Labor*: To provide unit prices for the labor costs, comments, and supplementary information on labor rates
6. *Project prices*: To provide optional information on the unit cost for project prices for validation purposes
7. *Support*: To provide information on the resource mixes, contractors' markups, and professional fees

Annex C presents the respective worksheets and the related guidance.

Resource mixes were estimated centrally by the Global Office using income groups as a proxy for the resource allocation. However, an economy may have decided to provide economy-specific estimates for the resource mixes.



## Annex A

### List of Resources: Construction Materials and Products, Equipment, and Labor, ICP 2011

Construction Materials And Products	
Aggregate for concrete*	Clean, hard, strong crushed stone or gravel free of impurities and fine materials in sizes ranging from 9.5 to 37.5 mm in diameter
Sand for concrete and mortar*	Fine aggregate washed sharp sand
Softwood for carpentry	Sawn softwood sections for structural use pretreated to national standards (e.g., 50 mm × 100 mm)
Softwood for joinery	Dressed softwood sections for finishing (e.g., 18 mm × 120 mm)
Exterior plywood*	Exterior quality plywood 15.5 mm thick in standard sheets
Interior plywood*	Interior quality plywood 12 mm thick in standard sheets
Chipboard sheet	Interior quality chipboard 15 mm thick in standard sheets
Petrol/gasoline	Standard grade for use in motor vehicles
Diesel fuel	Diesel fuel for use in construction equipment
Oil paint	Oil-based paint suitable for top coat finishes to timber surfaces
Emulsion paint	Water-based paint suitable for internal plaster surfaces
Ordinary Portland cement*	Ordinary Portland cement in bags or bulk delivery
Ready mix concrete*	Typical common mix, 1:2:4 cement, sand, and 20–40 mm aggregate, 20N/mm <sup>2</sup>
Precast concrete slabs	Precast concrete paving slabs 600 mm × 600 mm × 50 mm thick
Common bricks	Ordinary clay bricks, suitable for render or plaster finish (e.g., 215 mm × 100 mm × 65 mm thick—715 bricks/m <sup>3</sup> )
Facing bricks	Medium-quality self-finished clay bricks for walling (e.g., 215 mm × 100 mm × 65 mm thick—715 bricks/m <sup>3</sup> )
Hollow concrete blocks	Hollow dense aggregate concrete blocks, 7N/mm <sup>2</sup> (e.g., 440 mm × 215 mm × 140 mm thick—76 bricks/m <sup>3</sup> )
Solid concrete blocks	Solid dense aggregate concrete blocks, 7N/mm <sup>2</sup> (e.g., 440 mm × 215 mm × 140 mm thick—76 bricks/m <sup>3</sup> )
Clay roof tiles	Clay plain smooth red machine-made or similar tiles per square meter of roof surface area (e.g., 265 mm × 125 mm tiles)
Concrete roof tiles	Concrete interlocking tiles per square meter of roof surface area (e.g., 420 mm × 330 mm tiles)
Float/sheet glass	Standard plain glass, clear float, 4 mm thick
Double glazing units	Factory-made, hermetically sealed medium-size units, 0.5–2.0 m <sup>2</sup> with 4 mm glass, 12 mm seal
Ceramic wall tiles	152 mm × 152 mm × 5.5 mm thick white or light-colored for medium-quality domestic use
Plasterboard	12.5 mm paper-faced, taper-edged plasterboard in standard sheets
White wash hand basin	Average quality white vitreous china domestic wash hand basin for domestic use, wall hung (excluding taps, trap, and pipework)
High-yield steel reinforcement*	Reinforcing bars up to 16 mm in diameter (excluding cutting and bending)
Mild steel reinforcement*	Reinforcing bars up to 16 mm in diameter (excluding cutting and bending)
Structural steel sections*	Mild steel I beams approximately 150 mm deep and approximately 19 kg/m
Sheet metal roofing	Twin skin roofing panel comprising color-coated steel or aluminum profiled sheeting outer layer, 100 mm insulation, internal liner sheet
Metal storage tank	Metal storage tank capacity 15 m <sup>3</sup> ; thickness of steel, 5 mm; typical size, 3.75 m × 2 m × 2 m
Cast-iron drain pipe	150 mm in diameter with mechanical coupling joints
Copper pipe	15 mm copper pipe suitable for mains pressure water
Electric pump	Electric pump for pumping water; temperature range, 5–80°C; flow rate, 10 L/sec; head pressure, 150 Pa
Electric fan	Electric exhaust fan for interior installation; flow rate, 1,000 L/sec; head pressure, 250 Pa

*table continues next page*

## Annex A (Continued)

Air-conditioning equipment	Air-cooled liquid chiller, refrigerant 407°C; reciprocating compressors; twin circuit; integral controls cooling load, 400 kW
Stand-by generator	Diesel generating set for stand-by use, three-phase 24 V DC, 250 KVA output
Solar collector	PV solar panels with peak output of 650 W, supply panels only, typically 4.5 m <sup>2</sup> total area
Electricity	Typical average commercial tariff
<b>Construction Equipment</b>	
Wheeled loader and excavator	1.0 m <sup>3</sup> loader capacity, 2.35 m wide shovel, 6.0 m maximum dig depth
Tracked tractor	Crawler dozer, 159 kW with "U" blade
Skid steer loader	Tipping load, 2,000 kg; travel speed, 11.1 km/hr.
Tandem vibrating roller	Self-propelled 5 tonne double vibratory
Compact track loader	Rated operating capacity, 864 kg; travel speed, 11.4 km/hr.
<b>Construction Labor</b>	
General (unskilled) laborer <sup>*a</sup>	General (unskilled) laborer <sup>*a</sup>
Bricklayer <sup>*b</sup>	Bricklayer <sup>*b</sup>
Plumber <sup>*b</sup>	Plumber <sup>*b</sup>
Carpenter <sup>*b</sup>	Carpenter <sup>*b</sup>
Structural steel worker <sup>*b</sup>	Structural steel worker <sup>*b</sup>
Electrician <sup>*b</sup>	Electrician <sup>*b</sup>
Machine (equipment) operator <sup>*b</sup>	Machine (equipment) operator <sup>*b</sup>

Source: ICP, <http://icp.worldbank.org/>.

Note: Items marked with an asterisk (\*) are identical to the basic items in the ICP 2005 basket of construction components (BOCC) survey documentation.

a. This group of construction workers undertakes simple, routine tasks in support of activities performed by more skilled workers. They usually have received little or no formal training. Examples of tasks they might undertake include loading and unloading materials, digging and filling holes and trenches, spreading gravel and related materials, and cleaning and tidying sites and site facilities.

b. This group of skilled construction workers has received training in their trade consisting of one or more of the following: an apprenticeship, on-the-job training, or training in a technical college or similar institution.

## Annex B

### Materials and Products Used in Basic Heading Work Types, ICP 2011

Material or product	Use in residential building	Use in nonresidential building	Use in civil engineering work
Aggregate for concrete	X	X	X
Sand for concrete and mortar	X	X	X
Softwood for carpentry	X	X	X
Softwood for joinery	X	X	
Exterior plywood	X	X	X
Interior plywood	X	X	
Chipboard sheet	X	X	
Petrol/gasoline	X	X	X
Diesel fuel	X	X	X
Oil paint	X	X	
Emulsion paint	X	X	
Ordinary Portland cement	X	X	X
Ready mix concrete	X	X	X
Precast concrete slabs	X	X	
Common bricks	X	X	X
Facing bricks	X	X	
Hollow concrete blocks	X	X	X
Solid concrete blocks	X	X	X
Clay roof tiles	X		
Concrete roof tiles	X		
Float/sheet glass	X	X	
Double glazing units	X	X	
Ceramic wall tiles	X	X	
Plasterboard	X	X	
White wash hand basin	X	X	
High-yield steel reinforcement	X	X	X
Mild steel reinforcement	X	X	X
Structural steel sections	X	X	X
Sheet metal roofing	X	X	
Metal storage tank		X	X
Cast-iron drain pipe	X	X	X
Copper pipe	X	X	
Electric pump		X	X
Electric fan		X	
Air-conditioning equipment	X	X	
Stand-by generator		X	
Solar collector	X	X	X
Electricity	X	X	X

Source: ICP, <http://icp.worldbank.org/>.

**Annex C**  
**Construction and Civil Engineering Questionnaire, ICP 2011**

**1. Introduction Worksheet**

1	Country:	
2	Currency:	
<b>Survey respondent</b>		
3	Name:	
4	Employer:	
5	Type of employer:	(please specify)
	consultant <input type="radio"/>	academic <input type="radio"/>
	research <input type="radio"/>	government <input type="radio"/>
	other <input checked="" type="radio"/>	
6	Contact details:	
7	Telephone no:	8 E-mail address:

**Purpose of the survey**

The purpose of this survey is to collect midyear national average prices as paid by contractors for resource inputs to construction work. The prices will contribute to the preparation of purchasing power parities (PPPs) for construction as part of a worldwide exercise coordinated by the World Bank and called the International Comparison Program (ICP). PPPs are currency converters (as an alternative to market exchange rates) that permit comparisons of construction volumes across countries to be made.

**Base date for prices**

Prices should be averages for the year 2011 or midyear prices.

9 Please tick one box only  Prices averaged over the year  Midyear prices

**National average price level**

The geographical base for this survey should be the national average for the country but, if this is not the case, please enter below the geographical base used in the survey and an adjustment factor to bring prices to a national average.

10	Geographical base		11	National average factor	E.g., 0.98, 1.00, 1.05, etc.
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**Completion of the survey**

Please refer to the Notes page for detailed instructions on completion of the survey.

## 2. Notes Worksheet

### General notes

i. The intention is to identify and collect prices for locally available, commonly used materials and products that are equivalent, if not identical, to the items described in the survey documents. The following notes are intended to assist in selecting and pricing the survey items.

### Item descriptions and units

ii. Specified materials and products: Item descriptions in the survey are intended to provide a clear description of the item to be priced. There is, however, a tension between the tightness of the specification and the content of the item to be priced—the tighter the specification, the more country specific it becomes. If a precise match to the specified material or product is not commonly available or used, the nearest commonly available and used equivalent should be priced and an appropriate note inserted in Column 10.

iii. Proprietary products: Generally, item descriptions in the survey do not use proprietary names but respondents can provide proprietary names in Column 10 if that simplifies the note.

iv. Detailed dimensions of materials: Generally, metric dimensions are stated in the survey documents, but these can be replaced by Imperial – or other – dimensions if these are more common in the country. Detailed dimensions of material and products will vary, both between and within countries; for example, the dimensions of bricks and blocks or timber sections. Survey respondents should select the nearest locally available and commonly used equivalent to the item described in the survey—and where that varies from the survey description, it should be noted in Column 10.

v. Units of measurement: Again, metric units are generally used in the survey documents but other units can be inserted. Alternative units of measurement can also be provided; for example, m<sup>2</sup> for plywood is preferred but a price per sheet indicating the dimensions of the sheet (length and width) is acceptable; similarly, cement is indicated as per tonne but per kg or per 50 kg bag is acceptable. The items and units should be as normally used in the country. Preferred units are indicated in Column 4 (Column 3 in the case of labor); alternative units should be inserted in Column 5 (Column 4 in the case of labor) and, if any notes are required, these should be inserted in Column 10.

vi. The units indicated for equipment hire are "per hour" but if other units are normally used, for example, "per day" or "per week," these should be indicated in Column 5. If the units are per day or per week, please indicate in Column 8 the typical numbers of hours worked per day or per week. It is assumed that equipment will be hired with an operator; if this is not the case, please indicate this in Column 8.

vii. The units indicated for labor are "per hour" but if other units are normally used, these should be indicated in Column 4 and the typical numbers of hours worked per alternative unit stated in Column 5.

### Prices

viii. Prices provided should be those paid by construction contractors to their suppliers. In the case of materials and products, that will typically be the prices paid after discounts to manufacturers or intermediaries (agents or merchants), including all nonrecoverable taxes; in the case of equipment, it should be the rental charges paid to hire companies or rates paid for internal hire; and, in the case of labor, the cost to the contractor of employing the workers. Informal payment arrangements for labor are common in construction—for example, some payment is in the form of wages, subject to taxes and on which employers' costs are incurred, while other payments are in cash—and respondents should bear this in mind when determining what is an "average" wage. There is space for notes on pricing after the material, plant, and labor sections, and it is important that these are completed by respondents.

ix. Prices should be provided for items that are commonly available and commonly used in the country; they should not be provided for items that match the item description precisely if that involves pricing a "special" item, either not generally available in the country or only available at a premium price.

x. The survey seeks annual and national "average" prices in national currency. Annual averages mean prices that are an average over the survey year (midyear prices are acceptable) and that average different price levels across the country, across different types and sizes of projects. The following notes are intended to help respondents select appropriate average prices for their country.

xi. Geographical location: Construction prices can vary across countries, as a result of local resource and distribution costs, geographic, seismic or climatic conditions, local market conditions, and so forth, particularly in large countries; sometimes these variations can be significant. Respondents should consider the extent of geographical variations when pricing items and make a judgment on what is a realistic national average.

xii. Site context: Construction prices can vary depending on detailed site conditions; for example, constrained city center sites, greenfield sites adjacent to urban areas, and remote sites that are difficult to access. When pricing items, respondents should assume reasonable site contexts with good access.

xiii. Size of projects: The size of projects can influence the cost of resources, particularly materials and equipment—large quantities and long periods of hire, for example, can reduce unit costs and vice versa. Prices should be provided for medium-sized projects, that is, projects that are not unusually small or unusually large.

### 3. Materials Worksheet

#### Construction materials and products

Respondents should indicate by inserting an asterisk, in columns 7, 8, and 9, the importance of each item in the work categories R = residential, NR = non-residential, and C = civil engineering. Here, importance means "in common use." Items that are available but are not commonly used should not be asterisked.

See  
pricing  
notes

1	2	3	4	5	6	7	8	9	10
Ref	Item	Specification notes	Preferred unit	Alternative unit	Unit price	R *	NR *	C *	Notes and comments
1	Aggregate for concrete	Clean, hard, strong crushed stone or gravel free of impurities, and fine materials in sizes ranging from 9.5 to 37.5 mm in diameter.	m <sup>3</sup>						
2	Sand for concrete and mortar	Fine aggregate washed sharp sand	m <sup>3</sup>						
3	Softwood for carpentry	Sawn softwood sections for structural use pre-treated (to national standards) eg., 50 mm × 100 mm	m <sup>3</sup>						
4	Softwood for joinery	Dressed softwood sections for finishing eg., 18 mm × 120 mm	M <sup>3</sup>						
5	Exterior plywood	Exterior quality plywood 15.5 mm thick in standard sheets	m <sup>2</sup>						
6	Interior plywood	Interior quality plywood 12 mm thick in standard sheets	m <sup>2</sup>						
7	Chipboard sheet	Interior quality chipboard 15 mm thick in standard sheets	m <sup>2</sup>						
8	Petrol/gasoline	Standard grade for use in motor vehicles	litre						
9	Diesel fuel	Diesel fuel for use in construction equipment	litre						
10	Oil paint	Oil-based paint suitable for top coat finishes to timber surfaces	litre						
11	Emulsion paint	Water-based paint suitable for internal plaster surfaces	litre						
12	Ordinary Portland cement	Ordinary Portland cement in bags or bulk delivery	tonne						(metric tonne 1000 kg)
13	Ready mix concrete	Typical common mix 1:2:4 cement:sand:20–40 mm aggregate, 20 N/mm <sup>2</sup>	m <sup>3</sup>						
14	Precast concrete slabs	Precast concrete paving slabs 600 × 600 × 50mm thick	m <sup>2</sup>						
15	Common bricks	Ordinary clay bricks (suitable for render or plaster finish) eg., 215 mm × 100 mm × 65 mm thick (715 bricks/m <sup>3</sup> )	m <sup>3</sup>						
16	Facing bricks	Medium quality self-finished clay bricks for walling, eg., 215 mm × 100 mm × 65 mm thick (715 bricks/m <sup>3</sup> )	m <sup>3</sup>						
17	Hollow concrete blocks	Hollow dense aggregate concrete blocks, 7N/mm <sup>2</sup> , eg., 440 mm × 215 mm × 140 mm thick (76 bricks/m <sup>3</sup> )	m <sup>3</sup>						
18	Solid concrete blocks	Solid dense aggregate concrete blocks, 7N/mm <sup>2</sup> , eg., 440 mm × 215 mm × 140 mm thick (76 bricks/m <sup>3</sup> )	m <sup>3</sup>						
19	Clay roof tiles	Clay plain smooth red machine-made or similar tiles per m <sup>2</sup> of roof surface area eg., 265 mm × 125 mm tiles	m <sup>2</sup>						
20	Concrete roof tiles	Concrete interlocking tiles per m <sup>2</sup> of roof surface area eg., 420 mm × 330 mm tiles	m <sup>2</sup>						

see  
pricing  
notes

1	2	3	4	5	6	7	8	9	10
Ref	Item	Specification notes	Preferred unit	Alternative unit	Unit price	R*	NR*	C*	Notes and comments
21	Float/ sheet glass	Standard plain glass, clear float, 4 mm thick	m <sup>2</sup>						
22	Double glazing units	Factory made hermetically sealed, medium-sized units 0.5 to 2.0 m <sup>2</sup> with 4 mm glass, 12 mm seal	m <sup>2</sup>						
23	Ceramic wall tiles	152 × 152 × 5.5 mm thick white or light colored for medium quality domestic use	m <sup>2</sup>						
24	Plasterboard	12.5 mm paper-faced taper-edged plasterboard in standard sheets	m <sup>2</sup>						
25	White wash hand basin	Average quality white vitreous china domestic wash hand basin for domestic use, wall hung (excluding taps, trap, and pipework)	each						
26	High-yield steel reinforcement	Reinforcing bars up to 16 mm diameter (excluding cutting and bending)	tonne						
27	Mild steel reinforcement	Reinforcing bars up to 16 mm diameter (excluding cutting and bending)	tonne						
28	Structural steel sections	Mild steel I beams approximately 150 mm deep and approximately 19 kg/m	tonne						
29	Sheet metal roofing	Twin skin roofing panel comprising color coated steel or aluminium profiled sheeting outer layer, 100 mm insulation, internal liner sheet	m <sup>2</sup>						
30	Metal storage tank	Metal storage tank capacity 15 m <sup>3</sup> , thickness of steel, 5 mm, typical size, 3.75 m × 2 m × 2 m	each						
31	Cast iron drain pipe	150 mm diameter with mechanical coupling joints	m						
32	Copper pipe	15 mm copper pipe suitable for mains pressure water	m						
33	Electric pump	Electric pump for pumping water, temperature range, 5–80°C, flow rate 10 litres/second, head pressure, 150 Pa	each						
34	Electric fan	Electric exhaust fan for interior installation, flow rate, 1,000 litres/ second, head pressure, 250 Pa	each						
35	Air-conditioning equipment	Air-cooled liquid chiller, refrigerant 407c; reciprocating compressors; twin circuit; integral controls cooling load 400 kW	each						
36	Stand-by generator	Diesel generating set for stand-by use, three-phase 24V DC, 250 KVA output	each						
37	Solar collector	PV solar panels peak output 650 W, supply panels only, typically 4.5 m <sup>2</sup> total area	each						
38	Electricity	Typical average commercial tariff	kW/hr						
39	Please provide any other useful comments on the construction materials and products market:								





## 5. Labor Worksheet

### Labor rates

Labor rates should reflect the cost to the contractor of employing the labor and should include, in addition to pre-tax wages to the worker, any additional costs to the employer for accident/health insurance, pensions, and so forth. Labor rates should also include any "off the books" or "envelope" payments that are typically made to construction workers in your country. Please indicate in the Notes and comments column typical employment conditions for different types of workers, for example, permanently employed, daily paid, and so forth.

*see pricing notes*

1	2	3	4	5	6	7
Ref	Item	Preferred unit	Alternative unit	Number of hours	Unit price	Notes and comments
1	General (unskilled) laborers [1]	Hour				
2	Bricklayer [2]	Hour				
3	Plumber [2]	Hour				
4	Carpenter [2]	Hour				
5	Structural steel worker [2]	Hour				
6	Electrician [2]	Hour				
7	Machine (equipment) operator [2]	Hour				

*Notes:* [1] This group of construction workers undertake simple and routine tasks in support of activities performed by more skilled workers. They have usually received little or no formal training. Examples of tasks that they might undertake include loading and unloading of materials, digging and filling holes and trenches, spreading gravel and related materials, cleaning and tidying sites and site facilities.

[2] These skilled construction workers have received training in their trade comprising an apprenticeship, on-the-job training, or training, in a technical college or similar institution.

### Supplementary questions on labor rates

8 To help us ensure comparability with rates from other countries, please confirm that the above rates are as follows:

Gross (i.e., the cost of labor to the contractor as described above) or Net (i.e., the rates paid to workers)

*select Gross or Net*

9 If you have reported Net rates, please indicate the overall percentage adjustment for Gross labor costs against Net labor rates

10 Please provide any other useful comments on the local construction labor market:

## 6. Project Prices Worksheet

### Approximate project prices

Please provide approximate all-in unit prices for the project types listed below. Please also indicate below the table notes on the methods of measurement used. Generally, prices for buildings should exclude external works, furniture, loose or special equipment, and fees for professional services. Prices for civil engineering works should allow for average excavation and earthworks in good ground. Where there is a known range of prices, please take a midpoint.

		Preferred unit	Alternative unit	Unit rate	Notes and comments
<b>Residential buildings</b>					
1	Single-story average quality detached house masonry (brick or block) or timber frame	m <sup>2</sup> floor area			
2	Two-story attached house, mass market, center unit in terrace/ row of four units, otherwise as above	m <sup>2</sup> floor area			
3	Low rise apartment, mass market, concrete frame, brick or block infill, walk-up	m <sup>2</sup> floor area			
4	High rise apartment, average quality, concrete frame, brick or block infill	m <sup>2</sup> floor area			
<b>Nonresidential buildings</b>					
5	High rise office/administrative building, ±20 story, medium quality, air-conditioned, concrete frame	m <sup>2</sup> floor area			
6	Medium rise office/administrative building, ±10 story, medium quality, air-conditioned, concrete frame	m <sup>2</sup> floor area			
7	Primary school one or two story, approx. 12 classrooms	m <sup>2</sup> floor area			
8	Factory/warehouse building, single story, steel frame and coated steel cladding and roofing	m <sup>2</sup> floor area			
<b>Civil engineering work</b>					
9	Highway (not motorway) with tarmac surface on level good ground	m <sup>2</sup>			
10	Length of concrete sewer pipes, 0.5 m diameter, average 2 m depth	m length			
11	Length of concrete sewer pipes, 1 m diameter, average 3 m depth	m length			
12	In the space below, please provide notes on measurement of floor area, for example: is floor area measured over or within external walls; does it include or exclude voids such as service ducts, stair voids, and lift shafts; and does it include the plan area of internal walls? In the case of shared apartment buildings, is the area of common parts—stairs, lifts, storage, corridors, and so forth outside individual apartments—included; is the area of balconies included, in whole or in part; and is the area of attached or underground parking included? Please also note any other special features of either methods of measurement or pricing.				

Reported prices should not include costs relating to external works. External works are construction works often included in contracts, but outside the external walls of the building concerned. They will include things like boundary walls, footpaths, landscaping, car parking, and utilities outside the building. They are excluded because they are site dependent and extremely variable in scope.

Item 3 "Low rise apartment": Low rise apartment refers to a residential building with approximately 5 floors. If exact match is not found, the closest projects to a 5-floor apartment should be priced.

Item 4 "High rise apartment": High rise apartment refers to a residential building with approximately 20 floors. If exact match is not found, the closest projects to a 20-floor apartment should be priced.

Item 9 "Highway": Highway projects to be priced should be for major inter-city roads.

## 7. Support Worksheet

### Supporting Information

#### The mix of construction resources

What proportion of overall construction project value is taken by the main inputs to construction work (materials and products, labor and equipment) in the following types of projects? Other inputs—general site costs, head office overheads, profit, and so forth—should be spread across the main inputs. Please indicate approximate percentage values.

		Residential buildings	Nonresidential buildings	Civil engineering works
1	Construction materials and products			
2	Construction equipment			
3	Construction site labor			
	Total project value	100%	100%	100%

#### Contractors' markups

What percentages should typically be added to contractors' input costs to arrive at contractors' bid prices or construction purchaser prices? Please indicate approximate percentage values

	Cost headings	Residential buildings	Nonresidential buildings	Civil engineering works
1	Total markup of which:			
2	General site costs and temporary works			
3	Head office overheads			
4	Profit			
5	Other contractors costs (please specify)			

#### Professional fees

What percentage additions should be allowed for both pre- and post-contract services on different types of work? Professional fees will typically comprise pre- and post-contract services, including architectural and engineering design, technical supervision, project management, and other specialist services, but national rules and practices must be taken into account. Please enter the total amount as a percentage of the contractor's cost (which will include the contractor's markup described above). The intention is to arrive at the end user or purchaser price for construction work.

	Cost headings	Residential buildings	Nonresidential buildings	Civil engineering works
1	Overall percentage addition for professional services			

2 Any other notes or comments?

Source: ICP, <http://icp.worldbank.org/>.

## NOTES

- For informal construction, the relevant expenditure values should be included in the economy's national accounts.
- Most of these materials are available on the ICP website at <http://icp.worldbank.org/>.

## REFERENCE

World Bank. 2008. *Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Program*. Washington, DC: World Bank. <http://icp.worldbank.org/>.



# Computation of National Annual Averages

In the International Comparison Program (ICP), price deflators, specifically purchasing power parities (PPPs), are calculated based on the national annual average prices of a set of pre-designated products and services. In household final consumption surveys in which prices are collected on a quarterly basis, annual prices for the reference year are computed by taking the arithmetic means of the prices collected quarterly. National prices are derived from averaging prices collected from multiple locations within an economy. It is important to note that price sets are first nationalized every quarter and then annualized—not the other way around. Computing annual prices before nationalizing them will yield different results if regional weights vary quarter by quarter. In reality, though, all four quarterly prices are not always available from every selected location. At times, data are only partially available, depending on the regional and product-specific situations.

Not all surveys, however, follow the same frequency of data collection. Some surveys, such as compensation of employees, construction, or education, collect prices once a year. Thus they provide annual average prices. If education surveys are conducted in multiple locations in an economy or data on compensation of government employees are collected for both the central and local governments, it is important to annualize the data first before nationalizing them, which differs from the

guidelines for household consumption surveys. Sometimes, midyear prices are regarded as annual prices, which is the case for machinery and equipment and construction surveys.

Because the household final consumption survey serves as the main survey of ICP data collection, this chapter focuses more on this survey and its quarterly price collection. The sections that follow explain the basics of computing national annual average prices and examine special cases for dealing with missing data points.

## COMPUTATION OF NATIONAL AVERAGES

Calculation of national average prices is carried out along two perpendicular dimensions: space and time. Spatial averaging is aligned with the geographical stratification of price surveys, whereas temporal averaging reflects the survey schedule. Both averaging processes are carried out in keeping with the quarterly and annual sequencing of data validation, submission, and processing (see figure 13.1).

Although economies may choose or may be encouraged to compute monthly averages for validation purposes—that is, to see how collected prices have evolved from month to month during a given quarter and whether this escalation is consistent with the monthly consumer price indexes (CPIs) in the context of the ICP—monthly averaging is not a mandatory step in

the overall averaging process. Monthly averages are not shown in figure 13.1, and they are only mentioned here for the sake of exhaustiveness.

The national coordinating agencies are encouraged to conduct price collection in multiple locations within an economy so that the outcomes are representative of the national average prices. If the price collection is conducted as recommended, outlets will be evenly selected from both urban and rural areas. In most economies, urban areas are generally more populous than rural areas, and a good portion of the population may be concentrated in just a few cities. When prices are collected in multiple locations with different population distributions that yield different levels of economic activity, the question arises of how to take into account this inequality in population density and economic activity. Economies should opt to use weights at various levels—national, regional (subnational), urban/rural, location/outlet type—depending on the data availability at those levels. The following section uses examples in discussing what the options are and how weights should be treated in computation.

### Without Geographical Weights

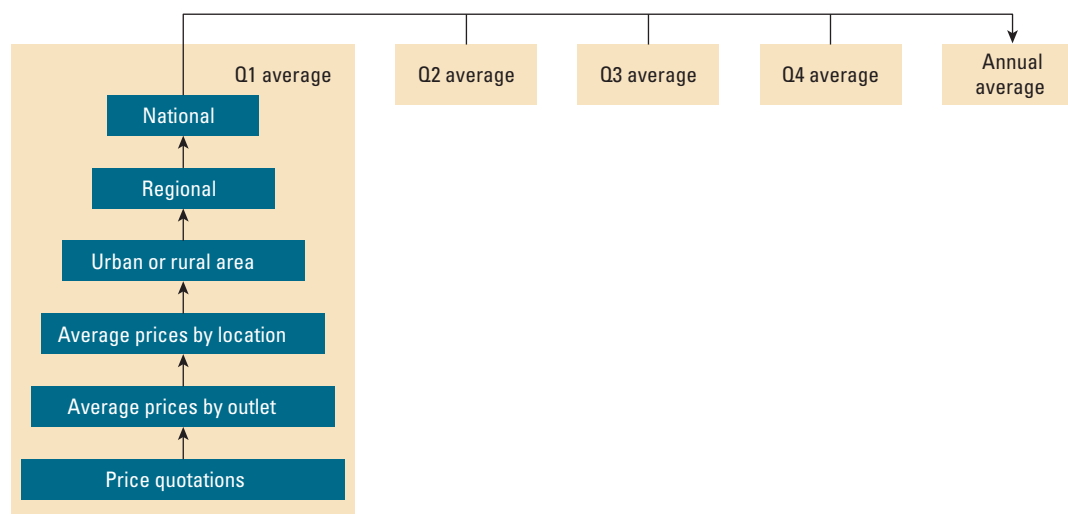
Difficulties arise in assigning weights to various locations because weights differ by product or group of products, and information at the detail

level or even at higher levels may not necessarily be available all the time. Therefore, for practical reasons it is easier to treat every location equally—that is, assign an even weight of  $1/n$  to every location, if price collection takes place in  $n$  locations. This is equivalent to assigning no weights because no factors other than the products' prices are taken into account during the averaging process. The method applied in ICP 2005 was to take simple arithmetic averages of prices from all locations. This method may not accurately reflect reality, but it can still be assumed that weights are implicitly taken into consideration. Because of their higher densities of population, more outlets are likely to be priced in populous areas, and a higher level of sales is likely to occur in these areas. It is recommended that economies design their surveys in a self-weighted way, ensuring that a larger number of outlets are included from populous regions, thereby yielding a larger number of price quotations with a bigger impact on the overall average prices.

### With Geographical Weights

If weights by region within an economy are readily available, it is recommended that, as in the ICP 2005 round, the hierarchical weighting system be used, meaning that at any level the total consists of its components. That approach

**Figure 13.1** Sequence of the ICP Price Averaging Process, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

will produce the required stratification of an economy into different regions based on population, sales volume, expenditures, and so forth.

Figure 13.2 depicts economy A, which has been stratified into two regions, A and B, assuming that the most detailed level of obtainable information is urban/rural data within a region. The hierarchical weighting scheme starts from the top—for example, if region A has a total weight of 70 (i.e., 70 percent of expenditures or sales) and the proportion of urban to rural areas is 3:2 for that region, then region A–urban has a weight of  $3/(3 + 2) \times 70 = 42$ , and so on. The figures shown in the rightmost column of table 13.1 (i.e., the lowest-level information) are then brought into the calculation as the weights of each location. The national coordinating agencies should provide the weights for the lowest level when they can be reliably obtained. If weights are provided as sales volumes or other figures that do not sum up to 100, the weights can be normalized accordingly.

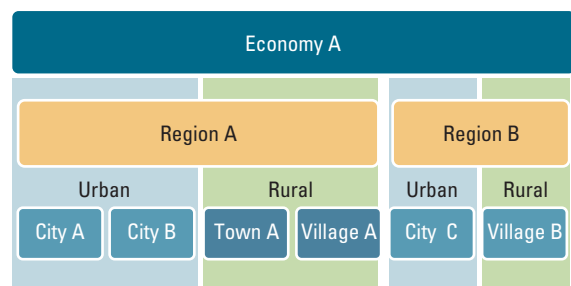
Distinct weights can be associated with each product or item. Ideally, weights should reflect the quantities of the product sold. Thus if for product 1 the urban areas of region A are responsible for 42 percent of total sales, that is

the weight used in determining average prices. At the same time, product 2 may have a different weight for that particular area. However, in many cases it will be difficult to find such detailed breakdowns, and some simplified procedures must be put in place. For example, if it is known that the urban areas of region A are responsible for 40 percent of *national* food (or personal consumption) expenditures and no detailed data on individual products exist, the 40 percent share for urban areas of region A can be used for *all* products comprising *national* food (or personal consumption) expenditures, so that

$$P_{\text{national}} = \frac{\sum_{i=1}^n P_{\text{region } i} \times W_{\text{region } i}}{\sum_{i=1}^n W_{\text{region } i}}$$

Table 13.2 captures the possible options at each level, even though the list may not be completely exhaustive. In each location, multiple outlets are selected for collection of a number of prices of a given product. These prices are averaged using a simple unweighted arithmetic average. This average is usually self-weighted in the sense that populous locations tend to have more outlets and thus are more heavily sampled. For the higher levels, economies are given options to weight prices with sales volume, expenditure, population density, or any combination of these indicators. The same measure

**Figure 13.2** Economy Stratification, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

**Table 13.1** Hierarchical Weighting System, ICP 2011

	<b>Region A</b> 70	<b>Urban</b> 42
		<b>Rural</b> 28
<b>Total</b> 100	<b>Region B</b> 30	<b>Urban</b> 20
		<b>Rural</b> 10

Source: ICP, <http://icp.worldbank.org/>.

**Table 13.2** Weighting Options, ICP 2011

Level	Option 1	Option 2	Option 3	Option 4	Option 5
National	Unweighted	Sales volume	Expenditure	Population	Combination of these indicators
Regional	Unweighted	Sales volume	Expenditure	Population	Combination of these indicators
Urban/rural	Unweighted	Sales volume	Expenditure	Population	Combination of these indicators
Location/ outlet type	Unweighted (self-weighted)				

Source: ICP, <http://icp.worldbank.org/>.

does not necessarily have to be applied across levels. For example, sales volume can be used as a weight at the urban/rural level for some regions, but population can be used at the national level for simplicity's sake. Table 13.2 applies not only to products but also to higher levels such as class, group, and category. If weights are not available at the lower levels, higher-level weights can be applied to all products within the level in question.

### Varying Quarterly Weights

Because a survey for the same group of products is conducted once a quarter in the reference year, seasonal items in the ICP surveys such as fruits and vegetables may have different consumption patterns by region and by quarter. In such a case, weights will be derived in a manner similar to that for the previous case but for every quarter, and the data requirements will be more extensive. All regional and urban/rural breakdowns will have to be replicated for each quarter. Because the national coordinating agencies will assign different weights for each quarter, the national annual average prices are calculated on the basis of a simple weighting method covering all quarters and all regions (see the section "Annual Weighted Average Based on Varying Quarterly Weights" for a numerical example):

$$P_{\text{national annual}} = \frac{\sum_{i=1, j=1}^{i=n, j=4} P_{\text{region } k, \text{quarter } j} \times W_{\text{region } k, \text{quarter } j}}{\sum_{i=1, j=1}^{i=n, j=4} W_{\text{region } k, \text{quarter } j}}$$

### Numerical Examples

The computation of national annual averages without geographical weights is a simplified case in which equal weights are assigned to each region/area. The numerical examples introduced in this section highlight special cases and deal mainly with the regional weighting cases for a single quarter.

In table 13.3, all the weights at the regional level are available, and thus average prices are computed using the arithmetic mean. Thus the national average price for product 1, for example, is

$$\frac{99.01 \times 213 + 51.3 \times 342 + 99 \times 678 + 78.42 \times 88}{213 + 342 + 678 + 88} = 85.28.$$

In table 13.4, the weights are missing completely for products 1 and 4, but are available for the remaining products. The national coordinating agencies may choose to use unweighted averages for those products only (1 and 4). Alternatively, based on experts' opinions, the national coordinating agencies could borrow weights from a similar product or a group of similar products. Weighted averages are calculated for the remaining products (2, 3, and 5).

In table 13.5, the weights are completely missing for products 1 and 4. These two products will be treated as in table 13.4. The weights for products 2 and 3 are partially available. If the missing weights cannot be retrieved, they will be deemed to be zero. Accordingly, the average prices for locations with missing weights will not be considered in the calculation of the average prices for the respective products.

**Table 13.3** All Weights and All Average Prices Provided, ICP 2011

Item	Regional quarter prices matrix, location				Weights matrix, location				National average
	A	B	C	D	A	B	C	D	
Product 1	99.01	51.30	99.00	78.42	213.00	342.00	678.00	88.00	85.28
Product 2	50.74	88.60	67.94	77.30	213.00	342.00	678.00	88.00	71.14
Product 3	8.88	33.13	79.98	57.55	213.00	342.00	678.00	88.00	54.89
Product 4	30.66	31.33	57.12	97.40	213.00	342.00	678.00	88.00	48.86
Product 5	92.96	45.84	92.04	89.98	213.00	342.00	678.00	88.00	80.09

Source: ICP, <http://icp.worldbank.org/>.



**Table 13.4** Weights Missing Completely for One or More Products, ICP 2011

Item	Regional quarter prices matrix, location				Weights matrix, location				National average
	A	B	C	D	A	B	C	D	
Product 1	99.01	51.30	99.00	78.42	0.00	0.00	0.00	0.00	81.93
Product 2	50.74	88.60	67.94	77.30	213.00	342.00	678.00	88.00	71.14
Product 3	8.88	33.13	79.98	57.55	213.00	342.00	678.00	88.00	54.89
Product 4	30.66	31.33	57.12	97.40	0.00	0.00	0.00	0.00	54.13
Product 5	92.96	45.84	92.04	89.98	213.00	342.00	678.00	88.00	80.09

Source: ICP, <http://icp.worldbank.org/>.

**Table 13.5** Weights Partially Missing for One or More Products, ICP 2011

Item	Regional quarter prices matrix, location				Weights matrix, location				National average
	A	B	C	D	A	B	C	D	
Product 1	99.01	51.30	99.00	78.42	0.00	0.00	0.00	0.00	81.93
Product 2	50.74	88.60	67.94	77.30	213.00	342.00	0.00	88.00	88.00
Product 3	8.88	33.13	79.98	57.55	213.00	0.00	678.00	88.00	62.50
Product 4	30.66	31.33	57.12	97.40	0.00	0.00	0.00	0.00	54.13
Product 5	92.96	45.84	92.04	89.98	213.00	342.00	678.00	88.00	80.09

Source: ICP, <http://icp.worldbank.org/>.

**Table 13.6** Some Average Prices Missing, ICP 2011

Item	Regional quarter prices matrix, location				Weights matrix, location				National average
	A	B	C	D	A	B	C	D	
Product 1	99.01	51.30	99.00	78.42	0.00	0.00	0.00	0.00	81.93
Product 2	50.74	0.00	67.94	77.30	213.00	342.00	0.00	88.00	58.51
Product 3	0.00	33.13	79.98	57.55	213.00	0.00	678.00	88.00	77.40
Product 4	30.66	31.33	57.12	97.40	0.00	0.00	0.00	0.00	54.13
Product 5	92.96	45.84	92.04	89.98	213.00	342.00	678.00	88.00	80.09

Source: ICP, <http://icp.worldbank.org/>.

The case shown in table 13.6 is quite similar to that shown in table 13.5, but it differs in the sense that some average prices are missing. Consider product 2. The average price for region B is missing, as well as the weight for region C. The price from region C for product 2 will not be taken into consideration as explained in the previous case, and naturally the missing average price for region B will not be used as well.

### With Calibration Factors

In practice, many economies collect prices only from the capital city or from a limited number of locations, and they nationalize such prices when the relevant calibration factors are available. This type of calibration factor can be taken from the CPI indexes, ICP 2005 data, or even from the ICP exercise in 2009, depending on

**Table 13.7** Computation of National Average Prices Using Calibration Factors, ICP 2011

Item	Economy 1			Economy 2			Economy 3		
	Capital city average prices	Calibration factor	National average prices	Capital city average prices	Calibration factor	National average prices	Capital city average prices	Calibration factor	National average prices
Product 1	199.01	0.95	189.06	78.42	1.00	78.42	8.56	0.98	8.39
Product 2	250.74	0.95	238.20	77.30	1.00	77.30	13.20	0.98	12.94
Product 3	140.30	0.95	133.29	57.55	1.00	57.55	7.40	0.98	7.25
Product 4	250.66	0.84	210.55	97.40	1.00	97.40	16.06	1.00	16.06
Product 5	192.96	0.84	162.09	89.98	1.00	89.98	15.94	1.00	15.94

Source: ICP, <http://icp.worldbank.org/>.

the regional practice. When using CPI indexes to render the capital city prices national, the national coordinating agencies should be cautious because the classification of ICP products may not follow their classification in the national CPI. Once calibration factors are verified for a given group of products, national average prices can be estimated by multiplying the surveyed prices by these calibration factors. Some economies may reveal a certain degree of differences between capital city average prices and national average prices, whereas for others this difference may be less significant. Table 13.7 provides a numerical example of the calculation of national average prices using calibration factors.

## COMPUTATION OF ANNUAL AVERAGES

### Annual Weighted Average Based on Varying Quarterly Weights

In an ideal scenario in which the national coordinating agencies are able to reasonably estimate varying quarterly weights, especially for seasonal products, the national annual average price would be computed based on all available weights and prices simultaneously. The ways in which missing weights and missing prices are treated would not differ from those in the cases illustrated earlier.

If the national coordinating agencies price national data every quarter and then try to annualize those quarterly prices (table 13.8), it is essential that they apply different weights for each quarter, as in

$$P_{\text{national, quarter1}} = \frac{41.03 \times 213 + 31.18 \times 342 + 85.32 \times 678 + 84.32 \times 88}{213 + 342 + 678 + 88} = 64.10,$$

and

$$P_{\text{national, annual}} = \frac{64.10 \times 1,321 + 38.80 \times 1,405 + 31.15 \times 1,370 + 52.37 \times 1,200}{1,321 + 1,405 + 1,370 + 1,200} = 46.20.$$

### Annual Average without Varying Quarterly Weights

In practice, once all prices have been validated, annual average prices are computed based on clean data sets of quarterly prices without varying quarterly weights. This annual averaging has to correspond to the reference year. If price collection has taken place in a year other than the reference year, the necessary adjustments have to be made. Similarly, if the average prices for some quarters are missing, adjustments have to be made. As mentioned earlier, the ideal case is one in which all four quarterly average prices are available and a simple arithmetic average can be computed. Consider the example in table 13.9 in which an economy collects prices for four products (1, 2, 3, and 4) and nationalizes quarterly prices.

### Missing Monthly or Quarterly Prices

It is possible that some economies have not priced all four quarters because of, for example, political or socioeconomic circumstances. If some quarterly price information is missing, the CPI indexes

**Table 13.8** Annual Average with Varying Quarterly Weights, ICP 2011

Product 1	Regional quarterly prices matrix				Weights matrix				Annual average price
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Region A	41.03	20.83	48.87	95.89	213.00	250.00	225.00	200.00	46.20
Region B	31.18	42.31	10.51	41.02	342.00	300.00	380.00	300.00	
Region C	85.32	39.17	34.30	45.74	678.00	780.00	675.00	600.00	
Region D	84.32	80.80	50.32	39.10	88.00	75.00	90.00	100.00	
Quarterly national prices/weights	64.10	38.80	31.15	52.37	1,321.00	1,405.00	1,370.00	1,200.00	

Source: ICP, <http://icp.worldbank.org/>.

**Table 13.9** Annual Average without Varying Quarterly Weights, ICP 2011

Item	Quarterly national average prices matrix				Annual average price
	Q1	Q2	Q3	Q4	
Product 1	7.22	7.25	7.21	7.23	7.23
Product 2	7.22	7.2	7.23	7.2	7.21
Product 3	7.22	7.25	7.25	7.23	7.24
Product 4	7.2	7.2	7.2	7.2	7.2

Source: ICP, <http://icp.worldbank.org/>.

should be used to impute the missing data points, provided that the national coordinating agencies are able to provide sound CPI data. Table 13.10 illustrates an economy in which the quarterly average prices are partially missing.

In the table, the first quarter average price is missing from the original price collection. This missing average price is imputed using CPI indexes from the next available quarter. If the second quarter price is also missing, then the third quarter data can be used for imputation and so on. In this case, the first quarter average price can be computed as  $7.17 = 7.25 \times (102.3/103.5)$ . For product 4, three quarterly average prices are computed using one data point and the relevant CPI indexes.

### Backcasting Prices to Reference Year

A similar approach can be applied when economies conduct price collection in periods before or after the reference year. This may arise when a few economies or regions lag behind in price collection because of administrative or preparatory difficulties, or when the

regional coordinating agencies agree with economies on survey cycles in which only a portion of the surveys take place in the reference year.

Table 13.11 depicts an economy in which all price collection would have taken place in 2012 instead of 2011. The quarterly national average price for Q3 2012 is 7.23, which is higher than that of Q2 2012 (7.2), and the CPI indexes are actually higher in Q2 2012 (103.5) than Q3 2012 (103.4). This is not an unlikely result because CPI indexes are often available at higher levels but not at the individual product level. When backcasting 2012 quarterly prices to 2011, it is important to keep in mind that imputation should be on a quarter-on-quarter (QOQ) basis. Thus in this example, Q1 2011 would be  $7.08 = 7.12 \times (101.7/102.3)$ ; Q2 2011 would be  $7.12 = 7.2 \times (102.4/103.5)$ , and so on.

If prices as well as CPI indexes are available for every month, it is better to impute data for missing months by applying monthly CPI indexes rather than using quarterly indexes so that seasonality is reflected in a more accurate way. The method for imputation of missing months is exactly the same as that for quarterly average prices—that is, CPI indexes are to be applied at the lowest category available in which products with missing prices belong, and backcasting is based on the month-to-month basis. For example, in table 13.12 the January 2011 average price is imputed as  $7.05 = 7.12 \times (101.6/102.6)$ .

### Averaging Methods

In mathematics, various methods can be used to calculate averages. Among them, the most common methods are arithmetic mean, geometric

**Table 13.10** Quarterly Average Prices Partially Missing, ICP 2011

Item	CPI matrix				Quarterly national average prices matrix				Annual average price
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Product 1	102.3	103.5	103.4	103.3	<b>7.17</b>	7.25	7.21	7.23	7.22
Product 2	102.3	103.5	103.4	103.3	<b>7.12</b>	7.2	7.23	7.2	7.19
Product 3	102.3	103.5	103.4	103.3	<b>7.12</b>	7.2	7.25	7.23	7.20
Product 4	102.3	103.5	103.4	103.3	<b>7.12</b>	7.2	<b>7.19</b>	<b>7.19</b>	7.17

Source: ICP, <http://icp.worldbank.org/>.

Note: CPI = consumer price index.

**Table 13.11** Backcasting Quarterly National Average Prices, ICP 2011

	2011				2012			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CPI matrix	101.7	102.4	102.0	102.1	102.3	103.5	103.4	103.3
Quarterly national average prices	<b>7.08</b>	<b>7.12</b>	<b>7.13</b>	<b>7.12</b>	7.12	7.2	7.23	7.2

Source: ICP, <http://icp.worldbank.org/>.

Note: CPI = consumer price index.

**Table 13.12** Backcasting Monthly National Average Prices, ICP 2011

	2011				2012			
	Jan.	Feb.	Mar.	Apr.	Jan.	Feb.	Mar.	Apr.
CPI matrix	101.6	101.2	102.3	102.5	102.6	101.7	102.6	104.3
Monthly national average prices	<b>7.05</b>	<b>7.08</b>	<b>7.11</b>	<b>7.12</b>	7.12	7.11	7.13	7.24

Source: ICP, <http://icp.worldbank.org/>.

Note: CPI = consumer price index.

mean, and harmonic mean. In previous ICP rounds as well as the 2011 round, average prices were computed using any of these three methods.

To illustrate, suppose there are  $n$  quotations for a product. The average prices can be computed as follows:

$$\text{arithmetic mean} = \frac{1}{n} \sum_{i=1}^n P_i,$$

or

$$\text{geometric mean} = \sqrt[n]{\prod_{i=1}^n P_i},$$

or

$$\text{harmonic mean} = \frac{1}{\frac{1}{n} \sum_{i=1}^n \frac{1}{P_i}}.$$

Although in ICP 2011 the national coordinating agencies could choose the method they

wished to adopt, the recommended method was the arithmetic mean for its simplicity and to ensure consistency across economies and regions.

## SPECIAL SURVEYS: COMPENSATION OF GOVERNMENT EMPLOYEES AND PRIVATE EDUCATION

For ICP special surveys, including those on compensation of government employees and private education, the surveyed information is likely to cover two calendar years. When the government fiscal year differs from the calendar year, the survey on compensation of government employees will inevitably contain salary information from two fiscal years. Similar logic applies to the survey on private education because the academic year differs from the calendar year for more than half of economies. Because these two special surveys pose a similar

question, figure 13.3 shows what is required in both cases.

Assume one academic year (or fiscal year) stretches from one calendar year to the next. First compute how many days or months, depending on availability, fall into calendar year 2011 and then multiply a percentage of

days/months in 2011 by the price for that academic (or fiscal) year. Adding up the calendar year portions from two academic (or fiscal) years produces the annualized prices for the reference year of the ICP. However, this is not a weighted method but a simple summation of parts.

**Figure 13.3** Calculating Tuition/Salary for the Reference Calendar Year, ICP 2011

Calendar year	2010	2011	2012
Academic (or fiscal) year	2010/2011		2010/2012
Tuition (or salary) for each year	$A = a1 + a2$		$B = b1 + b2$
Days/months allocated to calendar year 2011 (shown in dark blue)	$a1$	$a2$	$b1$
Estimated tuition (or salary) for calendar year 2011	$\frac{a2}{a1 + a2} A + \frac{b1}{b1 + b2} B$		



## Validation Tables

The main price data analysis at the regional and global levels of validation is carried out using two validation tables: the Quaranta table, named after Vincenzo Quaranta, who first proposed the table for use in the European purchasing power parities (PPP) program in 1990, and the Dikhanov table, named after Yuri Dikhanov, who first proposed the table for use during the 2005 round of the International Comparison Program (ICP). The purpose of both tables is to screen the national average prices for possible errors by comparing the average prices of the same items across countries. Both tables provide similar measures of price variation for basic headings (BHs), countries, and items.

The main difference between the two tables is that the Quaranta table is employed to edit prices within basic headings, whereas the Dikhanov table can also be used to edit prices within aggregates. The Dikhanov table can be set as well to show only key indexes while hiding other details. When presented in this compact form, the Dikhanov table is better suited for editing prices across the basic headings and the items composing an aggregate.

The Dikhanov table is specific to the country product dummy (CPD) or country product representative dummy (CPRD) method of calculating PPPs, whereas the Quaranta table has a broader application that includes the Éltető-Köves-Szulc (EKS) and EKS\* methods, as well as the CPD, CPRD, and weighted CPD (CPD-W) methods.

This chapter describes the characteristics of the Quaranta and Dikhanov tables. Chapter 15 on validation of the household consumption survey discusses the use of these tables during the validation process. And chapter 23, dealing with elementary aggregation using the CPD method, describes the PPP calculation methods employed in the Quaranta and Dikhanov tables.

### QUARANTA TABLE

The Quaranta table consists of a set of tables for basic headings—one for each basic heading as a whole and one for each item within the basic heading. For comparison of average prices, the Quaranta table provides three main measures: exchange rate (XR)-ratio, purchasing power parity (PPP)-ratio, and price level index (PLI). For analysis of price variation, the Quaranta table provides four measures, ranging from variation of individual price observations to variation of items within a basic heading. Each of these indexes is discussed in detail in the rest of this section.

### Average Price Measures

Once converted to a common currency, the average prices of different countries for *the same item* can be compared and extreme values

can be identified. However, prices cannot be compared *across items* directly, even when expressed in the same currency, but the price ratios of countries pricing an item can be compared with the equivalent price ratios for other items once they have been "standardized."

The standardized price ratios for an item are the ratios of the individual average prices in countries pricing the item to the geometric mean of the average prices in all countries pricing the item, when the average prices are expressed in a common currency. Both exchange rates and PPPs are used in validation to convert the average prices to a common currency, and both the exchange rate-converted average prices and the PPP-converted average prices are used to derive the standardized price ratios.

The standardized price ratios<sup>1</sup> based on exchange rate-converted prices are called XR-ratios, and the standardized price ratios based on PPP-converted prices are called PPP-ratios.<sup>2</sup>

The third measure used to compare prices is the PLI. This index is defined as the ratio of the basic heading PPP to the exchange rate and is expressed as a percentage. A PLI greater (less) than 100 indicates that when the national average prices are converted at exchange rates, the resulting prices within the basic heading tend to be higher (lower) on average than the prices in the base country of the group.

### Measures of Price Variation

The Quaranta table provides four coefficients of variation:

- *Overall average coefficient of variation*—measures dispersion among all the PPP-ratios 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. Naturally, the higher the value of the coefficient, the less homogeneous will be the price structures, resulting in less reliable PPPs.
- *Country coefficient of variation*—measures dispersion among a country's PPP-ratios for a basic heading. In other words, it measures the variation in a country's price levels

among the items in a basic heading and the reliability of its PPP for the basic heading. The higher the coefficient's value, the less uniform will be the country's price levels, leading to less reliable PPPs.

- *Item coefficient of variation*—measures dispersion among the PPP-ratios for an item. It is an indicator of comparability and accuracy that addresses the question of whether comparable products have been priced for an item. The higher the coefficient's value, the less uniform will be the item price levels. Low uniformity would raise questions about the comparability and accuracy of the item's pricing across countries.
- *Price observation coefficient of variation*—measures variation in the price observations on which the average price reported for an item by a country is based. It is taken straight from the average price table and is used to identify extreme values among average prices during the country-level validation.

Besides serving as editing tools, the coefficients provide a means of monitoring progress during the validation stage and, at its conclusion, of assessing the effectiveness of the entire process of editing and verification in reducing the incidence of nonsampling errors among the price data. Coefficients should be significantly smaller at the end of validation than they were at the beginning.

### Description of the Quaranta Table

Table 14.1 is an example of a Quaranta table. The numbers in italics have been added for ease of reference. Explanatory notes follow the table. The table has four sections:

1. *Data selection criteria* provides general details about the table such as the run date [3], averaging method [4], and imputation method [5].
2. *Summary information* gives information that relates to the basic heading as a whole such as the number of items [6] and countries [8] included in the analysis, as well as the average weight of the basic heading in the total expenditure [7] and the average coefficient of variation [9].



**Table 14.1** Example of a Quaranta Table, ICP 2011

QUARANTA TABLE DIAGNOSTICS—Rice								
Data selection criteria								
<b>[1] Basic heading code</b>	110111.1	<b>[2] Time period</b>	Q1, 2011	<b>[3] Run date</b>	3/29/2012			
<b>[4] Averaging method</b>	Arithmetic mean	<b>[5] Imputation method</b>	CPD					
Summary information								
<b>[6] No. of items included in the analysis</b>	11 out of 11	<b>[7] Average weight of basic heading in total expenditure</b>	0.0					
<b>[8] No. of countries included in the analysis</b>	5 out of 5	<b>[9] Average coefficient of variation</b>	30.9					
<b>[10] Base country</b>	Country							
Country-level details								
* Shares are multiplied by 10,000.								
<b>[11]</b>	<b>[12]</b>	<b>[13]</b>	<b>[14]</b>	<b>[15]</b>	<b>[16]</b>	<b>[17]</b>		
<b>Country</b>	<b>XR</b>	<b>PPP</b>	<b>PLI (%)</b>	<b>Weight*</b>	<b>Items</b>	<b>Var. co.</b>		
Country 1	3,104.03	2,167.5700	6983.10%	0.0	8;*5	28.6		
Country 2	15.38	9.9332	64.60%	0.0	6;*2	41.4		
Country 3	1.00	1.0000	100.00%	0.0	7;*7	19.5		
Country 4	9.27	10.6217	114.58%	0.0	11;*5	31.9		
Country 5	9.49	8.5859	90.45%	0.0	8;*3	33.1		
Item-level details								
<b>[18]</b>	<b>[19]</b>				<b>[20]</b>	<b>[21]</b>		
110111.101	Long grain rice, parboiled				Var. co.:	34.2	1 kilogram	
<b>[22]</b>	<b>[23]</b>	<b>[24]</b>	<b>[25]</b>	<b>[26]</b>	<b>[27]</b>	<b>[28]</b>	<b>[29]</b>	<b>[30]</b>
<b>Country</b>	<b>NC-price</b>	<b>Quotations</b>	<b>Var. co.</b>	<b>XR-pr</b>	<b>XR-ratio</b>	<b>PPP price</b>	<b>PPP-ratio</b>	<b>Pref. UoM</b>
Country 1	—	—	—	—	—	—	—	1 kilogram
Country 2	18.000	*14	6.0	1.17	108.19	1.81	151.49	1 kilogram
Country 3	1.309	*17	17.5	1.31	120.94	1.31	109.40	1 kilogram
Country 4	8.605	*19	26.2	0.93	85.79	0.81	67.73	1 kilogram
Country 5	9.150	5	1.5	0.96	89.08	1.07	89.09	1 kilogram
<b>Geometric mean</b>			<b>[31]</b>	<b>[32]</b>				
			1.08	1.20				

QUARANTA TABLE DIAGNOSTICS		
<b>[1]</b>	Basic heading code	Code for basic heading covered by table.
<b>[2]</b>	Time period	Period during which prices for products covered by table were collected.
<b>[3]</b>	Run date	Date table was computed.
<b>[4]</b>	Averaging method	Method used to calculate average values in table.
<b>[5]</b>	Imputation method	Method used to calculate basic heading PPPs in column <b>[13]</b> . Currently, it is the country product dummy (CPD), but it could also be the country product representative dummy (CPRD), weighted CPD (CPD-W), Éltető-Köves-Szulc (EKS), or EKS*.

table continues next page

**Table 14.1** (Continued)

Summary information		
[6]	No. of items	Number of items specified and included in basic heading analysis.
[7]	Average weight	Average expenditure weight for group of countries covered by basic heading. Unweighted arithmetic mean of the national weights in column [15]. Like the national weights, it is scaled to 10,000.
[8]	No. of countries	Total number of countries included in basic heading analysis.
[9]	Average coefficient of variation (var. co. 1)	Overall average coefficient of variation or, more precisely, average item coefficient of variation for items priced for basic heading. It is calculated as unweighted arithmetic mean of product coefficients of variation at [20]. It measures average variation of PPP-ratios in column [29] of all products priced for basic heading.
[10]	Base country	Country and respective currency selected as numéraire. Any of the countries and respective currencies included in the analysis could be chosen as numéraire.
Country-level details		
[11]	Country	Names of countries covered by table.
[12]	XR	Market exchange rates (XRs) of countries expressed as number of units of national currency (NC) per unit of numéraire currency specified in [10].
[13]	PPP	Purchasing power parities (PPPs) for basic heading calculated as specified in [5] and expressed as number of units of national currency per unit of selected numéraire currency specified in [10]. Prices used to calculate PPPs are average prices in national currencies that countries report for products they priced for basic heading—that is, the NC-prices in column [23].
[14]	PLI	Price level index (PLI). PPPs in column [13] expressed as percentage of the corresponding exchange rate in column [12].
[15]	Weight	National expenditure weights multiplied by 10,000. That part of a country's GDP that is spent on basic heading when both expenditures are expressed in national currency and valued at national price levels.
[16]	No. of items	Number of items priced by each country for basic heading. Number with asterisk (*) is number of important items.
[17]	Var. co. 2	Country coefficient of variation. Standard deviation of country's PPP-ratios in column [29] for all products priced by country for basic heading, expressed as percentage of arithmetic mean of country's PPP-ratios in column [29] for all products priced by country for basic heading.
Item-level details		
[18], [19]	Item code and name	Code, name, and summary definition of product covered in subsequent product section.
[20]	Var. co. 3	Item coefficient of variation. Standard deviation of item's PPP-ratios in column [29] expressed as percentage of arithmetic mean of product's PPP-ratios in column [29].
[21]	Unit and quantity of measurement	Unit and quantity to which price observations are converted.
[22]	Country	Names of countries covered by table.
[23]	NC-price	Average price for product in national currency.
[24]	Quotations	Number of price observations on which average prices in national currency in column [23] are based. Asterisk (*) indicates whether the item is important for given country.
[25]	Var. co. 4	Price observation coefficient of variation. Standard deviation of price observations underlying product's average price in column [23] expressed as percentage of arithmetic mean of price observations underlying product's average price in column [23].
[26]	XR-price	Average prices in national currency in column [23] converted to numéraire currency with exchange rates in column [12].
[27]	XR-ratio	Standardized price ratios based on exchange rate—converted prices in column [26]. XR-prices are expressed as percentage of their geometric mean at [31].
[28]	PPP price	Average prices in national currency in column [23] converted to numéraire currency with PPPs in column [13].

**Table 14.1** (Continued)

Item-level details		
[29]	PPP-ratio	Standardized price ratios based on PPP-converted prices in column [28]. PPP prices are expressed as percentage of their geometric mean at [32].
[30]	Pref. UoM	Preferred unit of measurement (UoM) for item.
[31]	Geometric mean	Geometric mean of exchange rate-converted prices in column [26]. Use of geometric mean here and in [32] ensures invariance with respect to choice of numéraire.
[32]	Geometric mean	Geometric mean of PPP-converted prices in column [28].

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available.

3. *Country-level details* gives key indexes that relate to individual countries at the basic heading level. Included are PPPs [13], PLIs [14], number of priced items [16], and country coefficients of variation [17].

4. *Item-level details* covers the items priced for the basic heading. Each item has its own table that shows the item coefficient of variation [20]; the average prices reported by countries in national currencies [23]; the average prices converted to a common currency with their exchange rates [26], their geometric mean [31], and their XR-ratios [27]; and the average prices converted to a common currency with the PPPs for the basic heading—that is, PPP prices [28], their geometric mean [32], and their PPP-ratios [29].

### Use of XR-Ratios and PPP-Ratios

The XR-ratios and PPP price ratios provide valuable information for screening the national average prices. Each of these ratios refers to a particular item in a particular country. A high (low) XR-ratio or PPP-ratio means that the national average price for the item in question is high (low) compared with the prices of the same product in other countries when converted into a common numéraire currency using the exchange rate or basic heading PPP. When the same logic is used to screen individual price observations within a country, there comes a point at which the XR or PPP price is high (low) enough to raise the question of whether the price may be erroneous. Experience suggests that the appropriate threshold for the individual XR-ratio is 50 and PPP-ratio is 150. To ease the process of detecting high (low) PPP-ratios, the color scheme presented in table 14.2 is used.

**Table 14.2** Color Scheme for PPP-Ratios, ICP 2011

PPP-ratios with values	Color code
Between 78 and 128	None
Between 47 and 78 or 128 and 212	Yellow
Between 14 and 47 or 212 and 739	Red
Less than 14 or greater than 739	Black

Source: ICP, <http://icp.worldbank.org/>.

An XR-ratio that lies outside these limits may signal a questionable observation. However, it must be remembered that the principal reason for calculating PPPs is that when the prices of a given product are converted into a common currency unit using exchange rates, they are not in fact equal in all countries. The general level of prices tends to be systematically higher or lower in some countries than in others. Thus a high or low XR price for an individual item in one country may be largely due to the fact that the general price level for that country is high or low when exchange rates are used. It may not signal any abnormality in that particular price. For this reason, XR price ratios are less useful than PPP price ratios for validation purposes.

On the other hand, PPPs are the rates of currency conversion that are designed to equalize price levels for the products covered. The PPPs for a basic heading such as fresh or chilled vegetables other than potatoes are the rates of currency conversion that should enable a given amount of currency to purchase the same basket of vegetables in all countries. Thus if the patterns of relative prices for the different items within the basic heading were similar in different countries, the PPP prices for the same item in different countries would tend to be bunched together and the PPP price ratios (i.e., the ratios of the individual PPP prices to the geometric

mean of the PPP prices for all the countries) would cluster around 100. There would be little dispersion between countries in either the PPP prices or the PPP price ratios derived from them.

Conversely, a high level of dispersion in the PPP prices of the PPP price ratios for the same item across different countries implies that the relative price of the item tends to vary a lot from country to country. This could happen in the real world, but it also could signal that one or more PPP prices are wrong. Thus the dispersion in the PPP prices or price ratios for the same item in different countries becomes a key indicator for purposes of regional level validation. It can be measured by calculating the coefficients of variation for the PPP prices or the PPP price ratios.<sup>3</sup>

In conclusion, if the coefficient of variation for the PPP prices or price ratios for the same item in different countries exceeds some predetermined threshold, the national average prices for that item become questionable and require further investigation.

### Quaranta Summary Tables

Although the basic heading Quaranta tables continue to be the main tool for in-depth price validation, a useful starting point is an overview of the price data provided by the countries. This overview should identify the most important cases for validation activities. To this end, two summary tables are added to the standard Quaranta table: (1) the PLI summary and (2) the coefficient of variation (CV) summary.

#### *Price Level Index Summary*

The PLI expresses the price level of one country relative to another by dividing the PPPs by the current nominal exchange rate. If the PLI of a country is higher than 100, the country is relatively expensive compared with the other in the comparison. Conversely, if the PLI is lower than 100, the country is relatively cheap compared with the other country. PLIs can be calculated for individual basic headings or for aggregates.

PLIs are useful in the validation process because the price levels for a certain country are expected to be relatively stable across the basic

headings. For example, if an overall (aggregate) PLI for a country is 100, a basic heading with a PLI of 300 would have to be checked for potential problems with the underlying price data. However, a high or low PLI is not an error by definition; it can be the result of a certain economic structure. Nevertheless, these cases should be carefully verified. It should also be noted that valid PLIs tend to fit within certain thresholds. Thus extremely high or low basic heading PLIs—1,000 or 0.1, for example—are clear indicators of problems with the price data for the basic heading.

The PLI summary table brings together basic heading PLIs for each country covered by the Quaranta table, and it adds certain indicators to assist in identifying problematic cases (see table 14.3 for an example of a PLI summary table).

The bottom part of the table is a matrix of basic headings and countries included in the analysis. The table presents five food basic headings and four countries. The PLIs appear as percentages for each country.

The upper part of the table gives the following information for each country:<sup>4</sup>

- (1) Rank of the country based on the geometric mean (4)
- (2) Minimum PLI
- (3) Maximum PLI
- (4) Unweighted geometric mean of all BH PLIs
- (5) Set upper limit for BH PLIs (here 2 times the geometric mean)
- (6) Set lower limit for BH PLIs (here 0.5 times the geometric mean)
- (7) Number of missing BH PLIs (thus missing PPPs)<sup>2</sup>
- (8) Number of BHs below set threshold in (5)
- (9) Number of BHs above set threshold in (6)
- (10) Total number of problematic BHs—sum of (7), (8), and (9).

In table 14.3, the geometric mean of all BH PLIs for country 1 is 149 percent, and the set upper limit for PLI variation is 297 percent. For country 1, most of the BH PLIs are close to the geometric mean, except the one for bread, for which the PLI is 300 percent. This basic heading should be flagged for further analysis to determine whether it is plausible that the price level

**Table 14.3** Example of PLI Summary Table, ICP 2011

PLI QUARANTA TABLE						
(1)	Rank	1	2	3	4	...
(2)	Minimum	115%	43%	65%	40%	...
(3)	Maximum	300%	124%	210%	107%	...
(4)	Geometric mean (GM)	149%	96%	92%	81%	...
(5)	Upper limit	297%	186%	184%	162%	...
(6)	Lower limit	74%	46%	46%	40%	...
(7)	No. of missing basic headings (BHs)	0	1	1	0	...
(8)	No. of BHs <0.5 GM	0	1	0	1	...
(9)	No. of BHs >2 GM	1	0	1	0	...
(10)	No. of problematic BHs	1	2	2	1	...
BH code	BH	Country 1	Country 2	Country 3	Country 4	...
110111.1	Rice	130%	124%	70%	107%	...
110111.2	Other cereals, flour, and other cereal products	115%	—	210%	94%	...
110111.3	Bread	300%	120%	75%	84%	...
110111.4	Other bakery products	120%	116%	—	40%	...
110111.5	Pasta products	135%	43%	65%	102%	...

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available; BH = basic heading.

for bread products in country 1 is over 2 times higher than those for the other products such as rice and other bakery products.

In this example, the upper and lower limits were set to be 2.0 and 0.5 times the geometric mean, respectively. However, these limits can be either wider or narrower; the selection depends on the quality of the price data. During the initial data validation, the focus is normally on correcting the extreme errors that make any finer data validation impossible. In this case, wide limits are normally selected. After a series of validation rounds, the limits can be set to be narrower. Gradually, after a number of rounds of verification with prices of all countries participating in the comparison, a convergence will occur, and the return on further rounds of verification will be deemed marginal and therefore not worth pursuing.

### **Coefficient of Variation Summary**

The Quaranta tables use two measures for variation for each basic heading:

- *Country coefficient of variation*—measures dispersion among a country's PPP-ratios for a

basic heading. In other words, it measures the variation in a country's price levels among the items for the basic heading and the reliability of its PPP for the basic heading. The higher the coefficient's value, the less uniform will be the country's price levels, leading to less reliable PPPs.

- *Basic heading coefficient of variation*—measures dispersion among all the PPP-ratios for a basic heading. In doing so, it measures homogeneity of the price structures of the countries covered by the basic heading and the reliability of the PPPs calculated for the basic heading. Naturally, the higher the coefficient's value, the less homogeneous will be the price structures, resulting in less reliable PPPs.

The coefficient of variation summary places these measures in matrix form and adds the average expenditure share for the group of countries covered by the basic heading. Table 14.4 is an example of a CV summary.

For a *region as whole*, the CV summary helps to identify basic headings that are most problematic based on the basic heading CV and that

**Table 14.4** Example of Coefficient of Variation Summary, ICP 2011

Coefficient of variation (CV) of PPP-ratios							
Basic heading (BH) code	Basic heading	Country 1	Country 2	Country 3	Country 4	BH CV	Expenditure share
110111.1	Rice	41.9	245.2	151.5	42.0	120.1	10.76
110453.1	Other fuels	31.5	21.1	42.8	50.1	36.4	6.69
110111.2	Other cereals, flour, and other cereal products	141.9	51.7	88.2	36.2	79.5	5.99
110117.1	Fresh or chilled vegetables other than potatoes	311.8	301.1	155.0	367.9	284.0	5.49
110115.3	Other edible oils and fats	19.1	30.1	13.7	27.2	22.5	4.92

Source: ICP, <http://icp.worldbank.org/>.

Note: Cells with CVs higher than 50 are highlighted.

also have high-expenditure shares. The basic headings are ranked row-wise based on the expenditure share. These basic headings are of utmost importance in the validation process because they have a greater impact when the BH PPPs are aggregated. Again, all problematic cases should be analyzed, but the starting point should be problematic basic headings with high expenditure shares.

For *individual countries*, the CV summary identifies the most problematic cases based on the basic heading CV. Countries are ranked column-wise from the most problematic to the least problematic, based on the geometric mean of the basic heading CVs.

In this example, CVs higher than 50 are highlighted, but, as explained earlier, the set limit depends on the phase of the validation.

### Country Diagnostic Report

The standard Quaranta table includes tables for each basic heading and each item under the basic heading. The item tables present information for all countries included in the analysis. An alternative way to present this information is to group countries, rather than items, for BH-level analysis. This grouping is called a country diagnostic report. In essence, the report compiles basic headings and item rows for a single country and presents them as an individual report. All information is gathered and calculated for the standard Quaranta table; the only difference between the standard Quaranta table and the country diagnostic report is the presentation (see table 14.5 for an example of a country diagnostic report).

The country diagnostic report has four sections, much like the standard Quaranta table. The first two sections, data selection criteria and summary information, are identical to those in the standard table. However, the two last sections, country-level details and item-level details, contain information only for the given country.

This kind of presentation has two main benefits: (1) it can serve as an effective validation tool, especially for the countries, by quickly pinpointing any potential problems with data; and (2) it allows focusing on the internal price structure and the potential systematic problems in a country's data that may go unnoticed when information is presented for all countries in the analysis.

However, identification of potentially problematic cases in the country diagnostic report is only the first step; the next step should be verification of each case in the full item context by studying the respective information and indexes for all countries pricing the item. Without this wider context, it is not possible to see the price relations of countries pricing the item and possible problems arising from it.

### DIKHANOV TABLE

The second validation table used in the context of the ICP is the Dikhanov table. As explained at the outset of this chapter, both the Dikhanov and Quaranta tables use a similar approach and concepts: studying item price deviations for each country in a two-dimensional space—that of items and countries. The Quaranta table is

**Table 14.5** Example of Country Diagnostic Report, ICP 2011

COUNTRY DIAGNOSTIC REPORT—Country								
<b>Basic heading code</b>	1101111			<b>Time period</b>	Q1, 2011	<b>Run date</b>	3/29/2012	
<b>Averaging method</b>	Arithmetic mean			<b>Imputation method</b>	CPD			
Summary information								
<b>No. of items included in the analysis</b>	11 out of 11			<b>Average weight of basic heading in total expenditure</b>	0.0			
<b>Base country</b>	Country			<b>Average coefficient of variation</b>	30.9			
Country-level details								
	Country	XR	PPP	PLI (%)	Weight*	Items	Var. co.	
	Country	1.00	1.0000	100.000	0.0	7;*7	19.5	
<b>* Shares are multiplied by 10,000.</b>								
Item-level details								
Product code	Product name	Pref. UoM	NC-price	Quotations	Var. co.	XR-ratio	PPP-ratio	
110111.101	Long grain rice—parboiled	1 kilogram	1.309	*17	17.5	120.94	109.40	
110111.102	Long grain rice—non-parboiled	1 kilogram	1.347	*14	2.8	117.09	107.99	
110111.103	Long grain rice—family pack	5 kilograms	3.031	*12	7.0	88.52	82.17	
110111.104	Jasmine rice	10 kilograms	6.639	*7	3.5	95.41	88.00	
110111.105	Basmati rice	1 kilogram	1.104	*4	53.7	104.10	89.42	
110111.106	White rice, 25% broken	1 kilogram	—	*—	—	—	—	
110111.107	White rice, medium grain	1 kilogram	—	—	—	—	—	
110111.108	Brown rice—family pack	5 kilograms	—	*—	—	—	—	
110111.109	Short grain rice	1 kilogram	—	—	—	—	—	
110111.110	Uncle Ben's rice	5 kilograms	6.313	*10	5.9	103.47	93.60	
110111.111	Thailand rice	1 kilogram	0.811	*2	4.9	150.66	139.87	

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available; XR = exchange rate; PLI = price level index; var. co. = coefficient of variation; UoM = unit of measurement; NC = national currency.

intended to serve as a diagnostic tool for prices at the basic heading level, whereas the Dikhanov table can be processed at any level, from the total gross domestic product (GDP)<sup>6</sup> down to the basic heading. The Dikhanov table can also be processed for intermediate aggregates such as goods and services. The Quaranta table shows additional information about item prices within a basic heading such as the number of quotations, the price variance and average prices, as well as the exchange rate ratios, whereas the Dikhanov table emphasizes the between-basic heading validation, adding features to detect anomalies across both countries and basic headings.

In the Quaranta table, PPPs are computed using one of the four methods: (1) EKS, (2) EKS\*,

(3) CPD or CPRD, or (4) weighted CPD. In the Dikhanov table, the CPD and CPRD methods are used in computations because the EKS method does not generate the average product price, an important measure that enters into various computations in the Dikhanov table.

### Average Price Measures

Similar to the Quaranta table, the Dikhanov table provides XR-ratios at the item level and PLIs at the aggregate or basic heading level. However, for the PPP-ratios the approach of the Dikhanov table differs from that of the Quaranta table. As explained in the previous section, the PPP-ratio is the double-normalized product price. The first normalization is to convert the

price of the product into the numéraire currency by dividing it by the basic heading PPP (this is the so-called PPP price). The second normalization is to divide the PPP price by the geometric mean of the PPP prices across all the countries.

The Dikhanov table uses CPD residuals instead of PPP-ratios as the double-normalized item price. When the CPD is used, the CPD residuals in the Dikhanov table are equal to the logarithms of the PPP-ratios in the Quaranta table. However, this identity holds only if

- The PPPs in both tables are calculated with the CPD (it will not hold if the CPD is used for the Dikhanov table but EKS for the Quaranta table).
- The items are included in the calculation as a single group—that is, either as a basic heading or as an aggregate (it will not hold if the CPD residuals for items in the basic heading in the Dikhanov table are based on PPPs for an aggregate and the PPP-ratios in the Quaranta table are derived from PPPs for the basic heading).

Table 14.6 summarizes the connection of the CPD residuals and PPP-ratios when these conditions hold.

Details on the CPD residuals are presented later in this section.

### Measures of Price Variation

The Dikhanov table uses standard deviations (STDs) instead of coefficients of variation to measure overall country and item variation. The STDs for the CPD residuals in the Dikhanov table are CVs because the mean of the residuals is 1. The two sets of coefficients are not the

same because of differences in computation. The overall CV in the Quaranta table is an average of the CVs of the items priced for the basic heading, whereas the overall CV in the Dikhanov table is computed with all the CPD residuals in the table's item section, thereby ensuring consistency among the overall CV, the item CVs, and the country CVs.

In addition, the item CVs in the Quaranta table should in theory be calculated using logarithms because the PPP-ratios are based on the geometric mean of the PPP prices, but for practical reasons they are calculated using the arithmetic mean and standard deviation of the PPP-ratios. By contrast, the item CVs in the Dikhanov table are based on CPD residuals, which are logarithms of the PPP-ratios. Despite the computational differences, these two sets of coefficients of variation are of similar orders of magnitude and reliability in terms of identifying extreme values.

### Description of the Dikhanov Table

The Dikhanov table can be presented in two versions: extended<sup>2</sup> and collapsed. Table 14.7A is an example of an extended table, and table 14.7B illustrates a collapsed table for the household final consumption expenditure (HFCE). Both tables are calculated at the basic heading level, and neither table is complete. CPD residuals are shown for only 3 (table 14.7A) or 6 (table 14.7B) of the 809 products priced and only for 5 of the 18 countries included in the comparison. The PPPs for the aggregate, HFCE, are not weighted. They have been calculated by a CPD that uses the whole set of products and their prices without taking basic heading expenditures into account.

**Table 14.6** CPD Residuals and Respective PPP-Ratios, ICP 2011

CPD residuals with values	PPP-ratio equivalence
Between -0.25 and 0.25	Between 78 and 128
Between -0.75 and -0.25 or 0.25 and 0.75	Between 47 and 78 or 128 and 212
Between -2.0 and -0.75 or 0.75 and 2.0	Between 14 and 47 or 212 and 739
Less than -2.0 or greater than 2.0	Less than 14 or greater than 739

Source: ICP, <http://icp.worldbank.org/>.



**Table 14.7A** Example of Extended Dikhanov Table (Basic Heading Level of Analysis), ICP 2011

Dikhanov temporal analysis		[1] Country 1	[1] Country 2	[1] Country 3	[1] Country 4	[1] Country 5	[2] STD	[3] Count
		[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005		
	[5] PPP	658.129	4.040	590.222	7.873	96.795		
	[6] STD	0.256	0.29	0.251	0.279	0.248	0.259	
	[7] No. of priced items	513	572	605	420	481		803
	[8] ER (LCU/US\$)	527.470	5.780	527.470	6.360	100.500		
	[9] Rebased_XR	959.036	10.509	959.036	11.564	182.727		
	[10] PLI	0.686	0.384	0.615	0.681	0.530		
Item-level details		[1] Country 1	[1] Country 2	[1] Country 3	[1] Country 4	[1] Country 5	[11] STD	[12] Count
Item code	Item name	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005		
[13] 110111.1	[14] Rice							
	[15] PPP	718.297	4.849	831.093	6.634	39.381		
	[16] STD	0.073	0.274	0.262	0.517	0.195		
	[17] PLI	0.749	0.461	0.867	0.574	0.216		
	[18] No. of priced items	5	6	5	4	5		
[19] 110111.101	[20] Long grain rice, prepacked	[21]—	[21] 0.267	[21] -0.068	[21] 0.223	[21] -0.162	0.251	5
	[22] Average price	—	5.51	675.00	7.21	29.14		
	[23] No. of observations	—	10	16	4	17		
	[24] Coefficient of variation	—	3.00	26.00	7.84	7.55		
	[25] XR-ratio	—	108.78	146.03	129.36	33.09		
[19] 110111.102	[20] Long grain rice, sold loose	[21] -0.01514	[21] -0.02193	[21] -0.40873	[21] —	[21] -0.16078	0.225	10
	[22] Average price	517.57	3.47	404	—	24.53		
	[23] No. of observations	7	10	14	—	19		
	[24] Coefficient of variation	23.36	7.89	19.69	—	10.16		
	[25] XR-ratio	134.11	82.05	104.68	—	33.36		
[19] 110111.103	[20] Basmati rice	[21] -0.02923	[21] 0.28665	[21] 0.00527	[21] 0.44355	[21] 0.28587	0.282	13
	[22] Average price	1,371.85	12.70	1,643.00	20.33	103.07		
	[23] No. of observations	19	9	11	8	20		
	[24] Coefficient of variation	12.75	8.48	50.58	15.75	10.07		
	[25] XR-ratio	120.05	101.42	143.78	147.55	47.34		

Explanatory notes keyed to the italicized numbers follow table 14.7B. The table is organized in three sections:

- *General section at the top*—gives general details and key indexes that relate to the aggregate or basic heading as a whole, such as number of items [3] included in the analysis, as well as the PPP [5], STD [6], and PLI [10] for each country.
- *Basic heading section in the middle*—gives information that relates to the basic heading as a whole, such as the number of items [12] included in the analysis, as well as the PPP [15], STD [16], and PLI [17] for individual countries.
- *Item section at the bottom*—covers the items priced for the basic heading. Shown for the extended version of the table are the

**Table 14.7B** Example of Collapsed Dikhanov Table (Basic Heading Level of Analysis), ICP 2011

Dikhanov temporal analysis	[1] Country 1	[1] Country 2	[1] Country 3	[1] Country 4	[1] Country 5	[2] STD	[3] Count
	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005		
[5] PPP	658.129	4.040	590.222	7.873	96.795		
[6] STD	0.256	0.292	0.251	0.279	0.248	0.259	
[7] No. of priced items	513	572	605	420	481		803
[8] ER (LCU/US\$)	527.470	5.780	527.470	6.360	100.500		
[9] Rebased_XR	959.036	10.509	959.036	11.564	182.727		
[10] PLI	0.686	0.384	0.615	0.681	0.530		

Item-level details		[1] Country 1	[1] Country 2	[1] Country 3	[1] Country 4	[1] Country 5	[11] STD	[12] Count
Item code	Item name	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005	[4] Yearly, 2005		
[13] 110111.1	[14] Rice							
	[15] PPP	718.297	4.849	831.093	6.634	39.381		
	[16] STD	0.073	0.274	0.262	0.517	0.195		
	[17] PLI	0.749	0.461	0.867	0.574	0.216		
	[18] No. of priced items	5	6	5	4	5		
[19] 110111.101	[20] Long grain rice, prepacked	[21]—	[21]0.26746	[21]–0.06845	[21]0.22277	[21]–0.16158	0.251	13
[19] 110111.102	[20] Long grain rice, sold loose	[21]–0.01514	[21]–0.02193	[21]–0.40873	[21]—	[21]–0.16078	0.225	10
[19] 110111.103	[20] Basmati rice	[21]–0.02923	[21]0.28665	[21]0.00527	[21]0.44355	[21]0.28587	0.282	13
[19] 110111.104	[20] Medium grain rice	[21]0.11338	[21]–0.38882	[21]0.40975	[21]—	[21]–0.14866	0.223	12
[19] 110111.105	[20] Short grain rice	[21]0.03658	[21]–0.33214	[21]0.06217	[21]–0.88125	[21]0.18515	0.342	12
[19] 110111.106	[20] Brown rice	[21]–0.10559	[21]0.18878	[21]—	[21]0.21493	[21]—	0.287	11

Summary Information		
[1]	Country 1, 2, . . . , n	Names of countries covered by table.
[2]	STD 1	Standard deviation (STD) of country product dummy (CPD) residuals of all products priced for basic heading or aggregate. It can be converted to an overall coefficient of variation for products by multiplying it by 100. The mean of all product residuals is 1.
[3]	Count	Number of products specified for basic heading or aggregate.
[4]	Frequency, year	Period during which prices for products covered by table were collected.
[5]	PPP	Purchasing power parity (PPP) for basic heading or aggregate covered by table. It is expressed as number of local currency units per unit of selected numéraire currency. Prices used to calculate PPPs are average prices in local currencies that countries report for products they priced for basic heading or aggregate—that is, the average prices in row [22].
[6]	STD 2	Standard deviation of each country's CPD residuals for basic heading or aggregate. It can be converted to a country coefficient of variation by multiplying by 100. Mean of each country's residuals is 1.
[7]	No. of priced items	Number of products priced by each country for basic heading or aggregate.
[8]	ER (LCU/US\$)	Market exchange rate (ER) of countries expressed as number of local currency units (LCUs) per U.S. dollar.
[9]	Rebased_XR	Exchange rate (XR) [8] rebased to numéraire currency. Number of local currency units per unit of numéraire currency.
[10]	PLI	Price level index (PLI). PPPs in row [5] expressed as ratio of corresponding rebased exchange rates in row [9] for basic heading or aggregate.

Item-Level Details		
[13]	BH code	Code of basic heading covered by table.
[14]	BH name	Name of basic heading covered by table.
[15]	PPP	Purchasing power parity for each country for basic heading covered.
[16]	STD 3	Standard deviation of each country's CPD or country product representative dummy (CPRD) residual for basic heading.
[17]	PLI	Price level index for each country for basic heading covered.
[18]	No. of priced items	Number of products priced by each country for basic heading.
[19]	Item code	Code of item covered by table.
[20]	Item name	Name of item covered by table.
[21]	CPD residual	CPD residual by product and country. See section on use of CPD residuals for additional information.
[22]	Average price	Average item price in local currency units.
[23]	No. of observations	Number of price observations on which average prices at [22] are based.
[24]	Coefficient of variation	Price observation coefficient of variation for each country.
[25]	XR-ratio	Standardized price ratio based on exchange rate—converted price. Converted price is expressed as a percentage of its geometric mean.

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available. Cells with CPD residuals are color-coded to facilitate visual diagnostics. See table 14.8 for color codes.

**Table 14.8** Color Scheme for CPD Residuals, ICP 2011

CPD residuals with values	Color code
Between -0.25 and 0.25	None
Between -0.75 and -0.25 or 0.25 and 0.75	Yellow
Between -2.0 and -0.75 or 0.75 and 2.0	Red
Less than -2.0 or greater than 2.0	Black

Source: ICP, <http://icp.worldbank.org/>.

item coefficient of variation [11], number of countries pricing the item [12], CPD residuals [21], average price in national currency [22], number of observations [23], coefficient of variation [24], and XR-ratio [25]. Only the item coefficient of variation [11], number of countries pricing the item [12], and CPD residuals [21] are shown for the *collapsed version* of the table.

### Use of CPD Residuals

CPD residuals are used throughout the Dikhanov table (see annex). As shown in the annex, the residuals from CPD regressions are presented as

$$\varepsilon_{cp} = \ln p_{cp} - x_{cp}\beta = \ln p_{cp} - Dc_c - Dp_p, \quad [14.1]$$

where  $Dc_c$  and  $Dp_p$  are the country and product dummies.

During the validation, CPD residuals and the standard deviation of CPD residuals should be analyzed in a manner similar to that in which PPP-ratios and coefficients of variation are analyzed in the Quaranta tables. The process of data validation with the Dikhanov table should thus start with checking the entries with the largest negative or positive residuals, trying to investigate and resolve these issues. Some of the deviations, even very large ones, can be legitimate. For example, the price of gasoline in República Bolivariana de Venezuela is very low compared with the prices in other Latin American countries, and therefore the large deviation (CPD residual) for the product as shown in the Dikhanov table at the GDP level is not a mistake in data. In general, the overall STD by country should reflect the quality of the price data.

It should also be noted that not every problem can be observed when the CPD is run only at the basic heading level. For example, if a country erroneously priced all its beverages in gallons instead of liters, its BH-level data alone could be very consistent (because everything is priced in gallons), but inconsistent with those of all other countries (priced in liters).

It is recommended that the Dikhanov table be run at different levels of aggregation<sup>8</sup>—for example, at the basic heading level, at a higher

**Table 14.9A** Example of Collapsed Dikhanov Table (Calculated at Basic Heading Level), ICP 2011

Dikhanov temporal analysis		Country 1	Country 2	Country 3	Country 4	Country 5	Country 6	STD	Count
		Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005		
	<b>PPP</b>	1.000	4.066	0.049	3.442	8.548	4.727		
	<b>STD</b>	0.502	0.728	0.750	0.711	0.800	0.717	0.705	
	<b>No. of priced items</b>	706	747	562	766	661	691		844
	<b>ER (LCU/US\$)</b>	88.600	527.468	5.110	527.468	1138.000	393.383		
	<b>Rebased_XR</b>	1.000	5.953	0.058	5.953	12.844	4.440		
	<b>PLI</b>	1.000	0.683	0.851	0.578	0.666	1.065		
<hr/>									
Item-level details		Country 1	Country 2	Country 3	Country 4	Country 5	Country 6	STD	Count
<b>Item code</b>		Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005		
<b>Item name</b>									
<hr/>									
<b>110111.1</b>	<b>Rice</b>								
	<b>PPP</b>	1.000	5.504	0.065	1.480	8.052	1.579		
	<b>STD</b>	0.596	0.640	0.441	0.634	0.614	0.653		
	<b>PLI</b>	1.000	0.924	1.120	0.249	0.627	0.356		
	<b>No. of priced items</b>	7	7	3	7	5	7		
110111.101	Long grain rice	-0.176	0.582	—	-0.402	0.406	-0.410	0.416	5
110111.102	Long grain rice	-0.665	0.698	0.502	-0.231	—	-0.305	0.515	5
110111.103	Long grain rice	-0.288	-0.400	-0.571	0.886	-0.541	0.913	0.643	6
110111.104	Medium grain rice	0.202	-1.157	—	0.071	0.802	0.082	0.638	5
110111.105	Short grain rice	-0.667	-0.464	—	0.976	-0.863	1.018	0.824	5
110111.106	Basmati rice	1.094	0.205	0.068	-0.722	—	-0.645	0.660	5
110111.107	Broken rice	0.501	0.536	—	-0.579	0.195	-0.654	0.518	5
<hr/>									
<b>110111.2</b>	<b>Other cereals, flour, and other cereal products</b>								
	<b>PPP</b>	1.000	3.531	0.052	3.274	4.962	6.010		
	<b>STD</b>	0.496	0.774	0.806	0.726	1.062	0.704		
	<b>PLI</b>	1.000	0.593	0.905	0.550	0.386	1.354		
	<b>No. of priced items</b>	14	20	13	21	11	19		
110111.201	Wheat flour	0.221	0.285	-0.371	0.357	-0.256	-0.236	0.293	6
110111.202	Wheat flour	0.419	0.122	-0.328	0.313	-0.087	-0.439	0.315	6
110111.203	Couscous	—	0.311	0.288	0.291	—	-0.314	0.302	4
110111.204	Couscous (millet)	—	-1.450	—	0.986	—	0.465	1.047	3

aggregate level (such as food), and at the GDP level. Processing the Dikhanov table at a level higher than the basic heading can help analyze price points for "bad" basic headings with partially erroneous price entries. These "bad" basic headings would be distorted, which would make the processing impossible at the basic heading level. However, processing at a higher level would help identify prices that are consistent within a broader set of products.

It is important to study the overall standard deviation of residuals (upper right-hand corner of the table). Table 14.9A, an example of a collapsed Dikhanov table calculated at the basic heading level, predictably shows a smaller value than table 14.9B (0.71 versus 0.80), an example of a collapsed Dikhanov table calculated at the GDP level.<sup>2</sup> However, the difference is not large (and even smaller for countries with data of poorer quality, in which case the within-basic heading

**Table 14.9B** Example of Collapsed Dikhanov Table (Calculated at GDP Level), ICP 2011

Dikhanov temporal analysis	Country 1	Country 2	Country 3	Country 4	Country 5	Country 6	STD	Count
	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005		
<b>PPP</b>	1.000	4.066	0.049	3.442	8.548	4.727		
<b>STD</b>	0.623	0.812	0.839	0.785	0.893	0.817	0.797	
<b>No. of priced items</b>	706	747	562	766	661	691		844
<b>ER (LCU/US\$)</b>	88.600	527.468	5.110	527.468	1138.000	393.383		
<b>Rebased_XR</b>	1.000	5.953	0.058	5.953	12.844	4.440		
<b>PLI</b>	1.000	0.683	0.851	0.578	0.666	1.065		

Item-level details		Country 1	Country 2	Country 3	Country 4	Country 5	Country 6	STD	Count
Item code	Item name	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005	Yearly, 2005		
110111.101	Long grain rice	0.163	1.224	—	-0.906	0.686	-1.167	0.914	5
110111.102	Long grain rice	-0.392	1.273	1.050	-0.802	—	-1.128	0.979	5
110111.103	Long grain rice	-0.051	0.140	-0.058	0.279	-0.364	0.054	0.200	6
110111.104	Medium grain rice	0.541	-0.515	—	-0.433	1.082	-0.675	0.689	5
110111.105	Short grain rice	-0.328	0.179	—	0.472	-0.583	0.261	0.392	5
110111.106	Basmati rice	1.366	0.780	0.616	-1.293	—	-1.469	1.156	5
110111.107	Broken rice	0.841	1.178	—	-1.084	0.475	-1.410	1.047	5
110111.201	Wheat flour	0.293	0.216	-0.237	0.379	-0.728	0.077	0.380	6
110111.202	Wheat flour	0.491	0.052	-0.194	0.335	-0.558	-0.127	0.347	6
110111.203	Couscous	—	0.142	-0.254	0.214	—	-0.102	0.188	4
110111.204	Couscous (millet)	—	-1.608	—	0.919	—	0.688	1.141	3

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available. See tables 14.7A and 14.7B for explanation of abbreviations. Cells with CPD residuals are color-coded to facilitate visual diagnostics. See table 14.8 for color codes.

deviations would dominate the between–basic heading ones). The overall standard deviation of residuals for larger regions with more variety tends to be larger than those for smaller and more uniform regions.

It is informative to study the standard deviations of residuals both by country and by item. The same overall picture can be observed: the STD values in table 14.9B are greater than those in table 14.9A.

As for the Quaranta table, it may be concluded that the goal of the validation is to reduce the overall standard deviation with the understanding that there are limits to its reduction, and that many large CPD residuals may be quite legitimate. However, each large residual needs to be investigated.

### Modified Dikhanov Table

Another variation of the Dikhanov table is the modified Dikhanov table. This table keeps the original presentation of the Dikhanov table, either collapsed or extended, but instead of using the Dikhanov table–specific indexes, it uses the indexes in the Quaranta table. Table 14.10 summarizes the differences between the original and modified Dikhanov tables. Table 14.11 is an example of a modified Dikhanov table.

The main advantage of the modified Dikhanov table is that users familiar with Quaranta indexes can benefit from the layout of the Dikhanov table, as well as from the option to calculate the tables and the respective PPPs at different levels of aggregation.

**Table 14.10** Indexes Used in the Original and Modified Dikhanov Tables, ICP 2011

Dikhanov table	Modified Dikhanov table
CPD residuals	PPP-ratios
Standard deviation	Coefficient of variation
Price level index (absolute)	Price level index (percentage)
No. of priced items	No. of priced items and no. of important items

Source: ICP, <http://icp.worldbank.org/>.

**Table 14.11** Example of Modified Dikhanov Table (Calculated at Basic Heading Level), ICP 2011

Dikhanov temporal analysis (calculation method: CPD)		Country 1	Country 2	Country 3	Country 4	Country 5	Var. co.	Count
		Q1 2011	Q1 2011	Q1 2011	Q1 2011	Q1 2011		
<b>PPP</b>		1.566	1	224.374	1.804	1.384		
<b>Variation coefficient</b>		29.7	17.3	23.9	18.9	24.9	21.6	
<b>No. of priced items</b>		30;*30	30;*30	30;*30	30;*30	30;*30		30
<b>ER (LCU/US\$)</b>		1.646	1	178.100	1.785	0.8444		
<b>Rebased_XR</b>		1.646	1	178.100	1.785	0.844		
<b>PLI (%)</b>		95.144	100	125.982	101.066	163.892		

Item-level details		Country 1	Country 2	Country 3	Country 4	Country 5	Var. co.	Count
Item code	Item name	Q1 2011	Q1 2011	Q1 2011	Q1 2011	Q1 2011		
<b>110111.1</b>	<b>Rice</b>							
	<b>PPP</b>	1.50157	1	223.787	1.81769	1.18924		
	<b>Variation coefficient</b>	32.4	24.4	16.9	23.8	22.2		
	<b>PLI (%)</b>	91.214	100	125.652	101.847	140.838		
	<b>No. of priced items</b>	6;*6	6;*6	6;*6	6;*6	6;*6		
110111.101	Long grain rice, parboiled	76.22	143.6	104.14	120.56	72.77	28.9	5
	<i>No. of observations</i>	*692	*472	*51	*620	*139		
	<i>Coefficient of variation</i>	49.3029	24.1644	32.3469	27.9986	11.8166		
	<i>XR-ratio</i>	62.9456	130.007	118.465	111.165	92.7914		
110111.102	Long grain rice, non-parboiled	92.43	107.6	95.25	121.65	86.77	13.8	5
	<i>Average price</i>	52.2131	40.479	8,018.59	83.1814	38.8185		
	<i>No. of observations</i>	*685	*473	*46	*595	*139		
	<i>Coefficient of variation</i>	37.6515	38.8443	19.3825	25.3717	13.0202		
	<i>XR-ratio</i>	76.3336	97.4204	108.356	112.169	110.639		
110111.103	Long grain rice, family pack	170.06	66.26	77.65	126.56	90.31	39.8	5
	<i>Average price</i>	360.21	93.4659	24,510.9	324.504	151.494		
	<i>No. of observations</i>	*520	*457	*40	*549	*135		
	<i>Coefficient of variation</i>	36.3971	48.4808	47.7075	44.9962	16.5691		
	<i>XR-ratio</i>	140.44	59.9888	88.3309	116.699	115.149		

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available. See tables 14.7A and 14.7B for explanation of abbreviations. Cells with CPD residuals are color-coded to facilitate visual diagnostics. See table 14.8 for color codes. An asterisk (\*) indicates number of important items out of total number of priced items.

## Annex

### CPD Residuals in the Dikhanov Table

By definition, the CPD index for a set of countries and products can be presented as follows:

$$\ln p_{cp} = y_{cp} = x_{cp} \beta + \varepsilon_{cp} \quad (14A.1)$$

and

$$x_{cp} = [Dc_2 \dots Dc_{Nc} Dp_1 Dp_2 \dots Dp_{Np}] \quad (14A.2)$$

$$\beta = [\alpha_2 \dots \alpha_{Nc} \gamma_1 \gamma_2 \dots \gamma_{Np}]^T,$$

where  $P_{cp}$  is the price of product  $p$  in country  $c$ ;  $Dc_j$  and  $Dp_i$  are the country and product dummies, respectively; and  $Np$  and  $Nc$  are the number of products and countries, respectively.

In matrix notation, by stacking individual observations, this can be written as

$$y = X\beta + \varepsilon. \quad (14A.3)$$

Note that the first country dummy is dropped from the system because matrix  $X$  is of rank  $(Np + Nc - 1)$ . In fact, any variable can be dropped from the system; dropping the first country's dummy simply makes it the base country.

The solution is given (under the conditions of independently and identically distributed random disturbances) by

$$\hat{\beta} = (X^T X)^{-1} X^T y. \quad (14A.4)$$

With use of expression (14A.3), the error term can be presented as

$$\varepsilon_{cp} = \ln p_{cp} - x_{cp} \hat{\beta} = \ln p_{cp} - Dc_c - Dp_p. \quad (14A.5)$$

Those error terms (residuals) enter the Dikhanov table and are used in its statistics such as the standard deviations of residuals by country and product.

The CPD residuals can be estimated at any level, starting from the basic heading and up to the GDP level. It is possible to compute the residuals at various other groupings as well—for example, for goods, services, nontradables, or unprocessed food. In those cases, the residuals will indicate the variability within those groups only.

## NOTES

1. A standardized price ratio is  $(\text{CC-price}_{1A} / [\text{CC-price}_{1A} * \text{CC-price}_{1B} * \dots * \text{CC-price}_{1N}]^{1/N}) * 100$  where  $\text{CC-price}_{1A}$  is the average price for product 1 in country A in the common currency.  $\text{CC-price}_{1A}$  is itself equal to  $\text{NC-price}_{1A} / \text{CC}_{1A}$  where  $\text{NC-price}_{1A}$  is the average price for product 1 in country A in the national currency, and  $\text{CC}_{1A}$  is the currency conversion rate between the national currency of country A and the common currency. The currency conversion rate is either the exchange rate or the PPP:  $\text{CC}_{1A} = \text{XR}_{1A}$  or  $\text{PPP}_{1A}$ .
2. An alternative term is the CUP-ratio, in which CUP stands for conventional unit for expressing parities.
3. In this particular case, it does not matter which is used because the PPP prices and PPP price ratios for the same item in different countries differ only by a scalar.
4. In the ICP Kit, the bottom part of the table is generated automatically, whereas the upper part must be completed manually.
5. If a base country approach is used in calculation of the PPPs, missing basic headings can be caused by missing price data for either the given country or the base country.
6. GDP PPP is estimated here as the CPD PPP utilizing the whole set of prices and products, and thus does not take into account basic heading expenditures. The advantage is that the CPD PPP at the aggregate level can be estimated before the actual basic heading weights are known, and it will still provide a ballpark estimate of the final PPP for the GDP.
7. Horizontal Quaranta tables, used in the European Comparison Program in 1993 and 1996, have a layout similar to that of the extended Dikhanov tables.
8. The difference between the residuals, run at different levels of processing such as the basic heading and GDP, can be expressed as

$$\varepsilon_{cp}(BH) - \varepsilon_{cp}(GDP) = -Dc_c(BH) - Dp_p(BH) + Dc_c(GDP) + Dp_p(GDP).$$

Because the country dummy is the log of the PPP, the difference between the CPD residuals in tables 14.9A and 14.9B can be broken down into two parts:

$$\begin{aligned} \varepsilon_{cp}(BH) - \varepsilon_{cp}(GDP) = & \left\{ \ln(PPP_c(GDP)) \right. \\ & \left. - \ln(PPP_c(BH)) \right\} \\ & + \left\{ Dp_p(GDP) - Dp_p(BH) \right\}. \end{aligned}$$

The first component is the difference between the BH PPP and the GDP PPP (the relative

price level of the basic heading vis-à-vis the overall price level at the GDP level), whereas the second component is the difference between the *logs* of the average prices of the product as computed with the CPD regression on all products and those as computed on the products within the basic heading only. Usually, the second component is insignificant.

9. The overall standard deviation of residuals is run on the whole country product tableau of the CPD residuals.



## Validation of Household Consumption Data

The national coordinating agencies (NCAs) of the economies participating in the regional comparisons of the International Comparison Program (ICP) provide the regional coordinating agencies (RCAs) with a set of national quarterly and annual purchasers' prices for items chosen from a common list of precisely defined items. These regional lists include both regional and global items belonging to the global core list (GCL). The quarterly prices refer to the quarterly national average prices; the annual purchasers' prices refer to the annual national average prices of the year of the comparison. Both sets of prices cover the whole range of final goods and services included in the gross domestic product (GDP). These prices are used to calculate purchasing power parities (PPPs) for basic headings (BHs). The basic heading PPPs are further used to derive intraregional measures of price and volume relatives for the economies participating in the comparison. The regional PPPs are then linked to form a global set of PPPs and measures of price and volume relatives. To complete the process, the measures are published by the RCAs and the World Bank, thereby reaching a variety of users, including policy makers, economic analysts, researchers, politicians, and journalists, as well as the general public. It is therefore essential that the prices on which the PPPs are based are rigorously checked and corrected for error—that is, validated—before the final PPPs are calculated.

Only after this step can the measures contribute accurately to informed debate. Validation of price data is thus an important phase in producing PPPs.

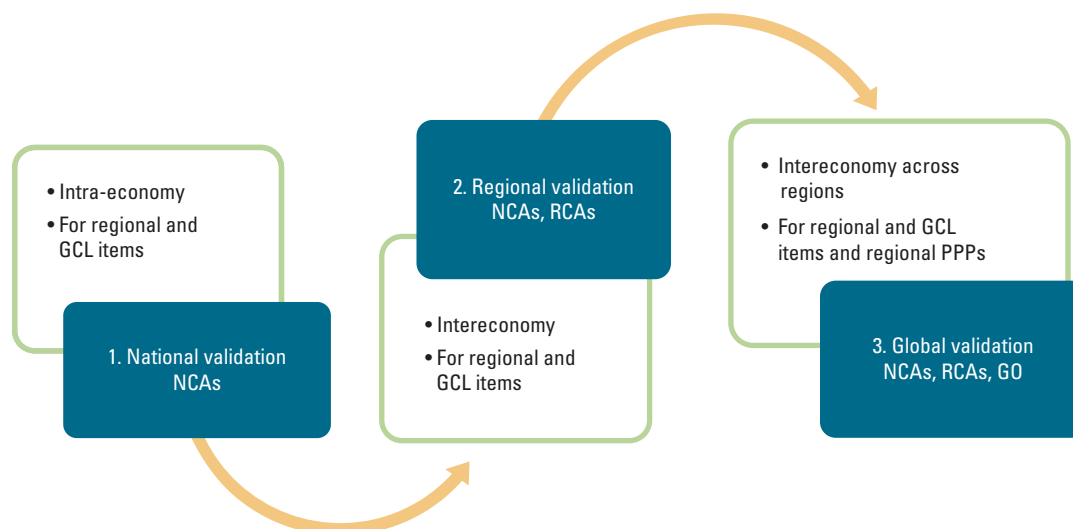
As a multilateral comparison, the ICP exercise requires not only correct but also comparable price data. Correctness and comparability require in turn that the validation process be supported by close cooperation and collaboration among the national and regional agencies and the Global Office. This chapter provides a step-by-step breakdown of the complete validation process for the household consumption survey.

The ICP validation process consists of three stages: (1) intra-economy validation at the national level; (2) intereconomy validation at the regional level; and (3) global validation at the global level. Figure 15.1 illustrates the stages, and the annex to this chapter summarizes the phases and steps in each stage.

Intra-economy validation is directed at an economy's individual price observations and the resulting average prices. The objective is to verify that price collectors within an economy have priced comparable products and have priced them correctly. It is carried out mainly by the economy's NCA. There may or may not be input from the RCA, depending on the region.

Itereconomy validation takes place after intra-economy validation and is carried out by

**Figure 15.1** Validation Stages: National, Regional, and Global Levels, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

Note: NCA = national coordinating agency; RCA = regional coordinating agency; GCL = global core list; GO = Global Office.

the NCAs and RCAs, but with overall coordination by the RCAs. Intereconomy validation is directed at the average prices reported by the participating economies, or in some cases at the individual price observations and the price ratios that the prices generate between the economies. The objective is to verify that price collectors in different economies have correctly priced comparable products.

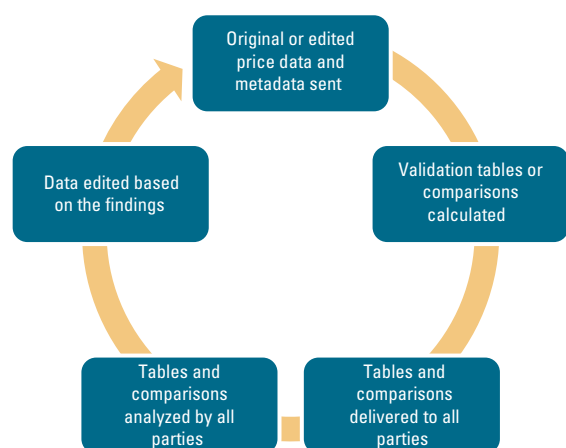
The final validation stage is the global validation; the Global Office and the NCAs and RCAs validate prices for the regional and GCL items, regional PPPs, and subsequent global PPPs. The objective is to ensure that prices collected for the items across regions are comparable and that the linked global PPPs are plausible in wider terms.

Prices for consumer products can be collected on a monthly or quarterly basis, with the final goal of producing annual average prices. Validation at the economy level should be carried out following the price collection schedule on either a monthly or a quarterly basis. Validation at the regional level should be carried out according to the agreed validation schedule, preferably on a quarterly basis. The global-level validation should be carried out on a quarterly basis. Various phases of validation require careful planning of the overall

validation timetable. In addition, timeliness is a crucial aspect requiring serious consideration, first because of the need to release data on a timely basis and second because the longer the delay between price collection and verification, the more difficult it becomes to correct erroneous prices. If economies within a region are not able to follow a common timeline for the validation, the RCAs may need to create validation groups for the regions' economies.

The intereconomy validation is an especially iterative process requiring a number of rounds of editing and verification. Possible errors are uncovered by identifying prices that diverge significantly from other prices in the series. They are detected by having a measure of divergence that is greater than a given critical value or a value that falls outside a given range of acceptable values. Divergence measures are generally defined by the parameters of the series being edited; examples are the average and the standard deviation. Thus if some of the possible errors identified in the initial edit are found to be actual errors and are corrected, the parameters of the price series will change and so will the divergence measures of each price remaining in the series. A second edit will find new possible errors that will need to be verified. Again, when actual errors are

**Figure 15.2** Validation Iterations, ICP 2011



Source: ICP, <http://icp.worldbank.org/>.

corrected, the parameters of the price series will change, which may lead to more possible errors being detected if a third edit is done. Usually the number of new possible errors falls as validation progresses, until the return on further rounds is considered marginal and not worth pursuing. Figure 15.2 illustrates validation iterations.

The following sections deal with each validation stage individually. Stages are divided into validation phases, which are further divided into the validation steps to be carried out. But first, what are the objectives and related general means of validation, as well as the limits faced?

## VALIDATION OBJECTIVES, MEANS, AND LIMITS

The *first objective* of the validation process is to rid data of pricing errors. Two types of nonsampling errors can be identified: price error and product error.

- A *price error* occurs when price collectors price products that match the item specification, but they fail to record the price correctly. A price error can also occur during the process of reporting and transmitting a price that initially was recorded correctly. Associated with each price is a quantity: the specified quantity (the quantity to be priced) and the reference quantity (the quantity to which the price collected is to be adjusted). A price error can also arise because, even though the price

is recorded correctly, the quantity priced is recorded incorrectly (or is recorded correctly and the error is introduced later, during processing). Thus the adjusted price for the reference quantity, which is the price validated, will be wrong as well.

- A *product error* occurs when price collectors price products that do not match the item specification and neglect to report having done so. Perhaps they are not aware of the mismatch, such as when the item specification is too loose, or perhaps they price a substitute product as required by the pricing guidelines but do not mention it on the price reporting form. Price collectors are usually instructed to collect the price of a substitute product if they are unable to find the specified product. 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 NCA, which, together with the RCA, can then decide what to do with the price collected. It may be possible to adjust the price for quality differences between the product priced and the product specified. Alternatively, if other economies report prices for the same substitute product, price comparisons can be made for the substitute product as well as for the product originally specified. If neither one of these options is possible, the price will have to be discarded. Substitution does not in itself introduce an error; it is the failure of price collectors to flag and document the substitution that leads to a product error.

Price and product errors are detected by identifying problematic observations or outliers. These are observations that diverge so much from the average that they are treated, at first glance, as implausible and therefore in need of further investigation and verification. Outliers are not rejected automatically; rather, they are investigated to determine whether they are genuine problematic observations. Indeed there is no exact rule about what makes a price an outlier, and so an element of judgment is required. The amount of divergence that triggers further verification depends largely on the variance of the price observations. It is also

possible that the high price variation reflects the economy's situation correctly. In these circumstances, the RCA must rely on the economy's experience and local market knowledge, and the agency is advised to discuss the thresholds for its region with market and industry experts. It is important to remember, however, that not all possible economy-specific situations may fit into the regional thresholds.

The *second objective* of the validation is to ensure comparability of prices. The purpose of the price comparison is to compare comparable products—that is, "likes with likes." Loose item specifications or difficult survey areas may introduce product errors because the products whose prices are being compared may not be the comparable ones. For example, if a generic product specification—that is, a specification that does not define the brand to be priced—is used, it may embrace a wider range of products than was intended when the specification was drawn up. In this case, errors may be introduced into the estimated PPPs because the products differ significantly in their characteristics. Errors stemming from loose specifications or difficult survey areas cannot be attributed to the data of any particular economy because they are not errors at the economy level; the data are coherent at the subnational level.

The role of the RCAs and the Global Office is to ensure that collected prices are comparable by analyzing both the price data and metadata. Because product errors at the regional level may not be errors at the economy level, it is not always clear to the NCAs why edits are proposed. Thus even if an economy actively participated in detecting price and product errors, it is the responsibility of the program coordinators to guarantee the comparability of the final prices.

The points just made are mainly related to nonsampling errors. Sampling errors occur

because the prices on which the PPPs are based are collected from a sample of outlets rather than from all outlets. An important distinction between the two types of error is that sampling errors would disappear were prices collected by an enumeration of all outlets, but nonsampling errors would not because they would continue to occur regardless of the types of outlets or the number of observations. Sampling errors should be controlled before price collection through sample design; nonsampling errors should be handled before and during price collection through good survey design and management and after price collection through validation. ICP validation is mainly directed at nonsampling errors. The objective is to minimize, if not eliminate, the incidence of nonsampling errors among the regional price data after collection. This is achieved by editing and verification. As for sampling errors, the possible validation actions are limited. However, the RCAs should try to assess the plausibility and comparability of the subnational sample and outlet sample across the region.

Overall, prevention is preferable to correction. The incidence of nonsampling errors can be significantly reduced through good survey design and management. Price collections must be carefully planned, efficiently carried out, and properly supervised; item specifications must be sufficiently detailed to enable price collectors to identify products unambiguously in the outlets they visit; price collectors must be well trained, given clear instructions, and provided with price reporting forms that are user-friendly; fieldwork must be closely monitored to ensure that price collectors record the prices, quantities, and other data required; and staff engaged in processing and validating the prices must be properly trained and supervised. Validation complements good survey practice.

## ***Intra-economy Validation***



The first validation stage in the ICP validation process is intra-economy validation. Within this stage, it is verified that price collectors within the same economy have priced products

that match the item specifications and that the prices they have reported are correct. The relevancy of the survey frame—that is, the outlet and location sample—also needs to be verified.

The intra-economy validation can be carried out entirely by the NCA without the assistance or intervention of the RCA, although the RCA can provide a valuable second opinion about doubtful or marginal cases.

Intra-economy editing searches for discrepancies between the requested and reported prices and metadata and analyzes problematic values—first, among the individual prices an economy has collected for each item, and then among the average prices for these items. The editing and subsequent verification are the responsibility of the economy's NCA. These tasks are carried out without reference to the price data of other economies. When the NCAs complete the intra-economy validation, they provide the RCA with validated average prices for the items priced plus the importance indicator,

the coefficient of variation, the minimum/maximum (min/max) price ratio, and the number of price observations for each of the average prices reported. The NCAs are also encouraged to submit the price observations and related metadata in order to facilitate the intereconomy validation.

The intra-economy validation stage consists of three validation phases: initial data validation (A), statistical tests (B), and finalization of price data (C). During the first phase, the price data generated by price collectors are merged and the first checks are made. During the second phase, the data are analyzed more systematically using statistical means. During the final phase, the data are prepared for delivery to the RCA. Each phase and its underlying steps are described in the following sections.

## Initial Data Validation



### Step A1 Enter price and metadata into the validation software.

The first step in the validation process is to enter the individual prices and related metadata into the validation software. It is preferable that this be done by staff other than the price collectors. A strict division of labor between price collection and data entry ensures that the operations are completely objective. For the purposes of validation, data entry should be done as close in time to the price collection as possible—that is, while price collectors and outlet personnel still have a clear recollection of the circumstances prevailing when the prices were collected. Ideally, the individual prices would be entered and screened the day after their collection, which would allow field supervisors to catch and correct the mistakes of price collectors from the beginning.

### Step A2 Check prices and metadata for errors and discrepancies.

The next step is to check the entries to ensure that (1) item codes are correct; (2) codes and the corresponding price observations have been entered in sequence; (3) there are

only numeric entries for reference quantity, quantity observed, and price observed, as well as for those fields, such as location of outlet or type of outlet, that use numeric codes; and (4) the quantity observed is in the same unit as the reference quantity. The NCAs should also check that the prices seem to be initially plausible and are in line with the general knowledge of the market. Box 15.1 gives two examples of quantity-related problems.

In addition, the following points should be considered:

- *Alternative outlets.* In most cases, price collectors have been given a list of items with detailed specifications and a list of outlets from which to collect the prices of the products. Price collectors are instructed to visit the outlets listed. If for some reason they are obliged to choose another outlet, the reasons should be explained, and detailed information should be provided about the outlet from which the prices were actually collected. The NCAs should ensure that the alternative outlets are good substitutes.
- *Alternative products.* Price collectors note in writing the prices of the alternative products

## BOX 15.1

### Errors of Quantity: Two Examples

*Example 1.* Often the price reported refers to a different unit of quantity than that requested and specified in the item list. The price reported may refer to the wrong weight—such as 250 or 500 grams instead of the required quantity unit of 1 kilogram—or it may be the price per egg instead of per dozen eggs, or per pint or gallon instead of per liter. However, price collectors are obliged to always report the actual unit of quantity, whether or not it corresponds with the quantity requested. Thus the use of a different quantity should not introduce an error as it will be recorded and known. The price collected can then be adjusted to convert it into the price for the quantity requested. If this is not feasible, the price may have to be deleted.

*Example 2.* Suppose a price collector is only able to obtain a price for a 1 kilogram package

of an item whose specification is 150–300 grams. Thus the size of the priced package falls well outside the predetermined range. In this case, an automatic proportional adjustment on the basis of the relative quantities may not be appropriate. In general, a bulk purchase cannot be treated as if it were no different than several smaller purchases adding up to the same quantity. In this case, a 1-kilogram package cannot be treated as if it were the same, from a consumer's point of view, as, say, four 250-gram packages. Thus the price for a kilogram package may have to be rejected because it is too difficult to make an appropriate quality adjustment for such a large difference between the reported quantity and the reference quantity.

on the paper forms provided, together with any accompanying notes, comments, or explanations. They are instructed to collect prices only for the items listed, if possible. If a product is not available exactly as specified in their list, price collectors can substitute another product within the same outlet whose characteristics are very similar to, even though not identical to, the item specification. The NCA should ensure that alternatively priced products are comparable with the rest of the priced products and with the item specification.

#### Step A3

**Check that prices are plausible at the subnational level.**

A large economy can be divided into different areas, with price collections carried out separately. It is essential that the NCAs ensure that the data received from different areas are correct and plausible based on knowledge of the region. Separate editing and validation

steps may have to be carried out for the different areas.

The relationship of the various areas to the economy as a whole resembles the one between the economies and the ICP region; even large differences in prices among different parts of the economy may be entirely appropriate. In any case, realistic national average prices have to be the end result.

#### Step A4

**Check that prices are temporally plausible.**

A temporal comparison analyzes possible inconsistencies in price data, which may be the result of price errors. Prices can be compared temporally either *between ICP rounds* or between price collection periods *within an ICP round*.

Because the intra-economy validation deals with the price observations and respective average prices at the item level, the most reasonable temporal validation is carried out between the

price collection periods within an ICP round. Temporal validation between ICP rounds can be conducted at the price level, but the following points have to be taken into account:

- Data at the item level may not be available for the previous round(s).
- If the item-level data are available, assurance is needed that the item definitions are comparable between the rounds—that is, the item parameters have not changed substantially and the reference units and quantities are the same.

A direct comparison of prices between ICP rounds may not be valuable because of real price level changes—inflation or deflation—within an economy. Thus without a consumer price index (CPI) adjustment, the consistency of the prices may be difficult to analyze. On the other hand, a direct comparison can be used to check whether a PPP price level change is in line with the respective CPI-observed change.

A temporal analysis between price collection months or quarters can be carried out without a CPI adjustment because prices are generally collected for identical item definitions. Because the average prices within a given year should be

relatively stable within an economy, large inconsistencies may be a sign of errors in the data. The possible reason for the variation should thus be investigated and a reasonable justification or correction provided.

A challenging aspect of temporal analysis is the difficulty in directly identifying the potential source of error. Potential sources can be either the previous or the current data set or, in the case of temporal analysis between ICP rounds, problematic CPI indexes. However, the main advantage of the temporal comparison is the opportunity to flag cases for further analysis.

**Step A5** Check important items.

The official method for computation of the ICP 2011 round basic heading PPPs within a region is the weighted country product dummy (CPD-W); it weighs items to reflect the expected expenditure shares within the basic heading of the item. Because expenditure shares below the basic heading level are by definition not available, participating economies are required to classify all available items as either "important" or "less important." Validation of these indicators at the economy level is discussed in chapter 20 of this volume.

## Statistical Tests

Initial data validation (A)

Statistical tests (B)

Finalization of price data (C)

After data have been added to the validation software and initially validated, four statistical tests should be conducted. The detailed price information and the statistical tests are read using two tables: the *average price table*, which shows average prices as well as the results of the min/max price

ratio test and the coefficients of variation for each item, and the *price observation table*, which gives the individual price observations, as well as the results of deviation and t-value tests. Table 15.1 is an example of an average price table, and table 15.2 is an example of a price observation table.

**Table 15.1** Example of Average Price Table, ICP 2011

Product code	Product name	Importance	Number of price quotations	Average price	Min price	Max price	Min/max price ratio	Coefficient of variation
110111.10110	Rice, basmati, first degree	1	6	7.58	5.50	10.00	0.55	20.99
110111.10111	Rice, Uncle Ben's	1	8	14.35	6.00	25.00	0.24	37.97
110111.10112	Rice, white, 25% broken	2	4	4.61	3.20	8.50	0.38	48.72

Source: ICP, <http://icp.worldbank.org/>.

Note: Outliers are highlighted.

**Table 15.2** Example of Price Observation Table, ICP 2011

Product code	Product name	Location code	Location name	Location type code	Outlet code	Outlet name
110111.10110	Rice, basmati, first degree	12	A	1	106	Market
110111.10110	Rice, basmati, first degree	11	B	1	119	Market
110111.10110	Rice, basmati, first degree	11	B	1	119	Market
110111.10110	Rice, basmati, first degree	11	B	1	119	Market
110111.10110	Rice, basmati, first degree	11	B	1	119	Market
110111.10110	Rice, basmati, first degree	11	B	1	119	Market
110111.10111	Rice, Uncle Ben's	12	A	1	101	Market
110111.10111	Rice, Uncle Ben's	12	A	1	101	Market
110111.10111	Rice, Uncle Ben's	12	A	1	101	Market
110111.10111	Rice, Uncle Ben's	12	A	1	101	Market
110111.10111	Rice, Uncle Ben's	11	B	1	119	Market
110111.10111	Rice, Uncle Ben's	11	B	1	14	Market
110111.10111	Rice, Uncle Ben's	12	B	1	14	Market
110111.10111	Rice, Uncle Ben's	12	A	1	56	Market
110111.10112	Rice, white, 25% broken	11	B	1	1	Market
110111.10112	Rice, white, 25% broken	11	B	1	1	Market
110111.10112	Rice, white, 25% broken	11	B	1	1	Market
110111.10112	Rice, white, 25% broken	12	B	1	101	Market

Source: ICP, <http://icp.worldbank.org/>.

Statistical tests are carried out for the prices that have been converted to a reference quantity—that is, to the same quantity or volume such as 1 kilogram or 1 liter. Box 15.2 discusses the suggested limits for the statistical tests, and boxes 15.3 and 15.4 present guidance on the editing of the price data based on the results of the statistical tests.

**Step B1** Check average price table for problematic values using min/max price ratio test.

The first test is the min/max price ratio test, which checks the ratio of the minimum reference quantity price observed for the product to the maximum reference quantity price observed

**BOX 15.2**

**Suggested Limits for Statistical Tests**

For each statistical test introduced in this section, a proposal for acceptance limits is given. However, these limits are suggested as "default values," and they may have to be modified, depending on the situation. Each basic heading or aggregate may have its "own" limits or critical values. For example,

for the coefficient of variation test, limits on the prices of new cars have to be tighter than those on services, whose prices tend to vary more substantially. Moreover, it may be necessary to apply different limits for different countries if, for example, it is known that the subnational price differences are high.



**Table 15.2** (Continued)

Outlet type code	Obs. date (mm-dd-yyyy)	Obs. qty.	Obs. price	Converted price	Deviation	T- value
1	5-26-2010	1	9.00	9.00	18.7	0.9
1	5-5-2010	1	8.00	8.00	5.5	0.3
1	5-19-2010	1	10.00	10.00	31.9	1.5
1	6-1-2010	1	6.00	6.00	-20.9	-1.0
1	6-1-2010	1	7.00	7.00	-7.7	-0.4
1	6-11-2010	1	5.50	5.50	-27.5	-1.3
1	6-9-2010	2	50.00	25.00	74.2	2.0
1	6-9-2010	3	40.00	13.33	-7.1	-0.2
1	6-10-2010	2	23.00	11.50	-19.9	-0.5
1	6-10-2010	1	20.00	20.00	39.3	1.0
1	5-26-2010	2	22.00	11.00	-23.4	-0.6
1	5-27-2010	1	15.00	15.00	4.5	0.1
2	5-28-2010	1	13.00	13.00	-9.4	-0.2
1	3-3-2010	0.5	3.00	6.00	-58.2	-1.5
1	3-3-2010	2	6.50	3.25	-29.5	-0.6
1	6-4-2010	1	3.50	3.50	-24.1	-0.5
1	6-11-2010	1	8.50	8.50	84.3	1.7
1	6-11-2010	1	3.20	3.20	-30.6	-0.6

### BOX 15.3

#### Editing Price Data Based on the Results of Statistical Tests

Editing for product errors and price errors involves identifying prices that have high values—that is, prices whose values are 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 predetermined limit, or its value may fall outside some prespecified range of acceptable values. Both are standard ways of detecting errors in survey data, and both are employed by the ICP. Prices with problematic values are not necessarily wrong. *But the fact that their values are considered to be outside of a prespecified range suggests that they could be wrong—they are possible errors and need to be investigated.* It is not ICP

practice to reject outright prices with problematic values. Rather, it is first established whether they are genuine observations. Once this is known, it can be decided how to deal with them. Prices with high values that are found to be wrong are errors and should be corrected or dropped, whereas prices with problematic values that are shown to be accurate observations are "outliers" and should be retained if they are part of the population defined by the rest of the price observations. In practice, it is not unusual for outliers that meet this criterion to be "corrected"—that is, discarded or replaced by an imputed value—in order to remove the "noise" they introduce into the data set.

## BOX 15.4

### Accounting for a High but Justified Coefficient of Variation (CV)

A high or even extreme CV may stem from reasons other than a straightforward product or price error. The price of the product may vary greatly among different types of outlets, 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. If the price observations are correct and a comparable product has been priced across outlets, the price variation arising from different outlet types is an economic fact of life. The average price should therefore be retained and the reason for the variation explained to the regional coordinating agency (RCA). It is possible that the mix of outlet types selected for the survey does not reflect the distribution profile of the product in question. This

possibility should therefore be investigated and, if necessary, the mix adjusted as appropriate by suppressing prices from those types of outlet that are overrepresented or by duplicating the prices from those types of outlets that are underrepresented. Items with average prices whose variation is caused by specifications that are too broad or by inconsistent pricing across outlets should be deleted, unless they are important and the basic heading does not have a sufficient number of items. In the latter case, the items and their average prices should be retained provisionally. This information should be noted in relation to the item. Later, it can be decided with the RCA whether the products should be dropped, retained, or split on the basis of what other national coordinating agencies in the region have reported.

for the product. The formula for calculating the min/max price ratio is

$$\text{min/max price ratio} = \text{min price}/\text{max price}.$$

The suggested limit for the min/max price ratio test is 0.5 or below. An item with a min/max price ratio below 0.5 fails the test and will be flagged in the average price table as having a high value that needs to be verified. The price data of all products having this flag should be analyzed and corrected or approved.

#### Step B2

#### Check average price table for problematic values using coefficient of variation test.

The second test is the coefficient of variation (CV) test, which checks the standard deviation for the product, expressed as the ratio of the average reference quantity price for the product to the standard deviation. The formula for calculating the CV is

$$\text{coefficient of variation} = (\text{standard deviation}/\text{average price}) \times 100.$$

The suggested limit for the CV test is 39 percent or below. An average price of the item with a CV greater than 39 percent fails the test and will be flagged in the average price table as having a high value that requires verification. The price data of all items having this flag should be analyzed and corrected or approved.

#### Step B3

#### Check price observation table for problematic values using deviation test.

The third test is the deviation test, which measures the deviation of the reference quantity price for a price observation from the average reference quantity price for the product. The formula for calculating the deviation is

$$\text{deviation} = [(\text{price} - \text{average price})/\text{average price}] \times 100.$$

The suggested deviation limit is 50 percent or below. A price observation with a deviation higher than this fails the test and will be

flagged in the price observation table as having a problematic value that needs to be checked. All prices having this flag should be analyzed and corrected or approved.

**Step B4** Check price observation table for problematic values using t-value test.

The final test is the t-value test, which checks the ratio of the deviation of the reference quantity price for a price observation from the average reference quantity price for the product to the standard deviation of the

product. The formula for calculating the t-value is

$$t\text{-value} = [(price - average\ price)/standard\ deviation].$$

The suggested limit for the t-value test is 2.0 or below. A price observation with a ratio greater than 2.0 fails the test and will be flagged in the price observation table as having a high value requiring investigation. All prices having this flag should be analyzed and corrected or approved.

### Finalization of Data



**Step C1** Confirm that price data and metadata have been intra-economy validated.

Before the data and metadata are submitted, it should be confirmed that steps A1 to B4 were conducted successfully and that the data were intra-economy validated.

**Step C2** Submit price data to the regional coordinating agency.

After the data are confirmed to be intra-economy validated, they can be sent to the RCA. The data and metadata have to be in a correct, prespecified format.

### Intereconomy Validation



The intereconomy validation stage starts as soon as a sufficient number of economies within the region have submitted intra-economy validated price data. Intereconomy validation is a collective process involving the RCA and a group of economies, and it is designed to establish that price collectors in different economies have priced products that are comparable between economies—in other words, they have all interpreted the item specifications in the same way—and that the prices they have reported are correct. Intereconomy editing looks for problematic values among the average prices as well as discrepancies in the metadata that the region's NCAs have reported to the RCA for the same items within a basic heading. For this step, the average prices, which are expressed in national currencies, have to be converted to a common currency. After being

converted, the average prices of each economy are checked against the average prices of the other economies in the region. This step cannot be carried out effectively without the active participation of the RCA and NCAs, which must agree to share their average prices.

The main tools for the intereconomy validation are the Quaranta table, named after Vincenzo Quaranta, who first proposed it for use in the European PPP program in 1990, and the Dikhanov table, named after Yuri Dikhanov, who first proposed it for use during the ICP 2005 round (for a detailed explanation of these tables, see chapter 14). Both validation tables are prepared by the RCAs, but the tables should be circulated to all economies within a region. The NCAs are expected to make their own assessments of their data relative to those of other economies independently of the RCA. In other

## BOX 15.5

### Editing of Price Data Based on Analysis of Quaranta and Dikhanov Tables

Editing a basic heading with a Quaranta table or an aggregate with a Dikhanov table entails identifying average prices with low or high values or, more precisely, the XR-ratios or PPP-ratios with low or high values. Average prices underlying these ratios flagged as deviant values are only possible errors. Regardless of how strictly the criteria used to identify these errors are defined, they are not necessarily errors by definition and therefore cannot be automatically removed. They have to be referred back for verification to the national coordinating agencies (NCAs) reporting them. The NCAs are required to investigate the average prices returned to them as possible errors and to confirm

whether they correct or incorrect. When prices are found to be incorrect, the NCAs are expected to correct them; otherwise, prices are suppressed. But if they are found to be correct, they are outliers, and a possibly difficult decision must be made about whether to keep them, to replace them with an imputed value, or to drop them. Some of the deviations, even larger ones, can be legitimate. Individual economies may have particular pricing policies, such as low fuel prices in some of the oil-producing countries. Such prices may be flagged as problematic values, but they would not be incorrect, and it would be wrong to remove them despite the "noise" they may introduce into the data set.

words, the NCAs are expected to be proactive during the intereconomy validation. The RCA may refer doubtful prices back to the economies for clarification or further investigation. The economies may then revise or correct their data, or seek to justify the data as reflecting the market situation in their economy. Intereconomy validation can involve several iterations or rounds before being completed, as explained at the outset of this chapter. After each round, as incorrect or incomparable prices are removed or corrected, the PPPs will become more reliable. Box 15.5 describes the editing of price data based on analysis of Quaranta and Dikhanov tables.

The intereconomy validation stage consists of six validation phases. The first phase, *initial data validation*, is a quick validation phase before any

in-depth validation to reveal any problems with the data that would make any deeper data analysis impossible by blurring the validation tables. The second phase is *validation of metadata*, which seeks to identify possible large deviations within requested and reported data and any other comparability issues that may not be visible as outlier indexes. *Validation at basic heading level* is the main phase of the intereconomy validation, and most of the edits are carried out within that phase. *Validation at aggregated level* takes basic heading average prices to a wider context. *Temporal analysis* checks the consistency of PPPs or price level indexes (PLIs) with regard to a previous ICP round or previous quarters within an ICP round. *Finalization of data* concludes the intereconomy validation phase.

### Initial Data Validation



When the data received from the NCAs are compared for the first time, a number of severe errors are usually evident that make any in-depth

analysis impossible because the indexes in the validation tables are blurred by the potential extreme problems with the data. The most

common extreme errors are quantity-related or simple typing mistakes that may not be visible at the economy level but become clear when data for different economies are compared. Because the focus is only on the extreme problems with the data, one initial validation round should be enough to conclude this validation phase.

**Step D1** Enter price and metadata into the validation software.

Intereconomy validation begins with the RCA entering the average prices reported by the NCAs into the validation software. The first problems with the data are normally encountered during this step, and they stem from incorrect data formats.

**Step D2** Calculate initial validation tables.

After the prices have been entered, it is possible to produce an initial Quaranta table. It is recommended that the Quaranta table be used instead of the Dikhanov table in this validation phase because at the early phases of data validation, the BH PPPs and the respective item

PPP-ratios and country product dummy (CPD) residuals are not reliable (they are based on invalidated data). The Dikhanov table focuses on residuals using a color scheme, whereas the Quaranta table gives equal weight to the exchange rate ratios of price (XR-ratios) and the PPP price ratios (PPP-ratios).

**Step D3** Check initial validation tables for extreme XR-ratios.

XR-ratios are standardized price ratios based on exchange rate-converted average prices. The ratios are thus a proxy measure that allows the average prices of a product to be compared across economies. Each of these ratios refers to a particular item in a particular economy. An extreme XR-ratio means that the national average price for the product in question is very much out of line when compared with the prices of the same product in other economies when they are all converted into the common numéraire currency using the exchange rate.

The focus should be only on very high or very low XR-ratios—that is, values approximately below 40 or over 300.

## Validation of Metadata



In addition to the validation based on the validation tables, the metadata underlying the average prices should be checked separately against large deviations between requested and priced products. For example, if an economy has systematically priced products with larger quantities than are requested for a basic heading, the result may be bias that is not visible at the BH-level indexes. However, references must also be made to the metadata during the following validation phases when potential outlier prices are investigated.

**Step E1** Check metadata for large deviations between requested and priced products.

Small deviations from the metadata should be allowed, but the deviation should be considered when a product is no longer the one priced

by the other economies. The common rules for the deviation permitted should be set while taking into account that these rules can differ across basic headings. Box 15.6 gives an example of the dialogue associated with edits based on the metadata validation.

**Step E2** Check metadata to ensure that survey frames are comparable across economies.

Survey frames established by the national coordinating agencies follow the typical national purchasing patterns. However, errors or very different purchasing patterns may result in data that cannot be compared. For example, data from an economy that prices products solely at department stores in its capital city may not be comparable with those from other economies that collect

## BOX 15.6

### Example of Validation Dialogue for Men's Tennis Socks

*Regional coordinating agency:* The item specification asks for multipacks, but you have priced both single packs and multipacks. This results in a very high coefficient of

variation. Please remove the incorrect package sizes.

*National coordinating agency:* OK, incorrect package types deleted.

prices from a balanced mix of outlets and locations. RCAs should try to assess the comparability of national survey frames to the

greatest extent possible while understanding that, in practice, the means for this may be limited.

### Validation at Basic Heading Level

Initial data validation (D)

Validation of metadata (E)

Validation at BH level (F)

Validation carried out at the basic heading level is the main phase of the intereconomy validation.

Step F1

**Calculate validation tables.**

After the data have been cleansed of extreme errors, the first "real" validation tables can be calculated. For this purpose, either the Quaranta or the Dikhanov table can be used.<sup>1</sup>

Step F2

**Check plausibility of BH price level indexes.**

PLIs provide a comparison of the economies' price levels with respect to the regional average. If the PLI of an economy is higher than 100, its price level is expensive compared with the regional average and vice versa. PLIs are not intended to rank economies strictly. In fact, they only provide an indication of the order of magnitude of the price level in one economy in relation to others, particularly when economies are clustered around a very narrow range of outcomes.

During validation, PLIs can be used in two ways: (1) to check the consistency of relative price levels across basic headings for a single economy and (2) to check the ranking of economies for a single basic heading.

If for a single economy PLIs across basic headings vary considerably, it may be a sign of problems with the data for the respective "outlier" basic headings. However, the variation may also be justified if, for example, individual economies have particular pricing policies, such as low fuel prices in some of the oil-producing economies. Nevertheless, such a basic heading should be flagged for further analysis.

For the PLIs for a single basic heading, the ranking of economies tends to follow a certain pattern. If the price level of an economy is considerably more or less expensive than it usually is in the other economies within the group, it may again be a sign of problems with data for this basic heading.

Step F3

**Check BH tables for high or problematic average coefficients of variation.**

The average CV measures dispersion among all the PPP-ratios for a basic heading. In doing so, it measures the homogeneity of the price structures of the economies 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 value of over 39 percent is considered problematic.

During verification of high (low) or problematic values, priority should be given to basic headings with coefficient values greater than 39 percent, particularly if they have large expenditure weights. Basic headings with large expenditure weights will have a greater influence on the overall PPPs than basic headings with small expenditure weights. Only the Quaranta table shows expenditure weights—they are available at the time of the validation.<sup>2</sup> The value of the coefficient should fall as validation progresses, thereby providing a means of assessing the overall effectiveness of the validation process.

**Step F4**

**Check BH tables for high or problematic economy coefficients of variation.**

The economy CV measures dispersion among an economy's PPP-ratios for a basic heading. In other words, it measures the variation in an economy's price levels among the items 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 economy's price levels and the less reliable are its PPPs. A value of over 39 percent is problematic.

During verification, priority should be given to basic headings for which the value of the economy CV is greater than 39 percent, particularly if the expenditure weight for the basic heading is large. The coefficient should decline in value as validation progresses. This allows an assessment of the effectiveness of the validation process.

The economy CV complements the item CV (see step F6) by introducing a different perspective to the same set of data. Focusing on economies rather than items can help to identify economies that have suspicious data.

**Step F5**

**Check BH and item tables for important products.**

The selection of important items should be verified across the economies within a region because the choice is based on estimated expenditure shares for the items within a basic heading. Validation of importance indicators at the

intereconomy stage is covered in chapter 14 in this volume.

**Step F6**

**Check item tables for problematic item coefficients of variation.**

The item CV could be said to be the most important of the CVs for validation purposes. It measures dispersion among the PPP-ratios for an item. It is an indicator of comparability and accuracy that addresses the following questions: Have the NCAs priced the same products or equivalent products? And have they priced them correctly? The higher the coefficient's value, the less uniform are the item's price levels and the more suspicious are the product's comparability and the accuracy of its pricing across economies. Such products are candidates for splitting or deletion, and the RCA should ensure that they are thoroughly investigated by the NCAs. During validation, priority should be given to products with a CV greater than 39 percent.

**Step F7**

**Check item tables for problematic XR-ratios.**

XR-ratios are standardized price ratios based on exchange rate-converted average prices. The ratios are thus a proxy measure that allows the average prices of a product to be compared across economies. Each of these ratios refers to a particular item in a particular economy. A high (low) XR-ratio means that the national average price for the item in question is high (low) compared with the prices of the same item in other economies when they are all converted into the common numéraire currency using the exchange rate.

However, it must be remembered that the principal reason for calculating PPPs is that when the prices of a given product are converted into a common currency unit using exchange rates, they are not in fact equal in all economies. The general level of prices tends to be systematically higher or lower in some economies than others. Thus a high or low exchange rate price for an individual item in one economy may be largely due to the fact that the general price level for that economy is high or low when exchange rates are used.

It may not signal any abnormality in that particular price.

For this reason, analysis of the XR-ratios facilitates the identification of problematic values among price ratios for an item at the beginning of the intereconomy validation when PPPs and PPP-ratios are likely to be unreliable because they are based on the average prices being validated. Initially, XR-ratios outside the range of 80–125 should be investigated during the first and second rounds of validation. In later rounds, when the PPP-ratios become more reliable, high (low) or even extreme values among the XR-ratios can be ignored. For this indicator, it is better to consult the Quaranta table because the series is clearly displayed. Box 15.7 addresses the issue of detected outliers.

#### Step F8

#### Check item tables for problematic PPP-ratios or CPD residuals.

PPP-ratios are standardized price ratios based on PPP-converted average prices. These ratios are the correct measure to use in comparing the average prices of a product across economies and the average prices of an economy across products, and they are the main validation indicator at the product level. It is thus the problematic values among these price ratios for an item that intereconomy validation seeks to identify and verify. CPD residuals in the

Dikhanov table are equal to the logarithms of the PPP-ratios in the Quaranta table.

High (low) PPP-ratios for the same product in different economies imply that the relative price of the item tends to vary considerably from economy to economy. Although plausible, this may signal that one or more of the prices of the items are incorrect. Ratios outside the range of 80–125 should be investigated, as should residuals smaller than  $-0.25$  or higher than  $0.25$ . Boxes 15.8 and 15.9 provide examples of the dialogue associated with edits based on high PPP-ratios.

#### Step F9

#### Check item tables for problematic price observation coefficients of variation.

The price observation CV measures variation in the price observations on which the average price reported for an item by an economy is based. It is taken directly from the average price table, and it is used to identify problematic values among average prices during intra-economy validation when average prices with a CV of over 39 percent are considered problematic. Should the CV remain over 39 percent after intra-economy validation, the NCA may need to re-edit the underlying price observations if there are problematic values among the item's PPP-ratios or if the item CV is over 39 percent. Box 15.10 gives an example of the dialogue associated with edits based on high price observation CVs.

### BOX 15.7

#### Outliers

The disturbance created by an outlier can affect not only the PPP for the economy reporting the outlier but also the PPPs for other countries in the regional comparison. In such cases, replacing the outlier with an imputed value or suppressing it is an option to be considered. If within the context of a basic heading the outlying average price refers to a product that is particularly

important for the reporting economy, deleting it may not be justified, but imputing a value may be. However, if the average price refers to a product that is less important or not important, removing it is probably warranted. Whatever action is taken, it has to be decided jointly by the economy's national coordinating agency and the regional coordinating agency on a case-by-case basis.



## BOX 15.8

### Example of Validation Dialogue for a Whiskey Product

*Regional coordinating agency:* This item is relatively very expensive because the XR-ratio is 207 and the PPP-ratio is 168. And you are the most expensive economy within the region, which is not normally the case. Please check that the correct products have been priced and that the quantity is correctly reported. Please also

note that within the previous quarter the average price for this item was in line with the other items within this basic heading.

*National coordinating agency:* Sorry, we priced 12-year-old whiskey, which is not according to the product specification. The prices are deleted.

## BOX 15.9

### Example of Validation Dialogue for Hairdressing Services

*Regional coordinating agency:* The PPP-ratio is high (160), and the average price for this dry haircut item is higher than for the next wet haircut item. Basically, this should not be possible. Please check. Also, if all services are offered typically

only with wash, you should price only the next item.

*National coordinating agency:* Only haircuts with wash are offered in our country. Prices are moved to the next item.

## BOX 15.10

### Example of Validation Dialogue for Loose Mushrooms

*Regional coordinating agency:* The coefficient of variation for loose mushrooms seems unusually high. In particular, price observations 5–10 should be checked again. Are you sure these prices are for the right product and quantity and that they were collected in representative outlets? In addition, observation 5 is marked as "sold loose." Are you sure your price collector weighed the product and gave the price for 500 grams?

Possible answers:

- The price collector may have priced a special offer by mistake. We have deleted the price.
- The price was collected from an unrepresentative small neighborhood shop. We have deleted the price.
- We have no explanation for the product. Our market specialists considered it exceptional: it has been deleted as an outlier.

## Validation at Aggregate Level



Dikhanov tables can be compiled for a group of basic headings constituting an aggregate. Validation at the aggregate level puts the editing and verification of average prices in a broader context. In other words, to ensure consistency between the average prices, an analysis within the basic heading as well as within a larger set of products is conducted.

Editing at the aggregate level enables inconsistencies to be identified that would not be found by editing solely at the basic heading level. The validation steps carried out at the BH level and introduced in the previous section should also be conducted at the aggregate levels. For example, if for the basic heading "alcoholic beverages" an economy priced all the beverages in quarts instead of liters as specified, its price ratios would be consistent within the basic heading, but they would not be consistent with the economy's price ratios

in other basic headings. Such errors are identified by editing across basic headings. In this respect, it is useful to compile Dikhanov tables at different levels of aggregation. For example, basic headings covering food items could be first checked in a Dikhanov table covering food and nonalcoholic beverages and subsequently in a Dikhanov table covering the entire household final consumption expenditure.

**Step G1** Calculate the Dikhanov tables.

This calculation should be carried out for different levels of aggregation.

**Step G2** Conduct steps F2 to F9.

See previous section. Box 15.11 is an example of validation at the aggregate level.

### BOX 15.11

#### Example of Validation at the Aggregate Level

Suppose that the PPP for a fruit aggregate for economy A is about 40 percent higher than the PPP for a vegetable aggregate, whereas for the other economies the two sets of PPPs are

of a similar order of magnitude. This result may reflect reality, or it may indicate a possible issue with the prices collected and recorded in economy A. That possibility must be verified.

## Temporal Analysis



Temporal validation at the regional level allows comparisons to be made using PLIs or PPPs, in addition to item-level average price comparisons. Comparisons of PLIs or PPPs are more robust over time because they are not comparing directly the average prices for certain items whose availability is not ensured

or whose item specifications may have changed between the two comparison points. Nevertheless, the basket of items as well as participating economies may have an impact on the results that is not related to the actual price level changes within individual economies.

In the temporal comparison, the source of potential errors may be difficult to determine. It can derive either from the previous or current data set or from the CPI indexes. In any case, the idea of a temporal comparison is to flag cases for further analysis.



As during the intra-economy validation, two types of temporal comparisons can be carried out: one between the ICP rounds or one between months or quarters within the ICP round.

In most cases, tables for these comparisons need to be created manually using the available

BH and aggregate PPPs or PLIs. For the comparison between ICP rounds, the CPI adjustment has to be applied, or, alternatively, the magnitude of the PPP price level change can be compared with that of the CPI price level change.



If differences in item average prices, PLIs, or PPPs are observed, they should be investigated. If errors are not found, a reasonable justification for the differences should be provided.

## Finalization of Data



Intereconomy validation is an iterative process. It can commence before all economies participating in the regional comparison have supplied their average prices. After each iteration or verification round, the RCA will change the region's price database in line with the findings reported by the NCAs of economies covered in the round, add to the database the prices of economies joining the validation process, and produce new Quaranta and Dikhanov tables. These tables will identify new problematic values as a result of the changes introduced by the RCA, and those values will have to be investigated by the NCAs. Gradually, after a number of rounds of verification in which the prices of all economies participating in the comparison have been included in the database, a convergence will occur, and the return on further rounds of

verification will be deemed marginal by the NCAs and the RCA and therefore not worth pursuing. Consequently, the intereconomy validation will be considered finalized.



In signing off on the validation process, the NCAs and the RCA formally attest that the price data were intereconomy validated.



After the price data are confirmed to be intereconomy validated, they are sent to the Global Office. The data and metadata have to be in the correct, prespecified format.

## Global Validation



After the data are validated at the economy and regional levels, the final validation stage is the global validation in which the NCAs,

RCA, and Global Office verify the prices for the GCL items, regional PPPs, and subsequent global PPPs. The objective is to ensure

that prices collected for the GCL items across the regions are comparable and that the linked global PPPs are plausible in wider terms.

The global validation stage includes three validation phases: (1) analysis of the regional validation tables, (2) validation of the GCL items, and (3) validation of the global PPPs.

## ***Analysis of Regional Validation Tables***



The global validation stage should start with analysis of the regional price data and respective validation tables in order to identify any problems at the regional level that could lead to comparison problems at the global level. The focus should be on the price variation at the economy, basic heading, and item levels, as well as on the classification of important items. As for the latter, the shares of important and

less important items should be analyzed, and the PPPs and PLIs calculated using different methods (CPD and CPD-W) should be compared in order to study the impact of the important items. Especially critical is ensuring that the classification of important items is comparable across regions in view of the fact that the CPD-W is the agreed-on BH PPP calculation method for the ICP 2011 round.

## ***Validation of Global Core List Items***



Central to the ICP 2011 round are the GCL items that are used to link the regional PPPs to form a global set of PPPs. It is essential that the price data for GCL items be validated thoroughly at the global level from both the "regional" and "global" perspectives.

### ***Regional Perspective***

An assessment is needed of how well the GCL items reflect the regional results as a whole. This assessment can be carried out by analyzing the regional validation tables but, most important, by comparing PLIs and PPPs based on (1) a full set of regional items, (2) only GCL items, or (3) regional items excluding GCL items. GCL items that are obvious outliers may be deleted in the global validation process if necessary after review and consultation with the RCAs and the economies concerned.

### ***Global Perspective***

To gain the global perspective, the price data for the GCL items should be validated across

regions by calculating PPPs and PLIs for all ICP economies. This step is a challenge because the large number of economies makes it difficult to apply the conventional Quaranta or Dikhanov table.

A top-down validation approach can be used by starting the validation at the class and BH levels and moving to more detailed levels if problematic cases are encountered. This approach consists of the following steps:

- Calculate PPPs and PLIs for all economies based on the GCL items.
- Compile BH and aggregate matrixes for PLIs and economy coefficients of variation.
- Flag PLI and CV matrixes for problematic cases.
- Analyze the flagged cases using country diagnostic reports and Quaranta tables.

Table 15.3 is an example of a PLI matrix, and table 15.4 is an example of a CV matrix. In the PLI matrix, potentially problematic cases are identified by searching for discrepancies

**Table 15.3** Example of Price Level Index Matrix, ICP 2011

	Economy 1	Economy 2	Economy 3
Group	94.3	88.9	119.4
Class 1	97.9	73.2	139.6
BH 1	145.4	84.4	81.5
BH 2	98.2	92.5	110.1
BH 3	111.9	46.3	192.9
BH 4	81.6	99.1	123.6
Class 2	86.2	135.3	85.8
BH 5	70.0	126.9	112.5
BH 6	112.8	116.8	75.9
BH 7	47.1	160.5	132.1
BH 8	67.1	218.5	68.2

Source: ICP, <http://icp.worldbank.org/>.  
Note: BH = basic heading.

(high or low values) between the economy's PLI for a class (e.g., bread and cereals) and the PLIs for the basic headings (e.g., rice) composing the class. Thus it is assumed that basic headings under a class would have similar price levels for an economy. The limits for identifying discrepancies can vary based on the validation round and the composition of the economy. Typically, a first validation round has wider highlight limits than subsequent rounds. Furthermore, if the group of economies being analyzed has very similar price levels, the limit can be tighter than in the case of economies with very different price levels. For example,

**Table 15.4** Example of Coefficient of Variation Matrix, ICP 2011

	Economy 1	Economy 2	Economy 3
Group	10.6	8.8	13.0
Class 1	10.8	9.1	12.8
BH 1	41.3	3.5	42.0
BH 2	20.0	21.1	27.0
BH 3	2.5	8.8	1.8
BH 4	6.5	10.7	13.1
Class 2	10.5	8.4	13.2
BH 5	20.6	7.3	19.6
BH 6	1.2	1.1	3.5
BH 7	41.0	15.0	40.1
BH 8	12.0	42.0	11.1

Source: ICP, <http://icp.worldbank.org/>.  
Note: BH = basic heading.

economy 1 in table 15.3 has a PLI of 145.4 for the first basic heading, which is considerably higher than the PLI value for the class (97.9), and thus it is highlighted in red for further analysis.

In the CV matrix, the cases requiring attention can be identified by searching for values higher than the pre-agreed limit, typically over 40. As noted earlier in the section on inter-economy validation, the average CV measures dispersion among all the PPP-ratios for a basic heading, or for a higher aggregate such as class. In table 15.4, five problematic cases require further analysis.

## Validation of Global PPPs



The global PPP validation phase comes after the price data for both purely regional and GCL

items have been validated. The steps to be carried out are described in chapter 22 of this volume.

## Annex

### Summary of Validation Stages, Phases, and Steps





**Step D1** Enter price and metadata into the validation software.

**Step D2** Calculate initial validation tables.

**Step D3** Check initial validation tables for extreme XR-ratios.



**Step E1** Check metadata for large deviations between requested and priced products.

**Step E2** Check metadata to ensure that survey frames are comparable across economies.



**Step F1** Calculate validation tables.

**Step F2** Check plausibility of BH price level indexes.

**Step F3** Check BH tables for high or problematic average coefficients of variation.

**Step F4** Check BH tables for high or problematic economy coefficients of variation.

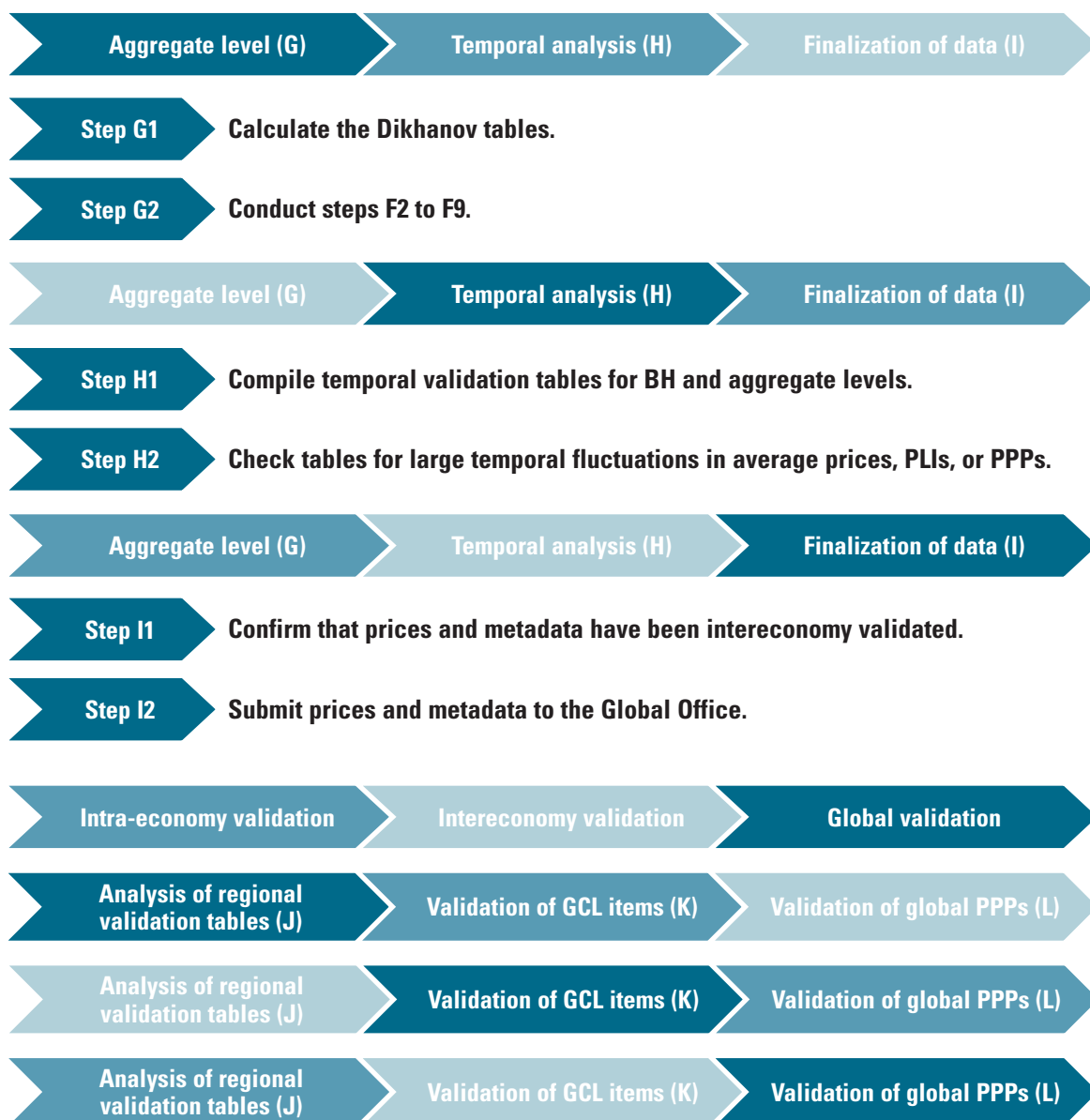
**Step F5** Check BH and item tables for important products.

**Step F6** Check item tables for high or problematic item coefficients of variation.

**Step F7** Check item tables for problematic XR-ratios.

**Step F8** Check item tables for problematic PPP-ratios or CPD residuals.

**Step F9** Check item tables for problematic price observation coefficients of variation.



## NOTES

1. This statement leaves open the question of whether intereconomy validation should commence with the Quaranta table or the Dikhanov table. Some analysts prefer to start with the Quaranta table and consult the Dikhanov table after several rounds of verification have been conducted and the

PPPs are more reliable. Others prefer to begin with the Dikhanov table, using it to identify economies and items that require investigation, and subsequently organize the investigation around the Quaranta table.

2. The weights in the Quaranta table are only presented; they are not used in the calculation of PPPs.



## Validation of Housing Data

The International Comparison Program (ICP) collects housing data through both its rental survey and its dwelling services questionnaire (as described in chapter 9).

For ICP 2011, the Global Office prepared a form on rental specifications for the rental survey (annex A), which ideally is conducted twice in the benchmark year to obtain annual average rents. The form breaks down dwelling types into 64 categories by applying eight criteria, including dwelling type, size, utilities, and age information (see chapter 9 for details).

All participating economies also were required to provide the dwelling services questionnaire (annex B). It was used to collect information for the volume method, which indirectly computes purchasing power parities (PPPs) by dividing the ratios of the volumes of dwelling services into their expenditure relatives. The questionnaire asks for number of dwelling units, rooms, and occupants, as well as information on utilities by dwelling type, construction type, and location. Table 16.1 is a summary of the types of data collected for the reference year.

If the user cost method is applied, the relevant information on housing expenditures is necessary, as specified in chapter 9.

Because dwelling services can be measured using two methods, the validation processes for the methods differ. The rental information is basically price data that share similar characteristics with other surveys, including household consumption, machinery and equipment, and compensation of government employees. As a result, the validation procedure largely follows the same steps, such as validation table analysis, that the other price data require. For the volume of dwelling data, the relevancy of the data had to be verified with simple arithmetic checks and by knowledge of the housing market and economic structure. Therefore, coordination among regions and the Global Office or World Bank is critical in securing data quality.

The general validation has three stages: intra-economy validation, intereconomy validation, and global validation.

**Table 16.1** Housing Data Collected for Reference Year, Rental Survey and Dwelling Services Questionnaire, ICP 2011

	Rental method	Volume method
Survey form	Rental survey	Dwelling services questionnaire
For	64 dwelling categories specified globally by <ul style="list-style-type: none"> <li>• Dwelling type (e.g., villa/single-family house)</li> <li>• Size</li> <li>• Electricity</li> <li>• Inside water</li> <li>• Private toilet</li> <li>• Air-conditioning or central heating</li> <li>• Structure age</li> </ul>	All dwellings broken down by <ul style="list-style-type: none"> <li>• Construction type (modern or traditional)</li> <li>• Location of dwelling (urban/rural)</li> </ul>
Data	<ul style="list-style-type: none"> <li>• Yearly rent (local currency unit)</li> <li>• Location (urban/rural)</li> <li>• Comments</li> </ul>	<ul style="list-style-type: none"> <li>• Number of dwelling units</li> <li>• Number of rooms</li> <li>• Usable surface area (1,000 m<sup>3</sup>)</li> <li>• Number of occupants</li> <li>• Land area occupied by dwellings (1,000 m<sup>3</sup>)</li> <li>• Number of dwelling units with electricity/inside water/private toilet/central heating/air-conditioning</li> <li>• Percentage of dwelling units (rented/owner-occupied)</li> </ul>

Source: ICP, <http://icp.worldbank.org/>.

### Intra-economy Validation



During the intra-economy validation stage, the national coordinating agencies (NCAs) validate both the rental survey and the dwelling

services questionnaire data to ensure the quality of data using the following steps.

### Initial Data Validation



**Step 1** Add housing rental data, volume data, and metadata to data collection form.

**Step 2** Check added rental data, volume data, and metadata for errors and discrepancies.

The rental prices, volume data, and metadata are checked for any errors or discrepancies. The NCAs first confirm whether prices are based on market rents. Subsidized rents such as those paid by employees living in dwellings owned by their employers or by tenants in low-rent public

housing are not market rents and should not be reported on the questionnaire. In addition to rents, the NCAs check whether the weights in the total rental stock by dwelling type are correctly reported.

**Step 3** Check that rental data are plausible *within the same dwelling type*.

The global specifications provide size, age, and other specifications such as the existence of an air-conditioning unit (see box 16.1). Within the same type of dwelling, it can be assumed in most

## BOX 16.1

### Example of Validation within the Same Dwelling Type, ICP 2011

Dwelling type	Size (m <sup>2</sup> )	Air-conditioning or central heating	Structure age	ABC Republic (ABC dollars)
Villa/single-family house	120–180	No	>5 years	5,040
Villa/single-family house	120–180	Yes	>5 years	5,800
Villa/single-family house	120–180	No	<5 years	6,800
Villa/single-family house	120–180	Yes	<5 years	7,860
Villa/single-family house	180–240	No	>5 years	6,400
Villa/single-family house	180–240	Yes	>5 years	7,120
Villa/single-family house	180–240	No	<5 years	7,640
Villa/single-family house	180–240	Yes	<5 years	7,720

In this case, the rental prices within the same size are plausible. However, when they are compared with a different size under the same dwelling type, the better option in size, 180–240 square meters, has a lower rental price than a smaller unit of 120–180, even though the other criteria in the

specifications are the same. Therefore the price should be flagged for further investigation because of the possibility of a price error or a product error. If there is an acceptable reason for the difference, such as location or quality of the building, the price should not be removed or edited.

cases that a smaller living unit is less expensive than a larger one, a unit in an older structure is less expensive than one in a newer structure, a unit without air-conditioning is less expensive than one with air-conditioning, and so forth. In other words, keeping other elements constant, when a better option (larger, newer, more equipped, etc.) has less expensive rentals, it should be flagged for further checking and vice versa. The need for a further check may not hold because of possible differences in the elements not described in the specifications (e.g., an older building can be located in a more valuable area). However, this check provides a list of rental prices that should be flagged for checking.

#### Step 4

**Check that rental data are geographically plausible.**

In most economies, urban areas have higher housing costs than rural areas because of higher demand. Therefore, when data for urban and rural areas are provided, the rental prices should

be compared and checked between urban and rural areas for the same dwelling type.

More broadly, the location information on urban or rural should be carefully examined at the intra-economy level and reported to the regional coordinating agencies (RCAs) in order to conduct intereconomy comparisons properly. When urban and rural data are available, they should be averaged to obtain national average rental prices. In doing so, weighted average is recommended, and the weights are supposed to be the number of dwellings in each location. If that information is not available, population could be used as approximate weights.

#### Step 5

**Check that volume data are plausible in comparison with other data sources.**

Comparisons with data from other official statistics such as a census survey are one of the first tests for the volume data (see box 16.2).

The basic arithmetic checks with other official statistics would include:

- Ratio of [total number of dwelling units] to [population]
- Ratio of [total number of dwelling units] to [number of households]
- Ratio of [total number of occupants] to [population].

Usually, the total number of dwelling units is lower than the population number; it is closer to the number of households. The total number of occupants should be close to the population number. If any unusual ratios are observed, they should be flagged for further investigation. However, there are exceptional cases for any of the tests depending on the economy's situation. Thus the NCA's or other expert's knowledge of the housing market should be fully utilized in the validation process. For example, in ICP 2011 exceptional cases were observed where the ratio of the total number of dwellings to population exceeded 1—for example, on some small islands with many resort houses.

## Step 6

**Check that volume data are plausible in relation to information within the questionnaire.**

The relevancy of the volume data also should be checked in relation to the other indicators in the dwelling service questionnaire. The basic tests include:

- Sum of the total correct within each category (all dwellings/type of construction/location of dwellings)
- Sum of the total the same across all three categories
- Ratio of [number of rooms] to [number of dwelling units]
- Ratio of [units with air-conditioning/central heating] to [number of dwelling units]
- Ratio of [units with private toilet] to [number of units with inside water].

The number of rooms per unit cannot be less than 1, and the number of units with a private toilet cannot be larger than that with inside water because a private toilet is generally available when inside water is available. These general

### BOX 16.2

#### Example of Validation of Volume Data with Population, ICP 2011

Number of dwellings/population	25%
Number of occupants/population	385%

In this example, even though the ratio of the number of dwellings to population is plausible, the number of occupants provided does not fall in the same range as population, and thus it should be flagged for further investigation because of the possibility of an error.

Number of dwellings/population	79%
Number of occupants/population	385%

However, coverage of other official statistics needs to be carefully examined as well. In this example, both the number of occupants and the number of dwellings are too high compared with the population. It is

thus possible that the source of the population data is based on a smaller area than the housing information.

Because of the difference in source data, the number of occupants and population cannot be exactly the same, although it should be within an acceptable range. Usually, the gap is within the range of  $\pm 10$  percent. The ratio of total number of dwelling units to population differs for each economy, but usually falls in the range of 15–40 percent.

When comparing data, the scale of the units used (such as thousands, millions, etc.) should be carefully checked to ensure they are comparable. In ICP 2011, some data were provided at the wrong scale, but this can be avoided with the checks just described.

rules work as a useful check to validate the relevancy of the provided data. The same applies to the tests with population data, although these do not necessarily hold if there is a plausible reason. For example, the ratio of units with central heating would be nil in tropical countries, but it would be very high in cold regions.

**Step 7** Check that rental, volume, and expenditure data are generally in line.

Theoretically, an economy's expenditure for basic heading 110411.1, actual and imputed rentals for housing, in the national accounts can be approximated using rental price data and volume information by type of construction. More specifically, the housing expenditure should match the total of the average rental prices for a villa/single-family house and attached house/row house multiplied by the housing volume for modern construction houses; a studio/one-bedroom/two-bedroom apartment multiplied by the housing volume for modern construction flats; and typical/traditional dwellings multiplied by the housing volume for traditional construction.

In reality, because of the differences in the systems of data collection used for expenditures versus rental and volume, as well as infeasibility issues,<sup>1</sup> the systems produce only rough sketches of the relationships. Thus those data would not yield any exact matches in numerical value. However, the calculation with simple arithmetic averages should still give rough approximations, and if the expenditure from the national accounts

data is too large or too small, something could be wrong with the data. If so, the NCA should check the breakdown figures to determine the source of the problem.

**Step 8** Check that data are temporally plausible by comparing them with those from the previous ICP round.

As mentioned earlier, the rental survey should be conducted twice in a benchmark year, and a temporal analysis between the data from the two surveys is highly recommended to check the plausibility of results. In doing so, attention should be paid to seasonality as well as inflation between the two survey periods because in some cases there is a tendency for higher yearly rents to be reported during the peak season. Yearly rents are reported for each survey, taken as an average from each survey to obtain the annual average rents.

If dwelling services data are available from previous rounds of the ICP, the NCAs are encouraged to carry out temporal analysis between ICP rounds to check the plausibility of the new information.

If possible, the volume data also should be compared with data from earlier rounds of the ICP. Temporal analysis helps the NCAs verify the validity of the gathered information. Data from the latest census and other surveys can be utilized for validation.

**Step 9** Analyze price data and metadata for flagged cases.

### Finalization of Data



### Intereconomy Validation



After receiving all data and metadata from the NCAs, the RCA conducts the regional-level

validation. Like validation of the household consumption survey, this level of validation is

a collective process involving the RCA and a group of economies. Rental data collected in economies in the region should be checked for their accuracy and comparability. Even though the RCA leads the process, the active involvement of the NCAs is essential because their

cooperation is required to investigate the data when the RCA finds any potential problems.

The RCAs carry out steps similar to those carried out during the intra-economy validation stage. This section focuses on the steps unique to the intereconomy validation process.

## Initial Data Validation



Once economies have submitted the national annual rents for each dwelling type applicable to the local situation, the RCAs ensure that the economies have followed the agreed-on global or regionally modified specifications.



After the completeness of the data and metadata has been verified, rents are then converted from the local currency units (LCUs) into a common currency.



Although this step is similar to the validation carried out at the economy level, it is important and beneficial that this step be carried out by the RCA, which is knowledgeable about the entire region.



Now that the data are based on the reference quantity and expressed in a common currency, the rental prices can be compared across economies (see box 16.3). Even when the data are plausible in the intra-economy validation, conducting basic checks across economies before

proceeding to statistical tests is beneficial. The RCAs need to employ their knowledge of the economic structure and situation of each economy in their region.

Volume data also have to be validated, taking into consideration the regional context. Each region would have some common housing features, and thus flagging the outliers in ratios checked for the intra-economy validation would be highly beneficial. For example, the ratio of the number of rooms to the number of dwelling units would be similar across a region because of the similarity in construction methods, or the ratio of units with air-conditioning or central heating to the number of dwelling units would be close in a region because of the similarity in climate. Therefore, it is crucial to compare those ratios across economies to find outliers to be flagged for checking.

The RCAs ensure that economies have provided the relevant information to the extent possible and that the data are comparable across economies. The evaluation of completeness of quality indicators is critical at this point because the ICP seeks to compute quality-adjusted volume measures for more accurate comparisons.

Once the RCAs confirm that the quality indicators are provided along with the volume measures, they calculate the quality-adjusted volume, as described in chapter 9. Quality-adjusted volume together with expenditure data will produce indirect PPPs across economies, which allow the RCAs to check the plausibility of the collected information.

## Validation Table Analysis



## BOX 16.3

### Example of Validation of Volume Data across Economies, ICP 2011

	Economy A	Economy B	Economy C	Economy D	Economy E
Number of dwellings/population	20%	9%	36%	28%	23%
Number of occupants/population	102%	87%	86%	105%	98%

In this example, the ratio of the number of dwellings to population for most of the economies in this region is 20–30 percent. However, economy B has a lower ratio, 9 percent, which is less than half that of other economies. Therefore, it should be flagged for further investigation because of the possibility

of a data error. It also should be checked with other data from the economy to identify any possible data issues. If there is an acceptable reason for the difference, such as culturally economy B has a larger family size than other economies in the same region, the data should not be removed or edited.

Just as in the household consumption survey validation process, analyses using tables such as the Quaranta and Dikhanov make it possible to conduct detailed comparisons. Analytical tables provide indexes for more objective validation such as the coefficient of variation and PPP-ratio. Thus the validation steps described in chapter 15 for the household consumption survey should be taken. Temporal analyses using data from the previous round of the ICP and indexes such as price level indexes and PPPs, if feasible, also help the RCAs examine the trend of the housing market and validate it against other rental market studies and knowledge.

Once validation at the intereconomy level is complete, it is recommended that, for validation purposes, regional PPPs be computed for the basic heading actual and imputed rentals for housing. By estimating regional PPPs, the RCAs can derive real housing volumes by dividing expenditures by PPPs. In doing so, it is possible to check whether the rental data provided and the estimated volume measures are plausible. After the RCAs have applied their geographical knowledge, any significant outlier should be confirmed with the NCAs.

### Finalization of Data



After confirmation that the rental data, volume data, and metadata have been intereconomy validated, the RCA should submit the data

to the Development Data Group at the World Bank for the global-level validation process across regions.

### Global Validation



Validation at the global level is the same as the regional validation but on a larger scale. Similar to the process for the validation of household consumption survey data, the active involvement of the NCAs and RCAs is

crucial to this final validation stage. The Development Data Group carries out validation in the same manner as the RCAs to ensure consistency as well as comparability across regions and economies.

**Annex A**  
**Rental Survey Questionnaire, ICP 2011**

Economy name		Global specifications				
Dwelling code	Dwelling type	Size (m <sup>2</sup> )	Approximate size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity
1104111.011	Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes
1104111.021	Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes
1104111.031	Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes
1104111.041	Villa/single-family house	120–180	1,300–1,950	150	1,600	Yes
1104111.051	Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes
1104111.061	Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes
1104111.071	Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes
1104111.081	Villa/single-family house	180–240	1,950–2,600	210	2,300	Yes
1104111.091	Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes
1104111.101	Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes
1104111.111	Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes
1104111.121	Villa/single-family house	240–360	2,600–3,900	300	3,300	Yes
1104111.131	Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes
1104111.141	Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes
1104111.151	Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes
1104111.161	Villa/single-family house	360–460	3,900–5,000	400	4,300	Yes
1104111.171	Attached house/row house	80–120	850–1,300	100	1,000	Yes
1104111.181	Attached house/row house	80–120	850–1,300	100	1,000	Yes
1104111.191	Attached house/row house	80–120	850–1,300	100	1,000	Yes
1104111.201	Attached house/row house	80–120	850–1,300	100	1,000	Yes
1104111.211	Attached house/row house	120–180	1,300–1,950	150	1,600	Yes
1104111.221	Attached house/row house	120–180	1,300–1,950	150	1,600	Yes
1104111.231	Attached house/row house	120–180	1,300–1,950	150	1,600	Yes
1104111.241	Attached house/row house	120–180	1,300–1,950	150	1,600	Yes
1104111.251	Attached house/row house	180–240	1,950–2,600	210	2,200	Yes
1104111.261	Attached house/row house	180–240	1,950–2,600	210	2,200	Yes
1104111.271	Attached house/row house	180–240	1,950–2,600	210	2,200	Yes
1104111.281	Attached house/row house	180–240	1,950–2,600	210	2,200	Yes
1104111.291	Studio apartment	15–35	160–380	25	270	Yes
1104111.301	Studio apartment	15–35	160–380	25	270	Yes
1104111.311	Studio apartment	15–35	160–380	25	270	Yes
1104111.321	Studio apartment	15–35	160–380	25	270	Yes
1104111.331	Studio apartment	35–60	380–650	45	480	Yes
1104111.341	Studio apartment	35–60	380–650	45	480	Yes
1104111.351	Studio apartment	35–60	380–650	45	480	Yes
1104111.361	Studio apartment	35–60	380–650	45	480	Yes



					Observations		
Inside water	Private toilet	Private kitchen	Air-conditioning or central heating	Structure age	Yearly rent (LCU)	Location (urban/rural)	Comments
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	< 5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			

table continues next page

Annex A (Continued)

Economy name		Global specifications				
Dwelling code	Dwelling type	Size (m <sup>2</sup> )	Approximate size (sq. ft.)	Reference size (m <sup>2</sup> )	Approx. reference size (sq. ft.)	Electricity
1104111.371	One-bedroom apartment	40–60	430–650	50	540	Yes
1104111.381	One-bedroom apartment	40–60	430–650	50	540	Yes
1104111.391	One-bedroom apartment	40–60	430–650	50	540	Yes
1104111.401	One-bedroom apartment	40–60	430–650	50	540	Yes
1104111.411	One-bedroom apartment	60–80	650–850	70	750	Yes
1104111.421	One-bedroom apartment	60–80	650–850	70	750	Yes
1104111.431	One-bedroom apartment	60–80	650–850	70	750	Yes
1104111.441	One-bedroom apartment	60–80	650–850	70	750	Yes
1104111.451	Two-bedroom apartment	60–80	540–850	70	750	Yes
1104111.461	Two-bedroom apartment	60–80	540–850	70	750	Yes
1104111.471	Two-bedroom apartment	60–80	540–850	70	750	Yes
1104111.481	Two-bedroom apartment	60–80	540–850	70	750	Yes
1104111.491	Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes
1104111.501	Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes
1104111.511	Two-bedroom apartment	80–120	850–1,300	100	1,000	Yes
1104111.521	Two-bedroom apartment	80–120	850–1,300	100	1000	Yes
1104111.531	Typical/traditional dwelling	25–75	270–800	50	540	Yes
1104111.541	Typical/traditional dwelling	25–75	270–800	50	540	Yes
1104111.551	Typical/traditional dwelling	25–75	270–800	50	540	Yes
1104111.561	Typical/traditional dwelling	25–75	270–800	50	540	Yes
1104111.571	Typical/traditional dwelling	25–75	270–800	50	540	No
1104111.581	Typical/traditional dwelling	25–75	270–800	50	540	No
1104111.591	Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes
1104111.601	Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes
1104111.611	Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes
1104111.621	Typical/traditional dwelling	80–120	850–1,300	100	1,000	Yes
1104111.631	Typical/traditional dwelling	80–120	850–1,300	100	1,000	No
1104111.641	Typical/traditional dwelling	80–120	850–1,300	100	1,000	No

Source: ICP, <http://icp.worldbank.org/>.

					Observations		
Inside water	Private toilet	Private kitchen	Air-conditioning or central heating	Structure age	Yearly rent (LCU)	Location (urban/rural)	Comments
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	Yes	<5 years			
Yes	Yes	Yes	Yes	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	No	No	No	<5 years			
Yes	No	No	No	>5 years			
No	No	No	No	<5 years			
No	No	No	No	>5 years			
Yes	Yes	Yes	No	<5 years			
Yes	Yes	Yes	No	>5 years			
Yes	No	No	No	<5 years			
Yes	No	No	No	>5 years			
No	No	No	No	<5 years			
No	No	No	No	>5 years			

**Annex B**  
**Dwelling Services Questionnaire, ICP 2011**

**FORM A. ICP DWELLING SERVICES QUESTIONNAIRE: VOLUME OF HOUSING IN 2011**

Country: .....

Year (If data are not available for 2011): .....

	All dwellings			Type of construction				Location of dwellings			
	Houses	Flats	Total	Modern Construction		Traditional Construction	Total	Urban areas		Rural	Total
				Houses	Flats			Large urban	Small urban		
Number of dwellings units ('000s)											
Number of rooms ('000s)											
Usable surface area in thousand square meters (Specify other unit ____)											
Number of occupants ('000s)											
Land area occupied by dwellings in thousand square meters (Specify other unit ____)											
<b>Number of dwellings units with :</b>											
Electricity ('000s)											
Inside water ('000s)											
Private toilet ('000s)											
Central heating											
Air-conditioning											
<b>Percent of dwellings units:</b>											
Rented											
Owner occupied											

Source: ICP, <http://icp.worldbank.org/>.

**NOTE**

1. Because of the infeasibility of implementation, the NCAs are not asked to determine the volume of each type of dwelling. Thus the precise average rental prices for each type are not available.

# Validation of Government Employee Compensation Data

As explained in chapter 10 on the approach and data requirements for government, three sets of data are required for the survey on compensation of government employees: (1) remuneration data for government employees; (2) government expenditure data—a necessary source to obtain weights; and (3) pay and employment structure indicators, which provide useful information for validation purposes (see table 17.1). Purchasing power parities (PPPs) for compensation of

government employees are calculated using these data sets.

## OCCUPATION TYPES

Thirty-seven occupations are listed in the 2011 International Comparison Program (ICP) government compensation survey. For each occupation, the survey records remuneration for four levels of experience: 0 years (starting salary), 5 years, 10 years, and 20 years. Therefore,

**Table 17.1** Data Collected, Compensation of Government Employees, ICP 2011

	Compensation of government employees	Government expenditure	Pay and employment structure indicators
From	Official government pay scales	Final government accounts	Relevant official statistics
For	37 typical occupations (4 levels of experience each)	3 categories of government (general = central + subnational)	General indicators
Data	Data collection form: <ul style="list-style-type: none"> <li>• Basic pay</li> <li>• Cash allowances</li> <li>• Income in kind</li> <li>• Employer's social security contributions</li> <li>• Information on hours worked</li> </ul>	Questionnaire: <ul style="list-style-type: none"> <li>• Wages and salaries in cash</li> <li>• Employer's contribution to social security fund</li> <li>• Benefits in kind</li> <li>• Information related to fixed capital formation</li> </ul>	Aggregated indicators: <ul style="list-style-type: none"> <li>• General indicators such as gross domestic product (GDP) and population</li> <li>• Government recurrent expenditure indicators</li> <li>• Wage bill indicators</li> <li>• Employment indicators</li> </ul>
Note	Covers three basic headings: health, education, and collective services.	Reports separately for health, education, and collective services.	Additional ratios are computed automatically (ICP Kit).

Source: ICP, <http://icp.worldbank.org/>.

the total number of items on the list for this survey is 148 ( $37 \times 4$ ).

Some of the 37 occupations, such as building caretaker and office cleaner, are used to calculate PPPs for three basic headings (BHs): health, education, and collective services. Others, such as hospital doctor, university teacher, or database administrator, are used only for one of the three basic headings. In summary, 23 occupations are used to calculate the BH PPPs for government collective services, 10 are used for government health services, and 9 are used for government education services.

## AVERAGE REMUNERATION

In most economies, governments have official national pay scales. For these economies, the number of observations per occupation is one. If an economy does not have a unified national pay scale and subnational governments have different pay scales, multiple observations are collected. In this case, the average remuneration for each occupation is the weighted average of the subnational pay scales (weighted by the number of employees at the subnational level).

### Validation Process



Like the validation of household consumption survey data, the validation of data from the survey on compensation of government employees has three stages: intra-economy validation, intereconomy validation, and global validation.

After the compilation of annual data in an economy, intra-economy validation is implemented by the national coordinating agency (NCA). This stage involves initial data validation and the finalization of data. Unlike data validation for the household consumption survey, there are no statistical tests at this stage because, as noted earlier, the number of observations is relatively small.

The NCAs submit their data to their regional coordinating agency (RCA) after data

validation at the national level. At the regional level, intereconomy validation is conducted by the RCA and NCAs. At this stage, initial data validation, validation table analysis, temporal analysis, and finalization of data are implemented.

After the data have been transmitted from the RCAs to the Global Office, the Global Office conducts the global-level validation in cooperation with the NCAs and RCAs.

The following sections explain the validation steps unique to this survey. Steps that are similar to those for household consumption validation are shown with just an arrow. For a detailed explanation of that validation, see chapter 15 on household consumption.

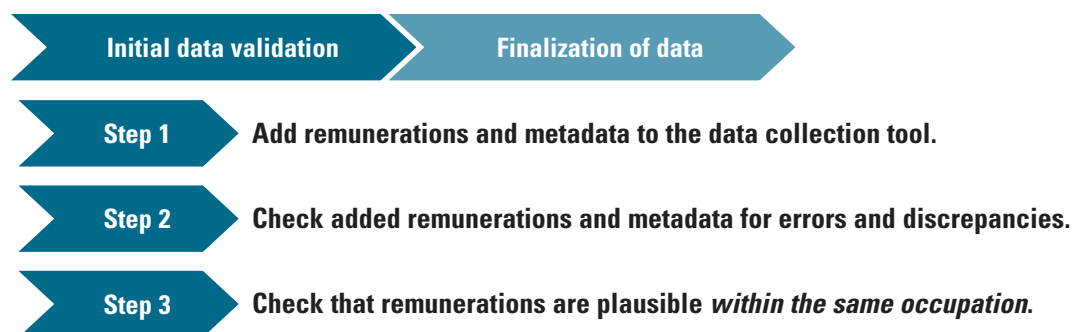
### Intra-economy Validation



After data collection ends, economy-level data validation is conducted by the NCAs. As noted, because of the lower number of observations for each item, this level of validation for the

compensation of government employees survey does not involve statistical tests. However, some validation steps are unique to this survey, and they are explained in this section.

## Initial Data Validation



### *Within the Same Level of Experience*

It is recommended that the process described earlier, averaging remuneration, be followed to obtain remuneration data. In most cases, only one observation will be recorded after the process. However, when each subnational government has different salary scales, remunerations of the same occupation with the same level of experience should be compared before obtaining the weighted average for each occupation. Even if subnational governments have different pay scales, remuneration for the same occupation within the same level of experience cannot differ so much (see box 17.1).

When multiple observations appear under an item, they should be averaged after all the observations are verified. In doing so, those

doing the validation should obtain data for the number of employees from which the remuneration data are quoted and take a weighted average, as mentioned earlier. All these processes and the data used in the processes should be noted and reported to the RCA when the data are submitted to that agency.

### *Between Different Levels of Experience*

In a normal economic environment, one's remuneration increases as one gains work experience in the same field—or at least it does not decrease. By comparing remunerations within the same occupation and between different levels of experience, those conducting validation can check the plausibility of this economic aspect of the observations (see box 17.2).

#### BOX 17.1

### Example of Validation within Same Occupation and within Same Level of Experience

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal A	Database administrator	5 years	35,256
Observation 2	Municipal B	Database administrator	5 years	74,662

In this case, the remuneration in municipal location B is more than double that in municipal location A for the same occupation with the same level of experience. Thus the data show an extreme difference and

should be flagged for further investigation because of the possibility of a price error or a product error. If there is an acceptable economic reason for the differential, the price should not be removed or edited.

**BOX 17.2****Example of Validation within Same Government Employee Occupation and between Different Levels of Experience**

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal C	Hospital doctor	0 years	50,653
Observation 2	Municipal C	Hospital doctor	5 years	45,367

In a private hospital, it is possible that a doctor earns more than a colleague with more experience because in some economies the salary they receive is based solely on the competence or popularity of each doctor. However, most governments have a

pay scale, and so it would be unusual for a doctor with five years of experience to earn less than a doctor who just recently began work. Thus observations like those shown here would have to be flagged for further investigation.

**BOX 17.3****Example of Validation between Related Government Employee Occupations**

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal C	Hospital doctor	5 years	62,556
Observation 2	Municipal C	Hospital nurse	5 years	75,698

As noted, generally a hospital doctor earns more than a hospital nurse. The observations shown here from government pay

scales could be subject to either a price error or a product error. Therefore, these observations should be flagged and rechecked.

**Step 4****Check that remunerations are plausible between related occupations.**

Of the 37 occupations, several occupations are related in terms of skill, knowledge, proficiency, or position that would result in a difference in their remunerations (see box 17.3). Usually, to become a hospital doctor one needs an advanced degree and greater proficiency than that required to be a hospital nurse. Therefore, in most cases a hospital doctor earns a larger salary than a nurse. Also, some occupations are better- or worse-paid

than other occupations, even if there is no direct relationship between the occupations. An example is a judge whose remuneration is expected to be higher than that of a personnel professional or a payroll clerk.

This analysis of related occupations must be *limited to the same level of experience*. Level of skill, knowledge, or proficiency strongly affects remuneration. However, level of experience also determines remuneration (see box 17.4). These two factors are totally independent and should not be mixed in this step of validation.



## BOX 17.4

### Example of Erroneous Validation between Related Government Employee Occupations

	Location	Occupation	Level of experience	Remuneration (local currency units)
Observation 1	Municipal C	Hospital doctor	0 years	62,556
Observation 2	Municipal C	Hospital nurse	20 years	75,698

Even though doctors have more education and proficiency than nurses, level of experience has an independent influence on remuneration. Thus comparing the salary of a

very experienced nurse with that of a new doctor would be very misleading. Mixing independent factors in an analysis should be avoided.

**Table 17.2** Example of Comparable Government Employee Occupations between ICP 2011 and ICP 2005 Lists

ICP 2011		ICP 2005	
Code	Occupation	Code	Occupation
31	Firefighter	215	Firefighter
32	Policeman/policewoman	213	Policeman/policewoman
33	Prison guard	214	Prison guard
34	Driver (general-duty)	221	Chauffeur
35	Office cleaner	212	Cleaner

Source: ICP, <http://icp.worldbank.org/>.

#### Step 5

**Check that remunerations are temporally plausible by comparing them with data from a previous ICP round.**

The occupation list for the survey on the compensation of government employees was updated from the list used in the ICP 2005 round (see annex). The 2005 list had 44 occupations, and level of experience was not necessarily specified for all the occupations. In ICP 2011, there were 37 occupations. Even though some items were updated from the 2005 list, most of the occupations in the 2005 list continued to be in the 2011 list. In some cases, however, the name of the item was changed (see table 17.2).

If price deflator data between 2005 and 2011 for the three basic headings are available, it is recommended that the 2005 remuneration data be adjusted to the 2011 value, making it easier to conduct the temporal analysis. However, even

if the relevant price deflator data needed to adjust the 2005 values to 2011 values are not available, the pattern of government pay scales can be checked. In this case, the general economic situation of the economy regarding the change in price level should be taken into consideration. If the economy is experiencing inflation, remunerations would also increase to reflect the inflation to some degree, and vice versa.

#### Step 6

**Compare remuneration data and expenditure data by using structure indicators—that is, compare the relationship between (remuneration × number of employees) and (expenditure).**

Information on pay and employment structure indicators provides important clues for verifying the plausibility of remuneration data.

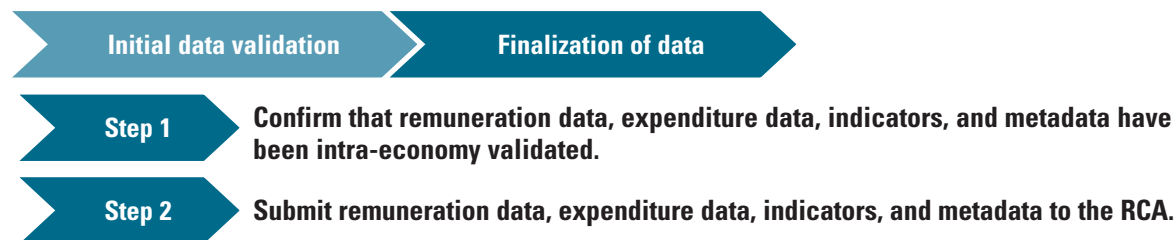
One of the ways to use the data is to check the relevancy in the relationship among remuneration, employment, and expenditure. Theoretically, for an occupation the government expenditure should match the amount of the remuneration multiplied by the number of employees with the occupation. Because of the infeasibility of implementation, the NCAs are not asked to determine the population of each occupation for each level. However, the questionnaire for indicators asks key questions such as number of government employees in education, health, and other collective services, and their aggregates. Starting from an aggregated level such as expenditure, average remuneration, and number of employees in the total public sector, the NCAs can verify to some degree whether the relationship between remuneration and expenditure makes sense. If the expenditure is too large or too small compared with the remuneration multiplied by the number of employees in each field, something

could be wrong with the data. If so, the NCA should check the breakdown figures to determine the source of the problem. However, those data would not yield any exact matches in numerical value. Because of the differences in the systems of data collection used on the expenditure side and on the remuneration side, and also because of infeasibility issues, the systems produce only rough sketches of the relationship.

Government expenditure data should be validated in line with the validation of national accounts data. This step also plays a role in validation of the expenditure data and pay and employment structure indicators data. If the NCAs find problems in the process, not only remuneration but also the expenditure and general indicators should be further investigated for verification.

**Step 7** Analyze price data and metadata for flagged cases.

### ***Finalization of Data***



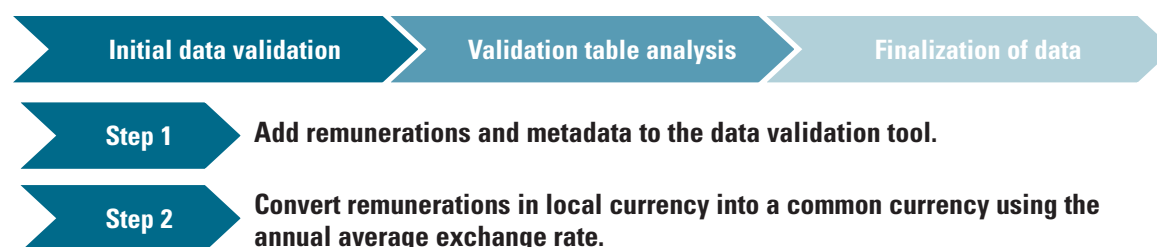
### ***Intereconomy Validation***



After receiving all data and metadata from the NCAs, the RCA conducts the regional-level validation. Like the validation for the household consumption survey, this level of validation is a collective process involving the RCA and a group of economies. Remuneration data collected in economies in the region

should be checked for their accuracy and comparability between economies. Even though the RCA leads the process, the active involvement of the NCAs is essential because their cooperation is required to investigate the data when the RCA finds any potential problems.

## Initial Data Validation



Intereconomy validation helps to check whether there are extreme values among the average remunerations as well as discrepancies in the reported metadata for each item within a basic heading. Therefore, the average remunerations must be converted to the same base to make them comparable. First, then, the remunerations expressed in a local currency unit should be converted and expressed in a common currency unit using the annual average exchange rate.

**Step 3** **Rebase data from all economies to the reference number of hours worked.**

Next, convert the remunerations into those based on the same number of hours worked across economies in the region. If they are

based on different reference numbers of hours worked, they are not comparable (see box 17.5).

In many economies, it is accepted practice that government employees work fewer than the regular (official) number of hours per week. Therefore, economies are asked to report the best estimate of the number of hours actually worked per week by employees for each occupation. For the conversion, in ICP 2011 the Global Office recommended converting remunerations into ones based on the actual number of hours worked, if the information was available.

After being converted by reference hours and exchange rate, the average prices provided by each NCA are checked against the average prices provided by the other NCAs in the region.

### BOX 17.5

#### Example of Rebasing to Reference Number of Hours Worked

Economy	Remuneration (in a common currency)	Regular hours worked per week	Actual hours worked per week
Neverland	60,000	32	25
Timberland	70,000	40	60

Economy	Remuneration (in a common currency)	Rebased on regular hours (40 hours)	Rebased on actual hours (40 hours)
Neverland	60,000 (a)	$[(a)/32] \times 40 = 75,000$	$[(a)/25] \times 40 = 96,000$
Timberland	70,000 (b)	$[(b)/40] \times 40 = 70,000$	$[(b)/60] \times 40 = 46,667$

Before being rebased, data from the two economies shown were not comparable. If one looks just at the remunerations, Timberland has the higher amount. However, it is obvious that the salary in Timberland is not so high if the number of hours worked per week is taken

into consideration. The remunerations must then be rebased so they represent the same number of hours worked per week.

After the conversion, it becomes clear that Neverland has the higher salary for the reference number of hours.

Remunerations from economies should be incorporated in a data validation tool that will allow the RCA to easily compare prices across economies.

**Step 4** Check that remunerations are plausible within an economy.

First, validate the plausibility of the remuneration data vertically (as in table 17.3; here *vertically* means within each economy).

Although what should be done in this step is almost the same as the validation carried out at the economy level (see steps 3 and 4 in the intra-economy validation section of this chapter), it is important and beneficial that this step

be carried out by the RCA, which is knowledgeable about the entire region.

**Step 5** Check that remunerations are plausible across economies.

Next, validate the plausibility of remunerations data horizontally (as in table 17.3; here *horizontally* means across economies).

Now that the data are based on the reference quantity and expressed in a common currency, the remunerations can be compared across the economies. The RCAs must employ their knowledge of the economic structure and situation of each economy in their region (see boxes 17.6 and 17.7).

**Step 6** Check that remunerations are temporally plausible by comparing them with those from the previous ICP round.

**Step 7** Analyze price data and metadata for flagged cases.

**Table 17.3** Example of Table for Validation at Regional Level of Remuneration of Government Employees, ICP 2011  
*common currency units*

Code	Occupation	Economy A	Economy B	Economy C	Economy D	Economy E
9	University teacher	9,086	16,182	17,109	28,697	35,387
11	Primary school teacher	1,214	4,652	5,108	9,920	25,562
12	Secondary school teacher	1,959	5,259	4,221	14,313	26,960
15	Database administrator	1,400	17,396	3,799	4,744	23,362
29	Building caretaker	965	5,947	1,931	2,542	8,605
31	Firefighter	560	7,569	18,199	4,660	13,719
32	Policeman/policewoman	1,380	8,235	3,257	5,422	12,501
33	Prison guard	836	2,457	3,820	5,422	13,918
34	Driver (general-duty)	999	4,308	2,531	3,558	8,024
35	Office cleaner	965	3,499	1,858	3,558	8,595

Source: ICP, <http://icp.worldbank.org/>.

**BOX 17.6****Example of Table for Validation at Regional Level of Remuneration of Government Employees, ICP 2011***common currency units*

		Economy A	Economy B	Economy C	Economy D	Economy E
9	University teacher	9,086	16,182	17,109	28,697	35,387
11	Primary school teacher	1,214	4,652	5,108	9,920	25,562
12	Secondary school teacher	1,959	5,259	4,221	14,313	26,960
15	Database administrator	1,400	17,396	3,799	4,744	23,362
29	Building caretaker	965	5,947	1,931	2,542	8,605
31	Firefighter	<b>560</b>	7,569	<b>18,199</b>	4,660	13,719
32	Policeman/policewoman	1,380	8,235	3,257	5,422	12,501
33	Prison guard	836	2,457	3,820	5,422	13,918
34	Driver (general-duty)	999	4,308	2,531	3,558	8,024
35	Office cleaner	965	3,499	1,858	3,558	8,595

This table reveals a big discrepancy in the remuneration of firefighters in economies A and C (see shading). This discrepancy could be a problem, or not a problem at all. Because the payment structures and price levels of economies differ, the knowledge of the RCA would be important in identifying potential problems. In this case, even though the remunerations for other

occupations in economy A are much lower than those of economy C, the gap for firefighter is still too large. These values would thus be flagged for further investigation. Although the validation table analyses in step 7 will provide more objective criteria for finding potential errors, it is useful for the RCAs to uncover any potential problems at this initial stage.

**Validation Table Analysis**

As in the household consumption survey validation process, analyses using tables such as the Quaranta and Dikhanov make it possible to conduct detailed comparisons. Analytical tables provide indexes for more objective validation such as the coefficient of variation and PPP-ratio.

One should follow the validation steps in the household consumption survey for the actual steps to be taken. Also, temporal analyses with ICP 2005 data using indexes such as price level indexes and PPPs make the series of analyses more robust.

## BOX 17.7

### Application of Information from Pay and Employment Structure Indicators

The following indicators are automatically calculated in the pay and employment structure indicators if the relevant information is entered. These indicators give insights into

the employment, payment, and economic structure of each economy and reinforce the knowledge of the RCAs, which is needed when comparing data across economies.

#### 1 Wage bill indicators

Government wage bill per gross domestic product (GDP)  
for general/central/subnational government

#### 2 Compression ratios (ratio of average total remuneration)

For health, education, and collective services, respectively:

Managerial-professional ratio

Managerial-clerical ratio

#### 3 Public sector remuneration per GDP per capita

For health, education, and collective services, respectively:

Managerial

Professional

Clerical

#### 4 Employment indicators

Employment per capita

Employment per labor force

### Finalization of Data

Initial data validation

Validation table analysis

Finalization of data

After confirmation that the remuneration data, expenditure data, indicators, and metadata have been intereconomy validated, the RCA

should submit the data to the Global Office for the global-level validation process across regions.

### Global Validation

Intra-economy validation

Intereconomy validation

Global validation

The Global Office conducts the global-level validation across regions. Similar to the process for the validation of household consumption survey data, the active involvement of the NCAs and RCAs is

crucial to this final validation stage. The objective is to ensure that the remunerations collected across the regions are comparable and that the linked global PPPs are plausible in wider terms.

## Annex

### Comparison of ICP 2011 Items with ICP 2005 Items

ICP 2011				ICP 2005	
	Occupation	ISCO 08	ISCO 88	Code	Occupation
1	Senior government official	1112	1120		(Not in 2005 list)
2	Hospital manager	1120	1210	110	Hospital chief executive
3	Data processing manager	1330	1226		(Not in 2005 list)
4	Secondary school principal	1345	1229	305	Head teacher
5	Government statistician	2120	2121/2122		(Not in 2005 list)
6	Hospital doctor	2211	2221/1229	101	Doctor, head of department*
			2221/1229	102	Doctor (20 years of seniority)*
			2221/1229	103	Doctor (10 years of seniority)*
7	Specialist doctor	2212	2212		(Not in 2005 list)
8	Hospital nurse	2221	2230/3231/3232	104	Nurse, head of department*
			2230/3231/3232	105	Nurse, operating theater*
			2230/3231/3232	106	Nurse
9	University teacher	2310	2310	304	University lecturer
10	Vocational education teacher	2320	2310/2320		(Not in 2005 list)
11	Primary school teacher	2341	2331/3310	302	Primary teacher
12	Secondary school teacher	2330	2320	303	Secondary teacher
13	Government accountant	2411	2411		(Not in 2005 list)
14	Human resources professional	2423	2412		(Not in 2005 list)
15	Database administrator	2521	2131	224	Database administrator
16	Judge	2612	2422		(Not in 2005 list)
17	Government economist	2631	2441		(Not in 2005 list)
18	Laboratory assistant	3212	3211	109	Laboratory assistant
19	Auxiliary nurse	3221	2230	107	Nursing auxiliary
20	Medical records clerk	3252	4143		(Not in 2005 list)
21	Office supervisor	3341	3431/3439/3442/3443/ 3449	202	Executive official (skill level III)*
			3431/3439/ 3442/3443/3449	203	Executive official (skill level IV)*
22	Medical secretary (hospital)	3344	4115/4111/4112	111	Secretary (hospital)
23	Customs inspector	3351	3441		(Not in 2005 list)
24	Computer operator	3511	3122	204	Computer operator
25	Secretary (not medical)	4120	4115/4111/4112	207	Secretary (not hospital)
26	Accounting and bookkeeping clerks	4311	4121	205	Bookkeeping clerk
27	Payroll clerk	4313	4121		(Not in 2005 list)
28	Cook	5120	5122	112	Cook (not head cook)
29	Building caretaker	5153	9141	211	Building caretaker
30	Teacher's aide	5312	5131		(Not in 2005 list)
31	Firefighter	5411	5161	215	Firefighter
32	Policeman/policewoman	5412	5162	213	Policeman/policewoman
33	Prison guard	5413	5163	214	Prison guard
34	Driver (general-duty)	8322	8322	221	Chauffeur

*table continues next page*

**Annex (Continued)**

ICP 2011		ISCO 08		ISCO 88		ICP 2005	
	Occupation					Code	Occupation
35	Office cleaner	9112	9132			212	Cleaner
36	Kitchen helper	9412	9132				(Not in 2005 list)
37	Messenger	9621	9151			209	Messenger

Source: ICP, <http://icp.worldbank.org/>.

Note: ISCO = International Standard Classification of Occupations. An asterisk (\*) indicates that level of experience should be considered when comparing the 2005 item with a 2011 item.



# Validation of Machinery and Equipment Goods Data

The survey guidelines for data collection on machinery and equipment goods were released by the Global Office of the International Comparison Program (ICP) in April 2011. The guidelines were updated and the list of items was finalized using the results of pilot surveys. Another important contribution to this survey was the workshop on data validation for non-household sectors held for Asia-Pacific economies in Bangkok, September 22–24, 2011. It was attended by 47 construction and machinery and equipment experts.

Survey data for this category are mainly validated at the national, regional, and global levels, using an approach similar to that adopted for household consumption items after ensuring that prices have been collected for comparable items and the required quantities.

In this validation process, each term and condition for price collection are assessed. Machinery and equipment goods experts verify that prices were collected for the suggested order quantity and that prices, fees, costs, and discounts were reported for one unit, as indicated in the survey guidelines.

This chapter sets the framework for data collection, entry, and validation. It focuses on the two main procedures of data validation for machinery and equipment goods: validation of product specifications and validation of terms and conditions. The chapter refers to the

existing guidelines for intra-economy and intereconomy data validation at the regional and global levels.

## VALIDATION OF MACHINERY AND EQUIPMENT GOODS SPECIFICATIONS

Any person planning to buy a durable good looks for the item that best fits his or her needs. The biggest challenge is deciding on the right one. To a certain extent, firms and established organizations do the same thing. In practice, an enterprise will have a contract with a provider or past experience with a set of providers from which it will choose the good it wishes to purchase. One would expect, then, that the range of goods from which to pick would be narrower than those available to individuals. However, the probability of having multiple providers of machinery and equipment goods is high. How then can the ICP ensure that the prices collected in the context of the ICP 2011 machinery and equipment goods survey are comparable?

Generally, three steps should be taken when comparing or validating the prices of machinery and equipment goods:

1. Ensure that the items involved are comparable by comparing the specifications of the items priced.

2. Once the comparability of the items is assured, compare the terms and conditions of trade.
3. Compare the observed prices at two levels: the base price and the total unit price. During this last process, the relative value of delivery costs, the nature and amplitude of the tax paid, and the level of rebate or discount negotiated are assessed and compared.

### **Validating Comparability of Brands of Machinery and Equipment Goods**

A credible hypothesis is that firms look around for the best deal before making a decision to invest in a specific machinery and equipment good. Those comparing machinery and equipment goods look at two important features: the brand name and model. Some brands are known to be more durable and cope well with intensive commercial usage. Although there is no unique or specific chart of comparable brands, well-known brands are believed to last longer and offer more after-sale support and longer warranties.

For those comparing investment goods, then, brands are important. The next step is to compare the models, specifications, and features of the products within each brand (or comparable brands) before comparing the prices.

### **Comparing the Proposed and Observed Models**

Models define machinery and equipment goods according to their purpose and functionality. Comparable models within a given brand or among brands serve the same purpose and have the same functionality—that is, they are perfect or very close substitutes. In most cases, comparable models have comparable specifications and features. Therefore, if for two goods the models are (or one of them is) unknown to the experts validating machinery and equipment goods prices, comparing specifications will lead to a comparison of the observed models.

### **Validating Item Specifications Individually and Collectively**

Mathematically, it sounds reasonable to compare specifications before determining the comparability of models or brands. But for the machinery

and equipment goods industry, this may not be the right thing to do because expert views are needed to ultimately secure comparability.

Under the structured product description approach, up to 12 specifications are selected to describe machinery and equipment goods. Twelve specifications may be comprehensive enough in most cases, but sometimes that number is just not enough to describe an item perfectly. An alternative approach to comparing the specifications of two items is to compare the proposed and the observed values for each specification. For an item, observed specifications are comparable to the proposed ones if all or the most important specifications are close or identical. Likewise, an observed specification value is comparable to the proposed one if they are close or identical according to the experts.

These steps will help classify observed items as identical, equivalent, or broadly comparable, or, if necessary, noncomparable. If the validation expert comes across a noncomparable item, he or she must exclude the observed price even if the terms and conditions of trade, especially the base and unit prices, are in the range of the comparable ones. After this classification, the expert proceeds to validation of the price parameters.

## **VALIDATION OF TERMS AND CONDITIONS**

### **Unit Base Price**

Because of expanded globalization and targeted competition in this industry, the unit base prices of comparable machinery and equipment goods are within a close range. Generally, if a firm proposes a price for a given good that is too high, the purchaser has the option to import. The most important buyers' decisions are based on comparing the unit base acquisition prices of comparable items available in the economy and imported from the economically closest origin. Therefore the unit base prices of comparable goods are within rather close ranges.

### **Order Quantity**

How do order quantities affect the prices of machinery and equipment goods? There are interesting economic theories and applied models on how total potential demand (sum of order

quantity) marginally affects the unit price of a good in general.<sup>1</sup> In the ICP 2011 machinery and equipment goods survey, most items were priced for one piece. For a few goods, however, an order quantity of 10 or 1,000 was targeted. Experts validating the prices of machinery and equipment goods were asked to ensure that the reported order quantities were in the same range (if not the same quantity) as the listed order quantity.

### **Delivery Costs**

Most items in the ICP's global core list of machinery and equipment goods do not involve delivery costs. But for some, these costs may be important. Some items may require installation costs, which could be high or low. These costs must be reported when they occur to ensure the comparability of the total price of the item. Usually for comparable delivery conditions, delivery and installation costs must be in the same range relative to the unit base price or to the total unit price. This is an important validation parameter.

### **Nondeductible Taxes**

For any amount of taxes reported for this category, the validation process should lead to confirmation that the taxes are nondeductible. In some economies, common taxes such as the value added tax (VAT) are nondeductible; in other economies the VAT is deductible. It is important to guarantee that the reported taxes are truly nondeductible. A hint might be provided by the ratio of nondeductible taxes to the unit base price in comparison with the various levels of enforced enterprise taxes in the economy. But here again, the views of experts are essential to validating this amount.

### **Discounts**

Commonly, machinery and equipment goods are purchased after direct negotiation between the seller and the buyer. Some items may receive a discount up to 10 percent of the unit base price. But this ceiling is not absolute; it depends on the goods to be purchased and the actual practice in

the economy. In any case, discounts that appear too high should be investigated. Also, the absence of discounts or the presence of discounts that appear too low may be an issue for items that usually (according to practice and actual data) receive discounts in a given economy.

### **Other Taxes**

Other taxes include a national security levy, customs tax, excise tax, special import and sales taxes, goods and services tax, and any other nondeductible VAT where applicable. Depending on the economy, these taxes may be charged on locally manufactured goods or imported goods. This amount must be checked and documented if it is over 10 percent of the total unit price.

### **Total Unit Price**

Total unit price is the unit base price *plus* the per unit delivery cost *plus* nondeductible taxes *less* the discount. This amount should be checked and documented if it falls outside the boundary of 80–125 percent of the unit base price.

## **FURTHER VALIDATION STEPS**

Similar to the validation process for the household consumption survey, analyses using validation tables such as the Quaranta and Dikhanov make it possible to conduct detailed validation. These analytical tables provide statistical measures such as the coefficient of variation, exchange rate (XR)-ratio, and purchasing power parity (PPP)-ratio. The validation steps listed in chapter 15 for validation of household consumption data should be followed. Temporal validation of the machinery and equipment PPPs for the ICP 2011 round against the ICP 2005 round is recommended as well.

## **NOTE**

1. A practical example is the quantity discounts/economic order quantity approach proposed by Michael Bogner, Chuck Wong, and Bernie Price in September 2002.



# Validation of Construction and Civil Engineering Data

The construction and civil engineering survey of the 2011 round of the International Comparison Program (ICP) is based on the input approach, in which economies price 50 basic and common resources for construction work that have been selected to correspond with the main inputs to national construction output. In addition, respondents to a national survey provide information on importance, resource mixes, typical markups and professional fees, and approximated project prices. These data are used to calculate and validate the construction and civil engineering purchasing power parities (PPPs).

This chapter is an overview of the steps required to calculate PPPs for the construction and civil engineering component of the gross domestic product (GDP). It also covers the process for validating the input data and subsequent PPPs. The first section describes the method for calculating the PPPs, and the next three sections cover the validation steps at the national, regional, and global levels.

## OVERVIEW OF APPROACH TO CALCULATING CONSTRUCTION AND CIVIL ENGINEERING PPPs

Construction is one of the three categories under the gross fixed capital formation aggregate.

The category is further broken down into groups, classes, and basic headings (BHs), as shown in table 19.1. The objective of the construction and civil engineering survey is to estimate PPPs for the three basic headings and to aggregate these up to the construction category.

To reach this objective, three separate but consecutive steps are taken: (1) form the sub-headings; (2) calculate the subheading PPPs; and (3) aggregate the PPPs up to the level of category. Each step is described in detail in the following sections.

**Table 19.1** Construction Headings, ICP 2011

Level	ICP code	Heading
<b>Aggregate</b>	<b>150000</b>	<b>GROSS FIXED CAPITAL FORMATION</b>
Category	150200	CONSTRUCTION
Group	150210	RESIDENTIAL BUILDINGS
Class	150211	<i>Residential buildings</i>
Basic heading	150211.1	Residential buildings
Group	150220	NONRESIDENTIAL BUILDINGS
Class	150221	<i>Nonresidential buildings</i>
Basic heading	150221.1	Nonresidential buildings
Group	150230	CIVIL ENGINEERING WORKS
Class	150231	<i>Civil engineering works</i>
Basic heading	150231.1	Civil engineering works

Source: ICP, <http://icp.worldbank.org/>.

## Step 1. Form the Subheadings

The 50 basic and common construction resources are grouped into three subheadings:

- *Materials*: 38 material inputs
- *Equipment*: five types of equipment hire services
- *Labor*: seven categories of construction labor.

These subheadings are allocated under the three construction basic headings (residential buildings, nonresidential buildings, and civil engineering works), so that each basic heading has three subheadings, or nine in total.

Inputs included in the *equipment* and *labor* subheadings are identical for all basic headings. However, the number and set of material inputs in the *materials* subheadings may differ, depending on the basic heading, because items such as concrete and steel reinforcement can be relevant for all construction projects, and thus for all basic headings, whereas other items such as sheet roofing and sanitary ware may be used only in residential and nonresidential projects. Annex A is an indicative list of the relevant materials for each basic heading.

National experts are required to indicate whether a material is commonly used—that is, whether the material in question is relevant for each type of construction project. Relevance is established by deeming materials as important or not important for each basic heading. It is suggested that the indicative list in annex A be used as a starting point. Table 19.2 summarizes the headings and number of items in each subheading and basic heading. As noted, the actual number of items under the material subheading may vary according to the basic heading. Annex B provides a complete list of headings and items for PPP computation.

## Step 2. Calculate the Subheading PPPs

Once the subheadings are formed for all economies and each basic heading, the next step is to calculate the PPPs. For *practical computation reasons*, subheadings are treated as basic headings in the subsequent process for calculating the PPPs, whereas actual basic headings are treated as aggregate levels, as shown in table 19.3.

**Table 19.2** Subheadings and Associated Number of Items, Construction, ICP 2011

Level	ICP code	Heading	No. of items
Basic heading	150211.1	Residential buildings	50
Subheading		<i>Materials</i>	38
Subheading		<i>Equipment</i>	5
Subheading		<i>Labor</i>	7
Basic heading	150221.1	Nonresidential buildings	50
Subheading		<i>Materials</i>	38
Subheading		<i>Equipment</i>	5
Subheading		<i>Labor</i>	7
Basic heading	150231.1	Civil engineering works	50
Subheading		<i>Materials</i>	38
Subheading		<i>Equipment</i>	5
Subheading		<i>Labor</i>	7

Source: ICP, <http://icp.worldbank.org/>.

The method for calculating subheading PPPs is the unweighted country product dummy (CPD). This method is selected instead of the country product representative dummy (CPRD) or the weighted CPD (CPD-W), because all items included in the calculation of PPPs are deemed relevant, or important, as explained in the previous section.<sup>1</sup> Because all items are relevant, all items have the same weight in the calculation of PPPs, and thus different calculation methods yield the same results.

## Step 3. Aggregate the Subheading PPPs

The next step is to aggregate the subheading PPPs to the actual basic heading level. Because construction basic headings are identical to their parent classes and groups, one single aggregation step will fill all these identical aggregation levels. Both national accounts expenditures and resource mixes are used in this process, as explained in the next section.

### *Construction Expenditure and Resource Mixes*

Construction expenditure data are reported in the national accounts for the construction headings listed in table 19.1.

Resource mix is the cost of materials, equipment, and labor expressed as a percentage share

**Table 19.3** Subheadings as Basic Headings, Construction, ICP 2011

Actual level	Considered as	ICP code	Aggregate or basic heading
<b>Aggregate</b>	<b>Aggregate level</b>	<b>150000</b>	<b>GROSS FIXED CAPITAL FORMATION</b>
<b>Category</b>	<b>Aggregate level</b>	<b>150200</b>	<b>CONSTRUCTION</b>
<b>Group</b>	<b>Aggregate level</b>	<b>150210</b>	<b>RESIDENTIAL BUILDINGS</b>
<b>Class</b>	<b>Aggregate level</b>	<b>150211</b>	<i>Residential buildings</i>
<b>Basic heading</b>	<b>Aggregate level</b>	<b>150211.1</b>	<b>Residential buildings</b>
Subheading	Basic heading	150211.11	Materials
Subheading	Basic heading	150211.12	Equipment
Subheading	Basic heading	150211.13	Labor
<b>Group</b>	<b>Aggregate level</b>	<b>150220</b>	<b>NONRESIDENTIAL BUILDINGS</b>
<b>Class</b>	<b>Aggregate level</b>	<b>150221</b>	<i>Nonresidential buildings</i>
<b>Basic heading</b>	<b>Aggregate level</b>	<b>150221.1</b>	<b>Nonresidential buildings</b>
Subheading	Basic heading	150221.11	Materials
Subheading	Basic heading	150221.12	Equipment
Subheading	Basic heading	150221.13	Labor
<b>Group</b>	<b>Aggregate level</b>	<b>150230</b>	<b>CIVIL ENGINEERING WORKS</b>
<b>Class</b>	<b>Aggregate level</b>	<b>150231</b>	<i>Civil engineering works</i>
<b>Basic heading</b>	<b>Aggregate level</b>	<b>150231.1</b>	<b>Civil engineering works</b>
Subheading	Basic heading	150231.11	Materials
Subheading	Basic heading	150231.12	Equipment
Subheading	Basic heading	150231.13	Labor

Source: ICP, <http://icp.worldbank.org/>.

of the total expenditure value of a basic heading. The shares in different clusters of economies are dependent on the skills and technology available in the economies and on other factors, and average values can vary from economy to economy, within economies, and across types of work.<sup>2</sup>

Information on resource mixes is collected primarily during the price survey. However, in cases in which national construction experts are not able to provide this information or there is considerable doubt about the reliability of this information, default values that have been estimated on the basis of gross national income (GNI) per capita and relative construction labor costs can be used. Indicative default values are presented later in this chapter in the section on resource mixes.

#### ***Establishment of Subheading Weights***

Aggregation of the subheading PPPs to the actual basic heading level requires the subheading

expenditures. These are formed by breaking down the basic heading–level expenditure over each subheading using resource mixes as weights. For example, in table 19.4 the nominal expenditure for the construction category is 70, which is further broken down into groups and classes, as shown in the table. The column devoted to resource mix shares lists them for each subheading. The last column lists the nominal expenditures to be applied when the subheadings are aggregated up to the basic heading level.

#### ***Aggregation of PPPs***

After the subheading weights are established, the subheading PPPs can be aggregated to basic heading, class, group, and finally up to the level of construction category, using the selected aggregation method, which for ICP 2011 was the Gini-Éltető-Köves-Szulc (GEKS).<sup>3</sup>

**Table 19.4** Calculation of Subheading Weights, Construction, ICP 2011

Actual level	Considered as	ICP code	Aggregate or BH	Nominal expenditure (LCUs)	RM shares (%)	RM-weighted nominal expenditure (LCUs)
<b>Aggregate</b>	<b>Aggregate level</b>	<b>150000</b>	<b>GROSS FIXED CAPITAL FORMATION</b>	120		
<b>Category</b>	<b>Aggregate level</b>	<b>150200</b>	<b>CONSTRUCTION</b>	70		
<b>Group</b>	<b>Aggregate level</b>	<b>150210</b>	<b>RESIDENTIAL BUILDINGS</b>	18		
<b>Class</b>	<b>Aggregate level</b>	<b>150211</b>	<i>Residential buildings</i>	18		
<b>Basic heading</b>	<b>Aggregate level</b>	<b>150211.1</b>	<b>Residential buildings</b>			
Subheading	Basic heading	150211.11	Materials		70.0	12.6
Subheading	Basic heading	150211.12	Equipment		5.0	0.9
Subheading	Basic heading	150211.13	Labor		25.0	4.5
<b>Group</b>	<b>Aggregate level</b>	<b>150220</b>	<b>NONRESIDENTIAL BUILDINGS</b>	12		
<b>Class</b>	<b>Aggregate level</b>	<b>150221</b>	<i>Nonresidential buildings</i>	12		
<b>Basic heading</b>	<b>Aggregate level</b>	<b>150221.1</b>	<b>Nonresidential buildings</b>			
Subheading	Basic heading	150221.11	Materials		67.5	8.1
Subheading	Basic heading	150221.12	Equipment		7.5	0.9
Subheading	Basic heading	150221.13	Labor		25.0	3.0
<b>Group</b>	<b>Aggregate level</b>	<b>150230</b>	<b>CIVIL ENGINEERING WORKS</b>	40		
<b>Class</b>	<b>Aggregate level</b>	<b>150231</b>	<i>Civil engineering works</i>	40		
<b>Basic heading</b>	<b>Aggregate level</b>	<b>150231.1</b>	<b>Civil engineering works</b>			
Subheading	Basic heading	150231.11	Materials		50.0	20.0
Subheading	Basic heading	150231.12	Equipment		27.5	11.0
Subheading	Basic heading	150231.13	Labor		22.5	9.0

Source: ICP, <http://icp.worldbank.org/>.

Note: BH = basic heading; LCU = local currency unit; RM = resource mix.

## VALIDATION OF CONSTRUCTION AND CIVIL ENGINEERING SURVEY

The overall validation process for the construction and civil engineering survey follows the general ICP validation process. Thus the validation work is carried out in three stages: (1) intra-economy validation, (2) intereconomy validation, and (3) global validation. However, because of the distinct methodology underlying the survey, a number of steps are specific to it. This section focuses on these specificities. A general description of the ICP validation process appears in chapters 14 and 15 of this volume.

### Intra-economy Validation

During the intra-economy validation process, the national coordinating agencies (NCAs), together

with national construction experts, verify the completeness and accuracy of the information collected during the survey. The sections that follow describe the checks needed for prices, equivalent materials, units of measurement and quantities, importance, and other reported information.

### Prices

The NCAs confirm with the national construction experts that the prices reported

- Are the prices paid by established contractors to their suppliers.
- Reflect the buying power of contractors undertaking significant amounts of work.<sup>4</sup>
- Include all nonrecoverable taxes.
- Exclude all recoverable taxes such as the value added tax (VAT).
- Represent national average prices.<sup>5</sup>



- Are the prices for typical construction projects within an economy.<sup>6</sup>
- Represent annual averages.

Prices should be provided for products that are commonly available and commonly used in the economy. They should not be provided for products that involve "special" items—that is, those that either are not generally available or are available only at a premium price in the economy.

### ***Equivalent Materials***

Materials included in the construction survey are selected on the basis of their common use across economies. However, the listed materials may not always be available or used in all economies. In these cases, equivalent materials are selected and priced.

When equivalent materials are priced, the NCAs should verify with the national construction experts that the alternative material is indeed equivalent to the original material,<sup>7</sup> that the substitution is clearly indicated in the price survey questionnaire, and that sufficient information is provided on the material.

### ***Unit of Measurement and Dimensions***

For each material, equipment, and labor item, prices are to be reported for a preferred unit and quantity. It is crucial to verify that the reported prices respond to the requested unit.

Prices can be reported in alternative units—that is, based on either the metric or the British imperial system. However, the NCAs must verify (1) that the alternative unit is clearly indicated and all relevant information is given and (2) that

the alternative unit can be converted into the preferred unit. For example, if cubic meters are requested, prices can be reported in cubic feet. However, the price cannot be reported in running meters, which cannot be converted to cubic meters.

Annex C is a table of conversion factors that can be used when prices are reported in alternative units. Generally, the factors should be used as multipliers for the prices provided for the alternative units in order to convert them to prices per preferred unit.

Errors and problems in units are the most common reason for prices that are not comparable across economies. Thus utmost attention should be paid to this point during the intra-economy validation.

### ***Relevance***

National experts indicate whether a material is commonly used in the construction projects in an economy. They do so by indicating the relevance of items separately for each basic heading (see box 19.1).

In the classification of items as relevant or irrelevant, the NCAs should verify that the following points are taken into account:

- If a material is available and commonly used in all three basic headings, it should be priced and classified as relevant by inserting 1 in the relevance column of each basic heading.
- If a material is available and commonly used in only some basic headings, it should be priced and classified as relevant (1) for those basic headings for which the material is important and classified as unimportant (0) for

## **BOX 19.1**

### **Method for Indicating Relevance of Items Used in Construction Projects, ICP 2011**

The current price survey questionnaire asks respondents to indicate the importance of an item with an asterisk (\*). However, for the sake of data processing numbers should be used instead to classify an item as relevant or irrelevant:

- 1 = material is relevant for a given basic heading (residential, nonresidential, or civil engineering work).
- 0 = material is irrelevant for a given basic heading (residential, nonresidential, or civil engineering work).

those basic headings for which the material is irrelevant.

- If a material is available but not relevant for any of the basic headings, a price should be provided, but the material should be classified as irrelevant (0) for all basic headings.
- If a material is not available and not used, it should not be priced and should be classified as irrelevant (0) for all basic headings.

Finally, the NCAs should check that relevancy is indicated for each item.

### Other Information

Percentages for resource mixes, markups, and professional fees should be provided separately for each construction basic heading. Table 19.5 is an example of a questionnaire used to collect this information. For these reported figures, the NCAs need to ensure that (1) the provided information is complete for each element (yellow cells in table 19.5) and (2) the percentages add up to the totals (in boldface in table 19.5).

Reporting approximate project prices is voluntary, but when these prices are given, the NCAs should confirm with the national experts that the prices

- Represent annual average prices; midyear prices can be treated as such.
- Refer to a midpoint in a range of prices—that is, if an economy has a range of midyear prices for a given project, the middle price should be selected and reported.<sup>8</sup>
- Are those charged by construction contractors and paid by purchasers—for example, purchasers could be housing developers or public authorities.
- Exclude external works.<sup>2</sup>
- Exclude the value of land.

### Completeness of Questionnaire

Prior to submission of the questionnaire, it must be verified that all the required information is provided. It is extremely critical to check the completeness of prices and related quantities.

**Table 19.5** Example of a Completed Construction Questionnaire, ICP 2011  
percent

Mix of construction resources			
	Residential buildings	Nonresidential buildings	Civil engineering works
1 Construction materials and products	30.0	30.0	20.0
2 Construction equipment	7.5	10.0	30.0
3 Construction site labor	62.5	60.0	50.0
Total project value	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Contractors' markups			
Cost heading	Residential buildings	Nonresidential buildings	Civil engineering works
1 Total markup:	<b>25.0</b>	<b>30.0</b>	<b>25.0</b>
2 General site costs and temporary works	18.0	21.0	18.0
3 Head office overhead	2.0	4.0	2.0
4 Profit	5.0	5.0	5.0
5 Other contractor costs (please specify)	n.a.	n.a.	n.a.

Professional fees			
Cost heading	Residential buildings	Nonresidential buildings	Civil engineering works
1 Overall percentage addition for professional services	12.0	13.0	11.0

Source: ICP, <http://icp.worldbank.org/>.

Note: n.a. = not applicable.

## Intereconomy Validation

During the intereconomy validation, the NCAs and regional coordinating agencies (RCAs) check the completeness and correctness of the data submission and conduct validation of the price data and metadata across economies.

### Initial Data Validation

When verifying the submitted data, the RCAs should conduct the following checks:

- Are the questionnaires complete?
- Are the units of measurement in which the prices are provided comparable?
- Are the equivalent materials comparable, at least initially?

If any of these points require further review, they should be checked with the NCAs just after submission of the data and prior to entering the next validation phases.

### Validation of Price Data Using Validation Tables

After initial review of the submitted data, the next step is to validate the data using either the Quaranta or Dikhanov validation table.

For practical price validation purposes, these tables can be calculated by treating the subheadings for materials, equipment, and labor as basic headings and further by including all items under these basic headings as follows:

- *Materials*: 38 material inputs
- *Equipment*: five types of equipment hire rates
- *Labor*: seven categories of construction labor.

This means that all 38 material inputs are included in the materials subheading without distinguishing the basic heading-specific selection of items, which were presented in table 19.2. Although each submitted average price has to be validated, there is no need to replicate each average price for each basic heading because they are identical. Furthermore, it makes sense to compare relative prices across economies for all materials together rather than clustering them according to actual construction project usage for each basic heading.

Annex D lists the subheadings and items, together with their respective codes, that can be used for price validation purposes.

Calculation of the validation tables is followed by analysis that adheres to the steps introduced in chapter 15 on validation of the household consumption data.

### Relevance

It is important to validate the provided relevance information by checking that (1) the classification within the economy is plausible, (2) the rationale for classifying the item as important is comparable across economies, and (3) a sufficient number of items are classified as relevant.

The RCAs should review doubtful cases of classification with the NCAs because differences in interpretation of the approach can lead to biased results when the PPPs are being calculated.

### Resource Mixes

As noted, a default set of resource percentages was estimated centrally by the Global Office (see table 19.6). The clustering of economies is based on GNI (high, middle, and low). GNI per capita is used as a proxy for estimating resource mix differentials because the main factors influencing resource mixes across economies, particularly for building work, appear to be the relative wealth of the economies and, within economies, the relative wage levels of construction workers. The shaded areas in table 19.6 indicate less

**Table 19.6** Initial Estimated Resource Mixes, ICP 2011  
*percent*

Income group	Materials	Equipment	Labor
Residential building			
Low-income economies	62.5	15.0	22.5
Middle-income economies	60.0	12.5	27.5
High-income economies	57.5	10.0	32.5
Nonresidential building			
Low-income economies	62.5	17.5	20.0
Middle-income economies	60.0	15.0	25.0
High-income economies	57.5	12.5	30.0
Civil engineering work			
Low-income economies	50.0	35.0	15.0
Middle-income economies	50.0	28.8	21.3
High-income economies	50.0	25.0	25.0

Source: ICP, <http://icp.worldbank.org/>.

plausible combinations of national wealth and the cost of construction labor. Annex E presents the clusters of economies based on GNI per capita and construction labor costs.

Generally, labor percentages tend to increase and material percentages decrease as national wealth and the cost of construction labor increase. Where construction labor is relatively cheap, contractors prefer to use labor rather than equipment. Civil engineering is the most variable area across economies and over time, particularly in small and developing economies.

The estimated default resource mix shares presented in table 19.6 can be used in two ways during the validation process: first as a check on the data provided by national experts, and second as an estimation when data have not been provided.

When the submitted values differ substantially from the default values, it should be confirmed that this difference stems from plausible reasons and is not the result of an error or misinterpretation of the approach.

### **Construction PPPs**

Once the input data have been validated, it is possible to calculate and validate the construction PPPs following steps 1–3, as described in the first section of this chapter. Validation of the PPPs should follow the process described in chapter 22 of this volume. Annex B provides a complete list of headings and items for PPP computation.

### **Approximate Project Prices**

Approximate project prices are an additional tool for checking the plausibility of the input price-based PPPs. The project prices reflect real-world construction projects within economies because they include all related costs. They can thus be used to estimate the total costs of construction projects.

Project prices are asked for four *residential building* projects, four *nonresidential building* projects, and three *civil engineering* projects.

PPPs can be calculated by treating the list titles as basic headings and the projects as items. In this way, the PPPs can be calculated and aggregated up to the level of construction category using national accounts expenditures as weights and the selected aggregation method.

Annex F lists the basic headings and items that can be used for validation purposes.

The approximate project price-based PPPs can be compared against the input price-based PPPs. Should the comparison show substantial differences between the two sets of PPPs, further verification of input prices may be needed.

### **Global Validation**

During the global validation, the Global Office, together with the NCAs and RCAs, works to ensure that (1) prices are validated consistently across the regions, (2) price data are comparable across all the economies, and (3) the resulting global PPPs are plausible.

## Annex A

### Material Inputs, ICP 2011

No.	Material or product	Use in		
		Residential building	Nonresidential building	Civil engineering work
1	Aggregate for concrete	X	X	X
2	Sand for concrete and mortar	X	X	X
3	Softwood for carpentry	X	X	X
4	Softwood for joinery	X	X	
5	Exterior plywood	X	X	X
6	Interior plywood	X	X	
7	Chipboard sheet	X	X	
8	Petrol/gasoline	X	X	X
9	Diesel fuel	X	X	X
10	Oil paint	X	X	
11	Emulsion paint	X	X	
12	Ordinary Portland cement	X	X	X
13	Ready-mix concrete	X	X	X
14	Precast concrete slabs	X	X	
15	Common bricks	X	X	X
16	Facing bricks	X	X	
17	Hollow concrete blocks	X	X	X
18	Solid concrete blocks	X	X	X
19	Clay roof tiles	X		
20	Concrete roof tiles	X		
21	Float/sheet glass	X	X	
22	Double glazing units	X	X	
23	Ceramic wall tiles	X	X	
24	Plasterboard	X	X	
25	White wash hand basin	X	X	
26	High-yield steel reinforcement	X	X	X
27	Mild steel reinforcement	X	X	X
28	Structural steel sections	X	X	X
29	Sheet metal roofing	X	X	
30	Metal storage tank		X	X
31	Cast-iron drain pipe	X	X	X
32	Copper pipe	X	X	
33	Electric pump		X	X
34	Electric fan		X	
35	Air-conditioning equipment	X	X	
36	Stand-by generator		X	
37	Solar collector	X	X	X
38	Electricity	X	X	X
<b>Total</b>		<b>34</b>	<b>36</b>	<b>19</b>

Source: ICP, <http://icp.worldbank.org/>.

## Annex B

### Complete List of Construction Headings and Items for PPP Computation, ICP 2011

Level	ICP code	Heading
GDP	100000.0	GROSS DOMESTIC PRODUCT
Aggregate	150000	GROSS FIXED CAPITAL FORMATION
Category	150200	CONSTRUCTION
Group	150210	RESIDENTIAL BUILDINGS
Class	150211	<i>Residential buildings</i>
Basic heading	150211.1	Residential buildings
Subheading	150211.11	Materials
Item	150211.1101	Aggregate for concrete
Item	150211.1102	Sand for concrete and mortar
Item	150211.1103	Softwood for carpentry
Item	150211.1104	Softwood for joinery
Item	150211.1105	Exterior plywood
Item	150211.1106	Interior plywood
Item	150211.1107	Chipboard sheet
Item	150211.1108	Petrol/gasoline
Item	150211.1109	Diesel fuel
Item	150211.1110	Oil paint
Item	150211.1111	Emulsion paint
Item	150211.1112	Ordinary Portland cement
Item	150211.1113	Ready-mix concrete
Item	150211.1114	Precast concrete slabs
Item	150211.1115	Common bricks
Item	150211.1116	Facing bricks
Item	150211.1117	Hollow concrete blocks
Item	150211.1118	Solid concrete blocks
Item	150211.1119	Clay roof tiles
Item	150211.1120	Concrete roof tiles
Item	150211.1121	Float/sheet glass
Item	150211.1122	Double glazing units
Item	150211.1123	Ceramic wall tiles
Item	150211.1124	Plasterboard
Item	150211.1125	White wash hand basin
Item	150211.1126	High-yield steel reinforcement
Item	150211.1127	Mild steel reinforcement
Item	150211.1128	Structural steel sections
Item	150211.1129	Sheet metal roofing
Item	150211.1130	Metal storage tank
Item	150211.1131	Cast-iron drain pipe
Item	150211.1132	Copper pipe
Item	150211.1133	Electric pump

**Annex B (Continued)**

Level	ICP code	Heading
Item	150211.1134	Electric fan
Item	150211.1135	Air-conditioning equipment
Item	150211.1136	Stand-by generator
Item	150211.1137	Solar collector
Item	150211.1138	Electricity
Subheading	150211.12	Equipment
Item	150211.1201	Wheeled loader and excavator
Item	150211.1202	Tracked tractor
Item	150211.1203	Skid steer loader
Item	150211.1204	Tandem vibrating roller
Item	150211.1205	Compact track loader
Subheading	150211.13	Labor
Item	150211.1301	General (unskilled) laborer <sup>a</sup>
Item	150211.1302	Bricklayer <sup>b</sup>
Item	150211.1303	Plumber <sup>b</sup>
Item	150211.1304	Carpenter <sup>b</sup>
Item	150211.1305	Structural steelworker <sup>b</sup>
Item	150211.1306	Electrician <sup>b</sup>
Item	150211.1307	Machine (equipment) operator <sup>b</sup>
Group	150220	NONRESIDENTIAL BUILDINGS
Class	150221	<i>Nonresidential buildings</i>
Basic heading	150221.1	Nonresidential buildings
Subheading	150221.11	Materials
Item	150221.1101	Aggregate for concrete
Item	150221.1102	Sand for concrete and mortar
Item	150221.1103	Softwood for carpentry
Item	150221.1104	Softwood for joinery
Item	150221.1105	Exterior plywood
Item	150221.1106	Interior plywood
Item	150221.1107	Chipboard sheet
Item	150221.1108	Petrol/gasoline
Item	150221.1109	Diesel fuel
Item	150221.1110	Oil paint
Item	150221.1111	Emulsion paint
Item	150221.1112	Ordinary Portland cement
Item	150221.1113	Ready-mix concrete
Item	150221.1114	Precast concrete slabs
Item	150221.1115	Common bricks
Item	150221.1116	Facing bricks
Item	150221.1117	Hollow concrete blocks
Item	150221.1118	Solid concrete blocks

*table continues next page*

**Annex B (Continued)**

Level	ICP code	Heading
Item	150221.1119	Clay roof tiles
Item	150221.1120	Concrete roof tiles
Item	150221.1121	Float/sheet glass
Item	150221.1122	Double glazing units
Item	150221.1123	Ceramic wall tiles
Item	150221.1124	Plasterboard
Item	150221.1125	White wash hand basin
Item	150221.1126	High-yield steel reinforcement
Item	150221.1127	Mild steel reinforcement
Item	150221.1128	Structural steel sections
Item	150221.1129	Sheet metal roofing
Item	150221.1130	Metal storage tank
Item	150221.1131	Cast-iron drain pipe
Item	150221.1132	Copper pipe
Item	150221.1133	Electric pump
Item	150221.1134	Electric fan
Item	150221.1135	Air-conditioning equipment
Item	150221.1136	Stand-by generator
Item	150221.1137	Solar collector
Item	150221.1138	Electricity
<b>Subheading</b>	<b>150221.12</b>	<b>Equipment</b>
Item	150221.1201	Wheeled loader and excavator
Item	150221.1202	Tracked tractor
Item	150221.1203	Skid steer loader
Item	150221.1204	Tandem vibrating roller
Item	150221.1205	Compact track loader
<b>Subheading</b>	<b>150221.13</b>	<b>Labor</b>
Item	150221.1301	General (unskilled) laborer <sup>a</sup>
Item	150221.1302	Bricklayer <sup>b</sup>
Item	150221.1303	Plumber <sup>b</sup>
Item	150221.1304	Carpenter <sup>b</sup>
Item	150221.1305	Structural steelworker <sup>b</sup>
Item	150221.1306	Electrician <sup>b</sup>
Item	150221.1307	Machine (equipment) operator <sup>b</sup>
Group	150230	CIVIL ENGINEERING WORKS
Class	150231	<i>Civil engineering works</i>
Basic heading	150231.1	Civil engineering works
<b>Subheading</b>	<b>150231.11</b>	<b>Materials</b>
Item	150231.1101	Aggregate for concrete
Item	150231.1102	Sand for concrete and mortar
Item	150231.1103	Softwood for carpentry



**Annex B (Continued)**

Level	ICP code	Heading
Item	150231.1104	Softwood for joinery
Item	150231.1105	Exterior plywood
Item	150231.1106	Interior plywood
Item	150231.1107	Chipboard sheet
Item	150231.1108	Petrol/gasoline
Item	150231.1109	Diesel fuel
Item	150231.1110	Oil paint
Item	150231.1111	Emulsion paint
Item	150231.1112	Ordinary Portland cement
Item	150231.1113	Ready-mix concrete
Item	150231.1114	Precast concrete slabs
Item	150231.1115	Common bricks
Item	150231.1116	Facing bricks
Item	150231.1117	Hollow concrete blocks
Item	150231.1118	Solid concrete blocks
Item	150231.1119	Clay roof tiles
Item	150231.1120	Concrete roof tiles
Item	150231.1121	Float/sheet glass
Item	150231.1122	Double glazing units
Item	150231.1123	Ceramic wall tiles
Item	150231.1124	Plasterboard
Item	150231.1125	White wash hand basin
Item	150231.1126	High-yield steel reinforcement
Item	150231.1127	Mild steel reinforcement
Item	150231.1128	Structural steel sections
Item	150231.1129	Sheet metal roofing
Item	150231.1130	Metal storage tank
Item	150231.1131	Cast-iron drain pipe
Item	150231.1132	Copper pipe
Item	150231.1133	Electric pump
Item	150231.1134	Electric fan
Item	150231.1135	Air-conditioning equipment
Item	150231.1136	Stand-by generator
Item	150231.1137	Solar collector
Item	150231.1138	Electricity
<b>Subheading</b>	<b>150231.12</b>	<b>Equipment</b>
Item	150231.1201	Wheeled loader and excavator
Item	150231.1202	Tracked tractor
Item	150231.1203	Skid steer loader
Item	150231.1204	Tandem vibrating roller
Item	150231.1205	Compact track loader

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## Annex B (Continued)

Level	ICP code	Heading
Subheading	150231.13	Labor
Item	150231.1301	General (unskilled) laborer <sup>b</sup>
Item	150231.1302	Bricklayer <sup>b</sup>
Item	150231.1303	Plumber <sup>b</sup>
Item	150231.1304	Carpenter <sup>b</sup>
Item	150231.1305	Structural steelworker <sup>b</sup>
Item	150231.1306	Electrician <sup>b</sup>
Item	150231.1307	Machine (equipment) operator <sup>b</sup>

Source: ICP, <http://icp.worldbank.org/>.

a. This group of construction workers undertakes simple, routine tasks in support of activities performed by more skilled workers. They usually have received little or no formal training. Examples of tasks they might undertake include loading and unloading materials, digging and filling holes and trenches, spreading gravel and related materials, and cleaning and tidying sites and site facilities.

b. This group of skilled construction workers has received training in their trade consisting of one or more of the following: an apprenticeship, on-the-job training, or training in a technical college or similar institution.

## Annex C

### Conversion Factors, ICP 2011

The conversion factors in the table are intended for use when alternative unit quantities have been used for prices in the materials section of the ICP construction survey form. Generally, the factors should be used as multipliers of the prices provided for alternative units in order to convert these prices to prices per preferred unit. Any errors or omissions discovered should be brought to the attention of the ICP Global Office.

Ref.	Item and brief description	Preferred unit	Alternative unit	Conversion factor	Notes on conversions and conversion factors
1	Aggregate for concrete Clean, hard, strong crushed stone or gravel free of impurities and fine materials in sizes ranging from 9.5 to 37.5 mm in diameter	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147	Straightforward imperial to metric conversion
			yd. <sup>3</sup>	× 1.307873	Straightforward imperial to metric conversion
			tonne	× 1.625	Assume aggregates weigh 1.625 t/m <sup>3</sup> (but may vary by local material and should be checked).
2	Sand for concrete and mortar Fine aggregate washed sharp sand	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147	Straightforward imperial to metric conversion
			yd. <sup>3</sup>	× 1.307873	Straightforward imperial to metric conversion
			tonne	× 1.50	Assume sand weighs 1.50 t/m <sup>3</sup> (but may vary by local material and should be checked).
3	Softwood for carpentry  Sawn softwood sections for structural use pretreated (to national standards) such as 50 mm × 100 mm	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147	Straightforward imperial to metric conversion
			yd. <sup>3</sup>	× 1.307873	Straightforward imperial to metric conversion
			m	× 200	These conversions assume 50 mm × 100 mm sections. Different sections will give different factors—e.g., 125 mm × 75 mm would give a conversion factor of 106.7 m/m <sup>3</sup> .
			ft.	× 656	
			yd.	× 218.7	
tonne	× 0.45	Assume softwood (or equivalent) timber weighs 450 kg/m <sup>3</sup> (but will vary locally and by type of timber and should be checked).			

**Annex C (Continued)**

Ref.	Item and brief description	Preferred unit	Alternative unit	Conversion factor	Notes on conversions and conversion factors
4	Softwood for joinery  Dressed softwood sections for finishing—e.g., 18 mm × 120 mm	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147	Straightforward imperial to metric conversion
			yd. <sup>3</sup>	× 1.307873	Straightforward imperial to metric conversion
			m	× 463	These conversions assume 18 mm × 120 mm sections. Different sections will give different factors—e.g., 12 mm × 75 mm would give a conversion factor of 1,111 m/m <sup>3</sup> .
			ft.	× 1519	
			yd.	× 506	Assume softwood (or equivalent) timber weighs 450 kg/m <sup>3</sup> (but will vary locally and by type of timber and should be checked).
tonne	× 0.45				
5	Exterior plywood Exterior quality plywood 15.5 mm thick in standard sheets	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	Straightforward imperial to metric conversion
			yd. <sup>2</sup>	× 1.196029	Straightforward imperial to metric conversion
			8 ft. × 4 ft. sheet	× 0.3364	8 ft. × 4 ft. is 32 ft. <sup>2</sup> or 2.97 m <sup>2</sup> .
6	Interior plywood Interior quality plywood 12 mm thick in standard sheets	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	Straightforward imperial to metric conversion
			yd. <sup>2</sup>	× 1.196029	Straightforward imperial to metric conversion
			8 ft. × 4 ft. sheet	× 0.3364	8 ft. × 4 ft. is 32 ft. <sup>2</sup> or 2.97 m <sup>2</sup> .
7	Chipboard sheet Interior quality chipboard 15 mm thick in standard sheets	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	Straightforward imperial to metric conversion
			yd. <sup>2</sup>	× 1.196029	Straightforward imperial to metric conversion
			8 ft. × 4 ft. sheet	× 0.3364	8 ft. × 4 ft. is 32 ft. <sup>2</sup> or 2.97 m <sup>2</sup> .
8	Petrol/gasoline Standard grade for use in motor vehicles	liter	gal.	× 0.219974	
			U.S. gal.	× 0.2642	
9	Diesel fuel Diesel fuel for use in construction equipment	liter	gal.	× 0.219974	
			U.S. gal.	× 0.2642	
10	Oil paint Oil-based paint suitable for top-coat finishes to timber surfaces	liter	gal.	× 0.219974	
			U.S. gal.	× 0.2642	
			kg	× 0.666667	Assume oil paint weighs 1.5 kg/L (but should be checked locally).
11	Emulsion paint Water-based paint suitable for internal plaster surfaces	liter	gal.	× 0.219974	
			U.S. gal.	× 0.2642	
			kg	× 0.666667	Assume water-based paint weighs 1.5 kg/L (but should be checked locally).
12	Ordinary Portland cement Ordinary Portland cement in bags or bulk delivery	tonne	ton long	× 0.9842	1 metric ton equals 0.9842 imperial tons.
			ton short	× 1.102311	1 metric ton equals 1.102311 U.S. tons.
			kg	× 1,000	
			lb.	× 2,204.6	
13	Ready-mix concrete Typical common mix 1:2:4 cement: sand: 20–40 mm aggregate, 20 N/mm <sup>2</sup>	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147	
			yd. <sup>3</sup>	× 1.307873	

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**Annex C (Continued)**

Ref.	Item and brief description	Preferred unit	Alternative unit	Conversion factor	Notes on conversions and conversion factors	
14	Precast concrete slabs	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764263		
	Precast concrete paving slabs 600 × 600 × 50 mm thick		yd. <sup>2</sup>	× 1.196029		
			each	× 2.777778		
15	Common bricks	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147		
	Ordinary clay bricks (suitable for render or plaster finish)—e.g., 215 mm × 100 mm × 65 mm thick (approx. 715 bricks/m <sup>3</sup> )		yd. <sup>3</sup>	× 1.307873		
			m <sup>2</sup>	× 10		Assume a wall 100 mm (half-brick) thick—71.5635 bricks/m <sup>2</sup> .
			ft. <sup>2</sup>	× 107.64263		
			yd. <sup>2</sup>	× 11.96029		
			each	× 715.5635		
1,000	× 0.7155635					
16	Facing bricks	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147		
	Medium-quality, self-finished clay bricks for walling— e.g., 215 mm × 100 mm × 65 mm thick (approx. 715 bricks/m <sup>3</sup> )		yd. <sup>3</sup>	× 1.307873		
			m <sup>2</sup>	× 10		Assume a wall 100 mm (half-brick) thick—71.5635 bricks/m <sup>2</sup> .
			ft. <sup>2</sup>	× 107.64263		
			yd. <sup>2</sup>	× 11.96029		
			each	× 715.5635		
1,000	× 0.7155635					
17	Hollow concrete blocks	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147		
	Hollow dense aggregate concrete blocks, 7 N/mm <sup>2</sup> —e.g., 440 mm × 215 mm × 140 mm thick (approx. 76 blocks/m <sup>3</sup> )		yd. <sup>3</sup>	× 1.307873		
			m <sup>2</sup>	× 7.14286		Assume a wall 140 mm (one block) thick—10.5708 blocks/m <sup>2</sup> .
			ft. <sup>2</sup>	× 76.88		
			yd. <sup>2</sup>	× 8.543		
			each	× 75.5059		
1,000	× 0.0755059					
18	Solid concrete blocks	m <sup>3</sup>	ft. <sup>3</sup>	× 35.3147		
	Solid dense aggregate concrete blocks, 7 N/mm <sup>2</sup> —e.g., 440 mm × 215 mm × 140 mm thick (approx. 76 blocks/m <sup>3</sup> )		yd. <sup>3</sup>	× 1.307873		
			m <sup>2</sup>	× 7.14286		Assume a wall 140 mm (one block) thick—10.5708 blocks/m <sup>2</sup> .
			ft. <sup>2</sup>	× 76.88		
			yd. <sup>2</sup>	× 8.543		
			each	× 75.5059		
1,000	× 0.0755059					
19	Clay roof tiles	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264		
	Clay plain smooth red machine-made or similar tiles per m <sup>2</sup> of roof surface area—e.g., 265 mm × 125 mm tiles		yd. <sup>2</sup>	× 1.196029		
			each	× 71.03		Assume a double lap, equivalent to 15% of tile length—71.03 tiles/m <sup>2</sup> of roof for this tile (but this will vary locally and should be checked).
			1,000	× 0.07103		
20	Concrete roof tiles	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264		
	Concrete interlocking tiles per m <sup>2</sup> of roof surface area—e.g., 420 mm × 330 mm tiles		yd. <sup>2</sup>	× 1.196029		
			each	× 9.431		Assume a single lap, equivalent to 15% of tile length, and a side interlock, equivalent to 10% of tile width—9.431 tiles/m <sup>2</sup> of roof for this tile (but will vary locally and should be checked).
			1,000	× 0.009431		

**Annex C (Continued)**

Ref.	Item and brief description	Preferred unit	Alternative unit	Conversion factor	Notes on conversions and conversion factors
21	Float/sheet glass	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	
	Standard plain glass, clear float, 4 mm thick		yd. <sup>2</sup>	× 1.196029	
22	Double glazing units	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	
	Factory-made, hermetically sealed, medium-size units, 0.5–2.0 m <sup>2</sup> with 4 mm glass, 12 mm seal		yd. <sup>2</sup>	× 1.196029	
23	Ceramic wall tiles	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	
	152 × 152 × 5.5 mm thick, white- or light-colored for medium-quality domestic use		yd. <sup>2</sup>	× 1.196029	
			each	× 43.28255	
			1,000	× 0.04328255	
24	Plasterboard	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	Straightforward imperial to metric conversion
	12.5 mm paper-faced, tapered-edged plasterboard in standard sheets		yd. <sup>2</sup>	× 1.196029	Straightforward imperial to metric conversion
			8 ft. × 4 ft. sheet	× 0.3364	8 ft. × 4 ft. is 32 ft. <sup>2</sup> or 2.97 m <sup>2</sup> .
25	White wash hand basin	each			
	Average-quality white vitreous china domestic wash hand basin for domestic use, wall hung (excluding taps, trap, and pipe work)				
26	High-yield steel reinforcement	tonne	lb.	× 2204.6	
	Reinforcing bars up to 16 mm in diameter (excluding cutting and bending)		ton long	× 0.9842	
			ton short	× 1.102311	
			m	× 633.6	Assume 16 mm diameter and steel weighing 7.85 t/m <sup>3</sup> .
27	Mild steel reinforcement	tonne	lb.	× 2204.6	
	Reinforcing bars up to 16 mm in diameter (excluding cutting and bending)		ton long	× 0.9842	
			ton short	× 1.102311	
			m	× 633.6	Assume 16 mm diameter and steel weighing 7.85 t/m <sup>3</sup> .
28	Structural steel sections	tonne	lb.	× 2204.6	
	Mild steel I-beams approx. 150 mm deep and 19 kg/m		ton long	× 0.9842	
			ton short	× 1.102311	
			m	× 52.63	
29	Sheet metal roofing	m <sup>2</sup>	ft. <sup>2</sup>	× 10.764264	
	Twin skin roofing panel comprising color-coated steel or aluminium profiled sheeting outer layer, 100 mm insulation, internal liner sheet		yd. <sup>2</sup>	× 1.196029	

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**Annex C** (Continued)

Ref.	Item and brief description	Preferred unit	Alternative unit	Conversion factor	Notes on conversions and conversion factors
30	Metal storage tank Metal storage tank: capacity 15 m <sup>3</sup> ; thickness of steel, 5 mm; typical size, 3.75 m × 2 m × 2 m	each			
31	Cast-iron drain pipe 150 mm diameter with mechanical coupling joints	m	ft. yd.	× 3.2808 × 1.0936	
32	Copper pipe 15 mm copper pipe suitable for mains pressure water	m	ft. yd.	× 3.2808 × 1.0936	
33	Electric pump Electric pump for pumping water: temperature range, 5–80°C; flow rate 10 L/sec; head pressure, 150 Pa	each			
34	Electric fan Electric exhaust fan for interior installation: flow rate, 1,000 L/sec; head pressure, 250 Pa	each			
35	Air-conditioning equipment Air-cooled liquid chiller, refrigerant 407C; reciprocating compressors; twin circuit; integral controls cooling load 400 kW	each			
36	Stand-by generator Diesel generating set for stand-by use, three-phase 24 V DC, 250 kVA output	each			
37	Solar collector PV solar panels, peak output 650 W, supply panels only, typically 4.5 m <sup>2</sup> total area	each			
38	Electricity Typical average commercial tariff	kWh			

Source: ICP, <http://icp.worldbank.org/>.

Note: ft. = foot; ft.<sup>2</sup> = square foot; ft.<sup>3</sup> = cubic foot; gal. = gallon; kVA = kilovolt-amp; kW = kilowatt; kWh = kilowatt hour; L = liter; lb. = pound; L/sec = liters per second; m = meter; m<sup>2</sup> = square meter; m<sup>3</sup> = cubic meter; mm = millimeter; mm<sup>2</sup> = cubic millimeter; Pa = pascal; V = volt; W = watt; yd. = yard; yd.<sup>2</sup> = square yard; yd.<sup>3</sup> = cubic yard.

## Annex D

### List of Materials, Equipment, and Labor Headings and Items for Validation, ICP 2011

Level	Validation code	Heading
Subheading	1	Materials
Item	101	Aggregate for concrete
Item	102	Sand for concrete and mortar
Item	103	Softwood for carpentry
Item	104	Softwood for joinery
Item	105	Exterior plywood
Item	106	Interior plywood
Item	107	Chipboard sheet
Item	108	Petrol/gasoline
Item	109	Diesel fuel
Item	110	Oil paint
Item	111	Emulsion paint
Item	112	Ordinary Portland cement
Item	113	Ready-mix concrete
Item	114	Precast concrete slabs
Item	115	Common bricks
Item	116	Facing bricks
Item	117	Hollow concrete blocks
Item	118	Solid concrete blocks
Item	119	Clay roof tiles
Item	120	Concrete roof tiles
Item	121	Float/sheet glass
Item	122	Double glazing units
Item	123	Ceramic wall tiles
Item	124	Plasterboard
Item	125	White wash hand basin
Item	126	High-yield steel reinforcement
Item	127	Mild steel reinforcement
Item	128	Structural steel sections
Item	129	Sheet metal roofing
Item	130	Metal storage tank
Item	131	Cast-iron drain pipe
Item	132	Copper pipe
Item	133	Electric pump
Item	134	Electric fan
Item	135	Air-conditioning equipment
Item	136	Stand-by generator
Item	137	Solar collector
Item	138	Electricity

*table continues next page*

## Annex D (Continued)

Level	Validation code	Heading
Subheading	2	Equipment
Item	201	Wheeled loader and excavator
Item	202	Tracked tractor
Item	203	Skid steer loader
Item	204	Tandem vibrating roller
Item	205	Compact track loader
Subheading	3	Labor
Item	301	General (unskilled) laborer <sup>a</sup>
Item	302	Bricklayer <sup>b</sup>
Item	303	Plumber <sup>b</sup>
Item	304	Carpenter <sup>b</sup>
Item	305	Structural steelworker <sup>b</sup>
Item	306	Electrician <sup>b</sup>
Item	307	Machine (equipment) operator <sup>b</sup>

Source: ICP, <http://icp.worldbank.org/>.

a. This group of construction workers undertakes simple, routine tasks in support of activities performed by more skilled workers. They usually have received little or no formal training. Examples of tasks they might undertake include loading and unloading materials, digging and filling holes and trenches, spreading gravel and related materials, and cleaning and tidying sites and site facilities.

b. This group of skilled construction workers has received training in their trade consisting of one or more of the following: an apprenticeship, on-the-job training, or training in a technical college or similar institution.

## Annex E

### Classification of Economies into Income Groups, ICP 2011

Based on 2010 gross national income (GNI) per capita and calculated using the World Bank Atlas method, 215 economies have been divided into three income groups:

- Low-income, US\$1,005 or less
- Middle-income, US\$1,006–12,275
- High-income, US\$12,276 or more.

Low-income economies (US\$1,005 or less)		35
Afghanistan	Gambia, The	Myanmar
Bangladesh	Guinea	Nepal
Benin	Guinea-Bissau	Niger
Burkina Faso	Haiti	Rwanda
Burundi	Kenya	Sierra Leone
Cambodia	Korea, Dem. People's Rep.	Somalia
Central African Republic	Kyrgyz Republic	Tajikistan
Chad	Liberia	Tanzania
Comoros	Madagascar	Togo
Congo, Dem. Rep.	Malawi	Uganda
Eritrea	Mali	Zimbabwe
Ethiopia	Mozambique	



**Annex E (Continued)**

Middle-income economies (US\$1,006–12,275)		110
Albania	Guyana	Paraguay
Algeria	Honduras	Peru
American Samoa	India	Philippines
Angola	Indonesia	Romania
Antigua and Barbuda	Iran, Islamic Rep.	Russian Federation
Argentina	Iraq	Samoa
Armenia	Jamaica	São Tomé and Príncipe
Azerbaijan	Jordan	Senegal
Belarus	Kazakhstan	Serbia
Belize	Kiribati	Seychelles
Bhutan	Kosovo	Solomon Islands
Bolivia	Lao PDR	South Africa
Bosnia and Herzegovina	Latvia	Sri Lanka
Botswana	Lebanon	St. Kitts and Nevis
Brazil	Lesotho	St. Lucia
Bulgaria	Libya	St. Vincent and the Grenadines
Cameroon	Lithuania	Sudan
Cabo Verde	Macedonia, FYR	Suriname
Chile	Malaysia	Swaziland
China	Maldives	Syrian Arab Republic
Colombia	Marshall Islands	Thailand
Congo, Rep.	Mauritania	Timor-Leste
Costa Rica	Mauritius	Tonga
Côte d'Ivoire	Mayotte	Tunisia
Cuba	Mexico	Turkey
Djibouti	Micronesia, Fed. Sts.	Turkmenistan
Dominica	Moldova	Tuvalu
Dominican Republic	Mongolia	Ukraine
Ecuador	Montenegro	Uruguay
Egypt, Arab Rep.	Morocco	Uzbekistan
El Salvador	Namibia	Vanuatu
Fiji	Nicaragua	Venezuela, RB
Gabon	Nigeria	Vietnam
Georgia	Pakistan	West Bank and Gaza
Ghana	Palau	Yemen, Rep.
Grenada	Panama	Zambia
Guatemala	Papua New Guinea	
High-income economies (US\$12,276 or more)		70
Andorra	Germany	Norway
Aruba	Gibraltar	Oman
Australia	Greece	Poland

*table continues next page*

## Annex E (Continued)

High-income economies (US\$12,276 or more)		70
Austria	Greenland	Portugal
Bahamas, The	Guam	Puerto Rico
Bahrain	Hong Kong SAR, China	Qatar
Barbados	Hungary	San Marino
Belgium	Iceland	Saudi Arabia
Bermuda	Ireland	Singapore
Brunei Darussalam	Isle of Man	Sint Maarten
Canada	Israel	Slovak Republic
Cayman Islands	Italy	Slovenia
Channel Islands	Japan	Spain
Croatia	Korea, Rep.	St. Martin
Curaçao	Kuwait	Sweden
Cyprus	Liechtenstein	Switzerland
Czech Republic	Luxembourg	Trinidad and Tobago
Denmark	Macao SAR, China	Turks and Caicos Islands
Equatorial Guinea	Monaco	United Kingdom
Estonia	Malta	United Arab Emirates
Faeroe Islands	Netherlands	United States
Finland	New Caledonia	Virgin Islands (U.S.)
France	New Zealand	
French Polynesia	Northern Mariana Islands	

Source: ICP, <http://data.worldbank.org/about/country-classifications>.

## Annex F

### List of Project Price Headings and Items for Validation, Construction, ICP 2011

Level	Validation code	Heading
GDP	100000.0	GROSS DOMESTIC PRODUCT
Aggregate	150000	GROSS FIXED CAPITAL FORMATION
Category	150200	CONSTRUCTION
Group	150210	RESIDENTIAL BUILDINGS
Class	150211	<i>Residential buildings</i>
Basic heading	150211.1	Residential buildings
Item	150211.101	Single-story, average quality detached house
Item	150211.102	Two-story attached house
Item	150211.103	Low-rise apartment
Item	150211.104	High-rise apartment
Group	150220	NONRESIDENTIAL BUILDINGS
Class	150221	<i>Nonresidential buildings</i>
Basic heading	150221.1	Nonresidential buildings
Item	150221.101	High-rise office/administrative building

## Annex F (Continued)

Level	Validation code	Heading
Item	150221.102	Medium-rise office/administrative building
Item	150221.103	Primary school one- or two-story
Item	150221.104	Factory/warehouse building
Group	150230	CIVIL ENGINEERING WORKS
Class	150231	<i>Civil engineering works</i>
Basic heading	150231.1	Civil engineering works
Subheading	150231.2	Materials
Item	150231.201	Highway
Item	150231.201	Concrete sewer pipes, 0.5 m in diameter, average 2 m in depth
Item	150231.201	Concrete sewer pipes, 1 m in diameter, average 3 m in depth

Source: ICP, <http://icp.worldbank.org/>.

## NOTES

1. If an item is classified as relevant, or important, in the construction and civil engineering survey, the material in question is commonly used in residential, nonresidential, or civil engineering construction projects within an economy. If an item is classified as not relevant, the material in question is not used commonly in construction projects within the economy. Thus it is less likely to realistically represent the construction material costs for the economy.
2. In most economies and in most types of work, with the possible exception of civil engineering works, material inputs represent the greatest proportion of construction value, typically as high as 50–75 percent. Building work labor represents the next greatest share, approximately 20–40 percent, whereas equipment has the smallest proportion, with a 5–20 percent share. In civil engineering works, the relative significance of labor and equipment can be reversed, and materials and products may not be the most significant component.
3. The choices of aggregation method are the Gini-Éltető-Köves-Szulc (GEKS), Geary-Khamis (GK), or Iklé-Dikhanov-Balk (IDB).
4. The size of projects can influence the cost of resources, particularly materials and equipment—large quantities and long periods of hire, for example, can reduce unit costs, and vice versa. Prices should be provided for medium-size projects—that is, projects that are not unusually small or unusually large.
5. Construction prices can vary across economies as a result of local resource and distribution costs; geographic, seismic, or climatic conditions; and local market conditions among other things, particularly in large economies and where these variations could be significant. National construction experts should consider the extent of geographic variations when pricing items and making a judgment on what represents the national average.
6. Construction prices can vary depending on detailed site conditions such as constrained city center sites, green field sites adjacent to urban areas, and remote sites that are difficult to access. When pricing items, respondents to the price survey questionnaire should assume reasonable site contexts with good access.
7. For example, for those economies that do not have clay and use alternative materials for bricks, prices for the alternative bricks should be provided and the alternative description noted. However, for those economies that do not use bricks at all but only use concrete blocks, prices for concrete blocks should not be provided because they cannot be treated as equivalent to bricks. In this case, the brick item should not be priced. Another example is that in some economies copper pipes are

not used; steel and plastic pipes are used instead. In this case, steel pipes can be treated as equivalent to copper pipes, and the respective prices should be provided and the alternative description noted. Plastic pipes are not considered equivalent to copper or steel pipes.

8. In practice, it may be useful to provide several prices per location and then take the midpoint (or average) per location, which

would then be used to determine the national midpoint or national average.

9. External works are construction works often included in contracts but outside the external walls of the building concerned. They may include boundary walls, footpaths, landscaping, parking lots, and utilities outside the building. They are excluded because they are site dependent and extremely variable in scope.

## Validation of Availability and Importance Indicators

The weighted country product dummy (CPD-W) was chosen as the official method for computing basic heading purchasing power parities (PPPs) within a region in the 2011 round of the International Comparison Program (ICP). The CPD-W weighs items to reflect the expected expenditure share *within the basic heading (BH)* of the item. Because expenditure shares below the basic heading level are by definition not available, participating economies are required to classify all available items as either "important" or "less important," and these indicators are used to assign quasi-expenditure weights in the calculation of BH-level PPPs. If an item is not available in the economy, the notion of importance is not applicable to the item. Box 20.1 describes briefly how to determine important products at the initial stage.

This chapter describes the validation steps needed to ensure the quality and comparability of the importance indicators provided by the participating economies. The validation of importance indicators is conducted in three stages: (1) intra-economy validation at the national level, (2) intereconomy validation at the regional level, and (3) global validation at the global level.

The main objectives of the three levels of validation are logically related: the objective of the intra-economy validation level is embedded in the objective at the regional (inter-economy) level, which is embedded in the global-level objective. The main objective of the intra-economy validation is to ensure that the items that best reflect the final uses of all goods and services pertaining to a basic heading have been declared important and are properly priced. This is a prerequisite to the regional-level objective, whereby it should be possible to estimate reliable PPPs for a basic heading using prices collected for important items in the basic heading, whether these are all the important items in the basic heading or only important ones in the global core list (GCL). In turn, the regional-level objective related to the GCL items is a prerequisite for the global objective, in which prices for important items in the GCL should lead to robust linking factors effectively representing the price levels of each region in the global comparison.

The following sections provide step-by-step validation guidelines, a summary of which is provided in annex.

## BOX 20.1

### How to Determine Whether an Item Is Important or Less Important

1. *Determine whether the item is in the consumer price index (CPI).* If an item is the same as or very similar to one included in the economy's consumer or retail price index, the economy should classify the item as important.
2. *Use expert judgment/common knowledge.* A statistician can call on his or her own knowledge of what brands of cigarettes, soap powder, biscuits, and so forth are widely available and commonly bought.
3. *Ask an expert.* Most often the experts are shopkeepers. The success of their businesses depends on knowing which products are best-sellers and which are bought less often.

### Intra-economy Validation



At the economy level, two stages of checks are required: (1) data and metadata availability and (2) relative price level.

The first stage consists of six steps (table 20.1) aimed at determining whether the required data and metadata sets for a particular basic heading are available so that the economy can potentially be included in the regional computation of PPPs for that basic heading. The data and metadata sets for a basic heading are (1) the prices of items declared important (check A1); (2) the importance indicators for at least one item in the basic heading (check A2); (3) the importance indicators for at least one item in a homogeneous component of the basic heading (check A3) if it is a heterogeneous basic heading; and (4) the importance indicators for at least one GCL item in the basic heading (check A4). It is expected that in most cases an important item would have a large sample of price

quotations covering as many outlets and locations (check A5) and months/quarters in the survey year (check A6) as possible. Checks A1 and A2 are essential for the economy's prices to be effectively included in the calculation of regional PPPs for the relevant basic heading. Check A3 is conducted for basic headings whose items are very diverse in nature and quality. Check A4 is critical because it determines the inclusion of an economy's prices in the calculation of regional linking factors for the basic heading. Checks A5 and A6 are desirable but not mandatory.

The second stage (table 20.2) is implemented in a two-option step depending on whether a basic heading is deemed homogeneous (check B1) or heterogeneous (check B2). The rationale is that one would expect a negative correlation between importance indicators and price relatives.

**Table 20.1** Data and Metadata Availability Checks, ICP 2011

Check type	Brief description
A1 Price availability	Each economy has provided prices for each item declared important in each basic heading.
A2 Basic heading coverage	Each economy has declared important at least one item in each basic heading.
A3 Basic heading heterogeneity	Each economy has declared important at least one item in each basic heading's homogeneous component (or subheading).
A4 Global core list (GCL) compliance	Each economy has declared important at least one GCL item in each basic heading.
A5 Consistency of relationship between importance and number of quotations	For each economy and in each basic heading, an important item displays a higher number of quotations than less important items in the same basic heading.
A6 Year-long availability	For each economy, prices for each important item are provided for each quarter, except when the item is seasonal.

Source: ICP, <http://icp.worldbank.org/>.

**Table 20.2** Relative Price Level Checks, ICP 2011

Check type	Brief description
B1 Price importance reverse relativity in homogeneous basic headings	For each economy and under each homogeneous basic heading, an important item displays lower prices than less important items in the same basic heading.
B2 Price importance reverse relativity in heterogeneous basic headings	For each economy and under each homogeneous subheading in a heterogeneous basic heading, an important item displays lower prices than less important items in the same subheading.

Source: ICP, <http://icp.worldbank.org/>.

## Data and Metadata Availability Checks



This stage of validation consists of six checks (see table 20.1).

### Check A1 Price availability

Each economy must provide prices for each item declared important in each basic heading. If a product is not available—that is, if a product does not have any price quotations—importance should not be assigned to the product.

At the outset of the ICP 2011 round, participating economies were required to assess the availability and importance of each product in the regional product list for the household consumption price surveys. Once the surveys were

over, this initial assessment was revised to ensure that, of the products actually priced in the economy, at least one product was considered important. As mentioned earlier, the importance indicators should be based on annual data, which means that if a product has quotations from any quarter, the product is deemed available in the economy.

The concept of importance is applied only to products that are available. Thus if a product does not have any price quotations throughout the survey, the product cannot be important. If a product marked as important in the initial assessment does not have any quotations in the survey, it should be revised so it will not be marked as important.

**Check A2****Basic heading coverage**

Within each basic heading, an economy must declare at least one item important. If there is no important item in a basic heading, the economy must identify at least one product that is considered to be more common in its market than other products in the basic heading and assign importance to that product.

The balance of important items and less important items must be realistic. Although it is not possible to provide a firm rule for the share of important items in a basic heading, in most cases 50–80 percent of the priced items per

basic heading would be classified as important. Higher shares may be possible if, for example, a basic heading includes very few items. Lower shares may be possible if the given market in an economy is atypical in relation to the regional item list.

**Check A3****Basic heading heterogeneity**

For the heterogeneous basic headings, each economy needs to check whether it has declared at least one item important under the homogeneous component (or subheading) of each basic heading. Box 20.2 briefly explains the notion of heterogeneous and homogeneous basic headings.

**BOX 20.2****Heterogeneous and Homogeneous Basic Headings**

If a basic heading contains a series of products that serve the same purpose, its homogeneous and importance indicators need to be validated within the basic heading. However, if a basic heading contains a range of products that serve different purposes, it is heterogeneous and should be split into homogeneous components to decide importance versus less importance.

Consideration of heterogeneity and homogeneity depends on the set of items in each regional list, on the culture of the economy, and so forth. Here is an example of a homogeneous basic heading:

110114.1	Fresh milk
Item 1	Milk, unskimmed, pasteurized
Item 2	Milk, unskimmed, UHT
Item 3	Milk, low-fat, pasteurized
...	...

The basic heading fresh milk is generally considered to be a homogeneous one because

the usage of items in the basic heading seems very similar. In this case, the importance of products belonging to the basic heading will be considered within the basic heading.

Here is an example of a heterogeneous basic heading:

110511.1	Furniture and furnishings
Item 1	Kitchen table, AKEI, Bjarstu
Item 2	Kitchen table, glass top
Item 3	Kitchen table, solid hardwood
Item 4	Kitchen chair, steel tube legs, AKEI, Gilberto
Item 5	Kitchen chair, steel tube legs
Item 6	Kitchen chair, solid hardwood
...	...

The basic heading furniture and furnishings is obviously heterogeneous. The basic heading can be divided into several subcomponents such as kitchen furniture, bedroom furniture, and dining room furniture.



### Box 20.2 (Continued)

However, the subcomponents may still not be homogeneous. For example, the prices of kitchen tables are not comparable with those of kitchen chairs. In this case, then, the heterogeneous subcomponents must be divided into homogeneous sub-subcomponents such as kitchen tables and kitchen chairs.

Deciding whether a basic heading is heterogeneous or homogeneous requires good knowledge of the market in an economy. However, most basic headings are straightforward. A basic heading such as fresh milk, fresh or chilled potatoes, or water supply is easily identified as homogeneous in most economies, whereas some basic headings such as

those named "other . . . products" are mostly heterogeneous. Also, there are some complicated basic headings such as garments and furniture and furnishings that require careful assessment when they are being divided into subcomponents.

Annex B in chapter 4 on the approach and data requirements for household consumption is a classification as heterogeneous or homogeneous of all basic headings under household consumption. It is recommended that economies use this table as a starting point for their assessment and then modify it depending on the context of their household consumption product list, market, and so forth.

#### Check A4

#### GCL compliance

In each economy, at least one GCL item must be declared important in each basic heading. Even if an item is declared important, it is not sufficient that it is a region-specific item. Region-specific items are not included in calculation of the global linking factors, and thus in the case just noted the lack of important items in the linking process would distort the results. Therefore economies must declare at least one GCL item as important among those declared important in each basic heading.

#### Check A5

#### Consistency of relationship between importance and number of quotations

For each economy and in each basic heading, an important item displays a higher number of

price quotations than less important items in the same basic heading (see box 20.3).

The number of prices collected for the products and also the number of outlets at which the prices are observed can be provisional indicators of the availability and the possible importance of the products in the market. Although this observation depends on the type of products and is not a strict rule, products with the higher number of outlets and observations would possibly be important, and those with the lower number of outlets and observations would possibly be less important.

If an item has a very high number of price quotations compared with other items and is marked as less important, or if a product with a very low number of quotations is marked as important, the case should be flagged for a relevancy check.

**BOX 20.3****Example of Consistency of Relationship between Importance and Number of Quotations****Example A****Table B20.3.1** Price Quotations for Rice Basic Heading, ICP 2011

Product code	Product name	Parent product code	Importance <sup>a</sup>	Number of price quotations	Average price
110111.101	Long grain rice, parboiled	110111.1	0	25	44.25
110111.102	Long grain rice, non-parboiled	110111.1	1	41	42.20
110111.103	Long grain rice, family pack	110111.1	0	18	202.30
110111.107	White rice, medium grain	110111.1	1	98	31.56
110111.110	Long grain rice	110111.1	1	12	1,054.60

Source: ICP, <http://icp.worldbank.org/>.

a. 1 = important; 0 = less important.

**Table B20.3.2** Product Description, ICP 2011

Product code	Product name	Reference quantity	Unit of measurement
110111.101	Long grain rice, parboiled	1	Kilogram
110111.102	Long grain rice, non-parboiled	1	Kilogram
110111.103	Long grain rice, family pack	5	Kilogram
110111.107	White rice, medium grain	1	Kilogram
110111.110	Long grain rice	35	Kilogram

Source: ICP, <http://icp.worldbank.org/>.

Suppose an economy has price quotations for the five products in the rice basic heading shown in table B20.3.1. Consistent with the number of quotations, the allocation of importance indicators for the first four items makes sense. The first and third items have a lower number of quotations and are marked as less important, whereas the second and the fourth items, with the higher number of observations, are marked as important. The fifth item should be flagged for checking because it has only 12 observations but is marked as important. If there are justifiable reasons it is marked as an important item with its small number of

observations, the indicator should not be changed. But if the national expert finds that the allocation of the importance indicator is not appropriate, it is recommended that the indicator be revised to make the product less important. In this case, the product description specifies that the price is for 35 kilograms of long grain rice as shown in table B20.3.2. Because it is a large package of 35 kilograms and the other items are packages of just 1 or 5 kilograms, each store may carry a larger number of the other products, but it is plausible that the fifth item is weighted more for the actual expenditure.

### Box 20.3 (Continued)

#### Example B

**Table B20.3.3** Price Quotations for the Basic Heading Passenger Transport by Road, ICP 2011

Product code	Product name	Parent product code	Importance	Number of price quotations	Average price
110732.101	Urban bus (city bus)	110732.1	0	3	6.25
110732.105	Interurban bus (intercity bus), 350 km	110732.1	1	3	180.00
110732.117	Taxi fare, metered	110732.1	1	3	100.00

Source: ICP, <http://icp.worldbank.org/>.

Example B is a case in which the consistency check of the number of quotations does not work well. In this case, transportation costs would be unified or controlled by the authorities, and so a high number of observations is not needed. The allocation of the importance indicator cannot be verified with the number of quotations, and even with just three observations the products can be important for the economy. This small number of observations also could apply to products that largely have the same prices across an economy, such as

automobiles and electric appliances. If the prices of a product are obtained from an economy's consumer product index survey, then even though the number of quotations is very small (such as just one), the item would be an important one for the economy.

Finally, in some cases, the NCAs set the number of quotations for their products at the beginning of their survey in order to have the same sample size each quarter. If so, this step of the check should not be conducted.

#### Check A6

#### Year-long availability

For each economy, the prices for each important item are provided for each quarter except when an item is seasonal. As in check A5, which examines the frequency of observations

in the spatial aspect, frequency of observations in the temporal aspect should be considered. Except for seasonal items, if the survey is conducted for each quarter, important items are expected to have price quotations for all quarters. This aspect can be easily checked when the national annual averages are calculated.

### Relative Price Level Checks

Data and metadata availability checks (A)

Relative price level checks (B)

Finalization of data (C)

After the annual average prices are calculated, economies are required to check the correlation between the importance indicators and the average prices of the product.

As indicated for the previous stage, economies have to price both important and less important items for each basic heading. Important products normally have lower price levels than less important products. This factor should be taken into account when calculating the PPPs for the basic heading to avoid biases.

#### Check B1

#### Price importance reverse relativity in homogeneous basic headings

For each economy and in each homogeneous basic heading, an important item displays lower prices than less important items in the same basic heading. If the unit of measurement is different item by item, it should be leveled (see box 20.4).

**BOX 20.4**
**Example of Price Importance Reverse Relativity**
**Table B20.4.1** Average Prices, Rice Basic Heading, ICP 2011

Product code	Product name	Parent product code	Importance	Number of price quotations	Average price
110111.101	Long grain rice, parboiled	110111.1	0	25	44.25
110111.102	Long grain rice, non-parboiled	110111.1	1	41	42.20
110111.103	Long grain rice, family pack	110111.1	0	18	202.30
110111.107	White rice, medium grain	110111.1	1	98	31.56
110111.110	Long grain rice	110111.1	1	12	1,054.60

Source: ICP, <http://icp.worldbank.org/>.

**Table B20.4.2** Product Description, Rice Basic Heading, ICP 2011

Product code	Product name	Reference quantity	Unit of measurement
110111.101	Long grain rice, parboiled	1	Kilogram
110111.102	Long grain rice, non-parboiled	1	Kilogram
110111.103	Long grain rice, family pack	5	Kilogram
110111.107	White rice, medium grain	1	Kilogram
110111.110	Long grain rice	35	Kilogram

Source: ICP, <http://icp.worldbank.org/>.

**Table B20.4.3** Average Prices for 1 Kilogram of Rice, ICP 2011

Product code	Product name	Importance	Average price	Average price for 1 kilogram
110111.101	Long grain rice, parboiled	0	44.25	44.25
110111.102	Long grain rice, non-parboiled	1	42.20	42.20
110111.103	Long grain rice, family pack	0	202.30	40.46 (= 202.3/5)
110111.107	White rice, medium grain	1	31.56	31.56
110111.110	Long grain rice	1	1,054.60	30.13 (= 1,054.6/35)

Source: ICP, <http://icp.worldbank.org/>.

To return to the example of the rice basic heading (check A5), the average prices of items in this basic heading in an economy appear in table B20.4.1. The usage of the items is mostly the same, and the economy considers the basic heading to be homogeneous. The economy must then check the relationship between the prices of important and less important items.

To do so, one must first check the specifications of the items to see any differences in the reference quantity (table B20.4.2). In table B20.4.1, the prices of the third and fifth items look exceptionally high regardless of importance or less importance. There should be some reason for it.

In the case shown in tables B20.4.2 and B20.4.3, the reference quantity is

### Box 20.4 (Continued)

1 kilogram, except for the third and fifth items. The prices of the third item (202.30) and fifth item (1,054.60) cannot be compared with those of other items without converting to the same reference quantity. Therefore, in such cases conversion to the same quantity is needed for this purpose.

A look at the average prices for 1 kilogram of each product reveals that the prices for the fourth and fifth items are lower than those of the less important items. However, the second item has a higher price than the third item,

even though the second item is important and the third item is less important. The products should therefore be flagged for a check. If there is a justifiable economic reason for the difference, the indicators should be retained. But if the national coordinating agency thinks the allocation of the indicator should be revised, it should be changed. (However, it is also possible that the prices of the third and fifth items are lower simply because they are sold in bulk. This aspect needs to be taken into account depending on the situation.)

#### Check B2

#### Price importance reverse relativity in heterogeneous basic headings

For each economy and under each homogeneous subheading in a heterogeneous basic heading, an important item displays lower

prices than less important items in the same subheading. As already noted in the discussion of check A3, if the basic heading is heterogeneous the importance indicators need to be verified under each homogeneous sub-basic heading (box 20.5).

### Finalization of Data

Data and metadata  
availability checks (A)

Relative price level  
checks (B)

Finalization of data (C)

#### Step C1

#### Confirm that importance indicators are intra- economy validated.

Before the importance indicators and price data are submitted, it should be confirmed that steps A1 to B2 have been successfully conducted and that the data have thus been intra-economy validated.

#### Step C2

#### Submit importance indicators together with prices to the regional coordinating agency.

After indicators are confirmed to be intra-economy validated, they can be sent to the regional coordinating agency (RCA). They should be submitted in the correct prespecified format.

### Intereconomy Validation

Intra-economy validation

Intereconomy validation

Global validation

After the RCAs receive data from their national coordinating agencies (NCAs), they have to conduct the same validation steps conducted at the intra-economy level. Data and metadata availability checks (A1–A6) and correlation checks

(B1–B2) need to be conducted again at the inter-economy level to ensure that the intra-economy validation was carried out in the proper manner. If they detect something problematic with the data and metadata availability checks

## BOX 20.5

### Sub-Subcomponents of Basic Headings

Some basic headings need careful consideration when divided into subcomponents. For example, the basic heading garments contains three subcomponents: men's clothing, women's clothing, and children's and infant's clothing. Each subcomponent contains different types of clothing such as pants, shirts, and socks. When validating importance indicators, each item needs to be assessed within the context of the homogeneous sub-subcomponents, not within the subcomponents, which are heterogeneous (see table B20.5.1).

In the example in the table, comparing the price of the suit with that of the shirt does not make sense, nor does comparing it with the price of the trousers. In this case, comparisons of the t-shirt and the open-front shirt, and of the trousers and jeans may give some indication of price

importance reverse relativity. Trousers, which are marked as important, have a lower price than jeans, which are marked as less important. If trousers were marked as less important and jeans as important, it would be better to flag them for a further check of relevancy. However, flagging them does not necessarily mean that the indicator should be changed. Depending on cultural contexts, such indicators could be justified.

If a region has a different brand strata of jeans on its product list, brandless products would be lower in price than branded products regardless of importance in the market. In some economies, a brand may have a dominant presence in the market even though it is not a less expensive product. In such a case, a reverse relativity check would not be appropriate.

**Table B20.5.1** Price Importance Reverse Relativity in Sub-Subcomponents, Garments Basic Heading, ICP 2011

Product code	Product name	Parent product code	Importance	Average price
110312.102	Men's suit, 50–80% wool blend	110312.1	1	2,068.29
110312.104	Men's trousers	110312.1	1	468.60
110312.105	Men's socks	110312.1	1	44.80
110312.106	Men's t-shirt	110312.1	1	250.40
110312.107	Men's blue jeans	110312.1	0	524.60
110312.109	Men's shirt, open front	110312.1	0	378.00

Source: ICP, <http://icp.worldbank.org/>.

or correlation checks, they need to verify the problematic indicator with the NCA before proceeding to the next stages of intereconomy validation.

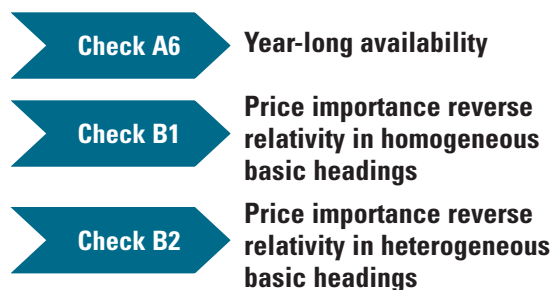
**Check A1** Price availability

**Check A2** Basic heading coverage

**Check A3** Basic heading heterogeneity

**Check A4** GCL compliance

**Check A5** Consistency of relationship between importance and number of quotations



(Refer to intra-economy validation for details.)

After the RCAs have verified the intra-economy validation, they must undertake two stages of intereconomy validation: (1) a regional binary comparability check and (2) a price level representativity check.

The first stage (table 20.3) is intended to verify whether the priced important products are available in multiple economies so that the price of the product can be compared with that in any other economy.

In the second stage (table 20.4), the price levels of important items are checked against the basic heading price levels. In the first step, the price level of each important item is compared with its basic heading price level to determine whether the price is typical for the basic heading. If the items belonging to the basic heading fail this check, then the second step of the check, in which the geometric average of the important items in the basic heading is checked against the basic heading price level, is conducted.

To assess the impact of using the concept of importance, it is recommended that differences

**Table 20.3** Regional Binary Comparability Check, ICP 2011

Check type	Brief description
D1 Regional binary comparability	Each item declared important by any economy is priced in at least one other economy in the region.

Source: ICP, <http://icp.worldbank.org/>.

**Table 20.4** Price Level Representativity Check, ICP 2011

Check type	Brief description
E1 Strong price level representativity	For a given economy, the price level of each important item is equal or very close to the basic heading price level.
E2 Weak price level representativity	For a given economy, the (geometric) average of price levels of all important items in a basic heading is equal or very close to the basic heading price level.

Source: ICP, <http://icp.worldbank.org/>.

between calculation methods that use importance in PPP calculations—the Éltető-Köves-Szulc\* (EKS\*) and country product representative dummy (CPRD)—are compared with those methods that do not use it—the EKS and country product dummy (CPD). If large differences are found, the selection of important items should be verified and corrections or reasonable justifications provided.

## Regional Relevancy Checks



Each item declared important by any economy is priced in at least one other economy in the region. In other words, any given item

should be available in at least two economies in the region, and at least one of them has declared that item as important. If the product is available in only one economy in the region, then the price cannot be compared with that of the item in any other economy.

## Price Level Representativity Checks

Regional relevancy checks (D)

Price level representativity checks (E)

Finalization of data (F)

After the basic regional binary comparability check, the price level of the important item is compared with the basic heading price level. This step is undertaken after the RCAs run the Quaranta table and obtain the PPP-ratios for each item.

### Check E1

#### Strong price level representativity

For a given economy, the price level of each important item is equal or very close to the basic heading price level. Because important items are expected to have larger expenditure shares under the basic heading, the price level of the basic heading should be closer to those of important items than those of less important items.

If an item with a very low or very high price level is selected as an important item, it should

be confirmed that this item is indeed an important one and no mistake has been made. This is important because the selection of potential outlier average prices will have an impact on the basic heading PPP. Especially for basic headings that contain only a few products, the allocation of importance indicators could greatly affect the resulting PPPs.

In practice, a region can check the price level representativity by taking the vector of all the PPP-ratios for all products in a basic heading for a given economy and then checking the items' PPP-ratios to determine whether the PPP-ratio for an item falls within a certain range close to 100. A PPP-ratio of 100 indicates that the relative price of the product is the same as the price level of the basic heading. If a PPP-ratio is far from 100, then the item should be flagged. Examples are shown in box 20.6.

### BOX 20.6

#### Example of Strong Price Level Representativity

In table B20.6.1, a Quaranta table for the basic heading fresh milk, there are eight economies in the region and seven items in the basic heading.

Table B20.6.2 looks at the allocation of importance for all seven products in this basic heading for economy C.

For economy C, the second, third, and fourth products, which are marked as important, have PPP-ratios close to 100, which means that the relative prices of those products are closer to the price level of the basic heading. Table B20.6.3 looks further at the allocation of importance for all seven products in this basic heading for economy H.

For economy H, from the perspective of price representativity, the second item should be checked to determine whether it is really an important item for the economy because its PPP-ratio is 61 percent and far from the basic heading price level of the economy. By contrast, the PPP-ratio of the fifth item is close to 100, and so it also needs to be checked to ensure that the item is important to the economy. A PPP-ratio close to 100 does not mean that the item is important, but it can be checked to ensure the allocation of indicators because its price level appears typical for the basic heading.



**Box 20.6** (Continued)

**Table B20.6.1** Quaranta Table, Basic Heading Fresh Milk (Item-Level Details), ICP 2011

110114.103	Milk, low-fat, pasteurized					Var. co.:	14.8	
Economy	NC-price	Quotations	Var. co.	XR-price	XR-ratio	PPP-price	PPP-ratio	Preferred UoM
Economy A*	1,548.1400	—*	—	1,548.14	94.59	1,548.14	103.32	1 liter
Economy B	7.000	58	3.0	1,413.12	86.34	1,567.89	104.64	1 liter
Economy C*	1.038	57*	8.4	1,770.51	108.17	1,607.07	107.25	1 liter
Economy D*	0.535	8*	2.3	1,660.66	101.46	1,580.27	105.46	1 liter
Economy E	6.880	25	13.6	2,303.69	140.75	1,504.10	100.38	1 liter
Economy F	3.583	3	4.0	1,171.70	71.59	987.28	65.89	1 liter
Economy G*	3.929	14*	25.4	1,756.09	107.29	1,734.01	115.72	1 liter
Economy H*	5.194	49*	13.6	1,689.07	103.20	1,601.03	106.85	1 liter
<b>Geometric mean</b>				<b>1,636.72</b>		<b>1,498.42</b>		

Source: ICP, <http://icp.worldbank.org/>.

Note: NC = national currency; var. co. = coefficient of variation; XR = exchange rate; UoM = unit of measurement. Important items are indicated by an asterisk (\*).

**Table B20.6.2** Basic Heading Fresh Milk: PPP-Ratios, Economy C, ICP 2011

Product code	PPP-ratio
110114.101	121.63
110114.102	107.79*
110114.103	107.25*
110114.104	98.15*
110114.105	96.35
110114.106	88.75
110114.107	84.73*

Source: ICP, <http://icp.worldbank.org/>.

Note: Important items are indicated by an asterisk (\*).

**Table B20.6.3** Basic Heading Fresh Milk: PPP-Ratios, Economy H, ICP 2011

Product code	PPP-ratio
110114.101	109.63*
110114.102	61.19*
110114.103	106.85*
110114.104	97.54
110114.105	103.86
110114.106	109.55*
110114.107	108.06*

Source: ICP, <http://icp.worldbank.org/>.

Note: Important items are indicated by an asterisk (\*).

**Check E2**

**Weak price level representativity**

For a given economy, the (geometric) average of price levels of all important items in a basic heading is equal to or very close to the basic heading price level.

If check E1, strong price level representativity, fails for a basic heading, it is strongly

recommended that the RCAs conduct the weak price level representativity check for the basic heading. If the geometric average of all important items in the basic heading does not represent the price level of the basic heading, the selection of important items needs to be carefully reviewed again. If a basic heading passes check E1, it is not necessary to conduct check E2.

## BOX 20.7

### Example of Weak Price Level Representativity, Economy G, ICP 2011

Table B20.7.1 shows the item price levels in relation to the basic heading price levels for economy G for the previous example, the basic heading fresh milk.

In economy G, importance is allocated to the items for which the PPP-ratios are

**Table B20.7.1** Basic Heading Fresh Milk: Price Level of Items, Economy G, ICP 2011

Product code	Price level
110114.101	73.84
110114.102	131.17
110114.103	115.72*
110114.104	—
110114.105	89.22*
110114.106	—
110114.107	124.50

Source: ICP, <http://icp.worldbank.org/>.

Note: — = no price quotations. Important items are indicated by an asterisk (\*).

not so close to 100. In other words, the prices are not so typical for the basic heading. In this basic heading, there is no item whose PPP-ratio is very close to 100 regardless of the allocation of the indicators. Therefore, this economy cannot have "strong" price level representativity for this basic heading, and it is recommended that the allocation of the importance indicators be verified by checking the geometric average to test weak price level representativity.

The geometric average of the PPP-ratios of the important items is 101.60, or close to 100. Therefore, although the strong price level representativity does not work well with this basic heading, at least the weak representativity is secured. If this test for weak price level representativity fails, it is recommended that the allocation of the indicators be reviewed.

In practice, this criterion can be checked by taking the geometric average of the PPP-ratios for important products in a basic heading for a given economy. If the

geometric average is close to 100, then it is fine. If it far outside a certain band—for example, 90–110—then the situation should be flagged.

## Finalization of Data



Like the household consumption (HHC) validation, the intereconomy validation of important indicators is an iterative process. In each step of checks, the NCAs and RCAs need to maintain close contact to ensure that the changes needed for the indicators will be made in a cooperative manner. Also, it should be

kept in mind that when the prices from economies joining later are added, the price level index (PLI) will change accordingly. Thus at the end of the HHC validation, it is recommended that the indicators in the last version of the Quaranta or Dikhanov tables for the region be confirmed.

**Step F1**

**Confirm that importance indicators are intra-economy validated.**

In signing off on the validation process, the NCAs are accepting responsibility for their importance indicators. The process is concluded when the NCAs formally approve the validated data. The RCA is in charge of implementing check F1.

**Step F2**

**Submit importance indicators together with prices to the Global Office.**

After the data are confirmed to be validated at the global level, they can be sent to the Global Office. The data and metadata have to be in the correct prespecified format.

## Global Validation

Intra-economy validation

Intereconomy validation

Global validation

After the indicators are validated at the national and regional levels, the Global Office conducts the global level validation to confirm and finalize them. The objective is to ensure that the submitted importance indicators for the GCL items can be properly utilized in the global linking process.

The global validation stage has three phases: (1) validation of the GCL items, (2) price level representativity checks, and (3) global linking checks.

At the first stage, the intra-economy and inter-economy checks carried out at the national and regional levels are applied to the GCL items only. At the second stage, price level representativity is checked at the intereconomy level, but this time to check the consistency across the regions. The third stage consists of two sets of checks. The first (table 20.5) checks the availability of the GCL across regions. The second (table 20.6) is intended to determine whether the velocity of the basic heading linking factors is ideal, strong, or weak.

**Table 20.5** Global Relevancy or Interregional Binary Comparability Check, ICP 2011

Check type	Brief description
G1 Global relevancy or interregional binary comparability	Each global core list item is priced in at least two regions.

Source: ICP, <http://icp.worldbank.org/>.

**Table 20.6** Linking Feasibility Checks, ICP 2011

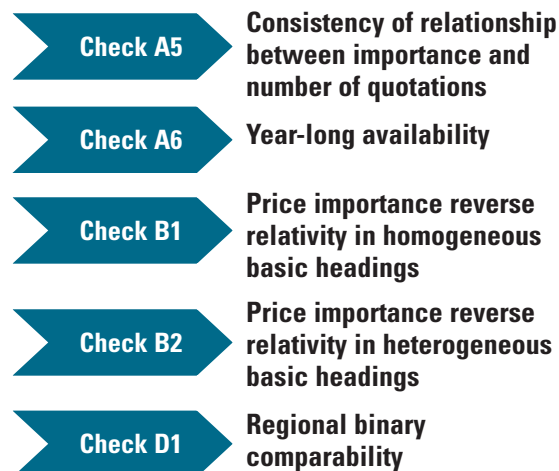
Check type	Brief description
G2 Ideal linking feasibility	For each region, the basic heading linking factor is based on the global core list (GCL) item prices provided by all economies in the region.
G3 Strong linking feasibility	For each region, the basic heading linking factor is based on the GCL item prices provided by several economies whose total share of the total regional expenditure for the basic heading is equal to or higher than 75 percent.
G4 Weak linking feasibility	For each region, the basic heading linking factor is based on the GCL item prices provided by one economy only, or the total basic heading expenditure share of the economies involved in the linking factor calculation is lower than 75 percent.

Source: ICP, <http://icp.worldbank.org/>.

## Validation of GCL Items



After receiving the importance indicators together with the price data from each region, the Global Office has to conduct the same validation steps conducted at the intraeconomy level and at the intereconomy level, for GCL items only. Checks A1, A4–A6, and B1–B2, as well as check D1, need to be conducted as part of global validation of GCL items. Only the importance indicators for the GCL items need to meet the criteria in these steps.

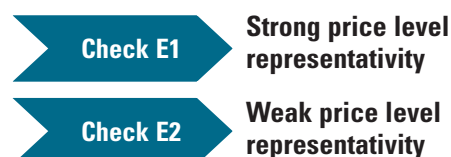


(Refer to intra- and intereconomy validation for details.)

## Price Level Representativity Checks



Price level representativity checks E1 and E2 will also be reviewed at the global level before the global linking checks. In this step, the price level of the basic heading is based on both the GCL and region-specific items.



## Global Linking Checks



Global linking checks are solely for the global-level validation in order to ensure the accuracy and preciseness of the global linking factors.



Each GCL item is priced in at least two regions. If any of these items is priced in only one region, the item cannot be used in the calculation of global linking factors because it

cannot be compared with that in any other regions.



For each region, it is ideal to base the basic heading linking factor on the GCL item prices provided by all economies in the region. In regions with a small number of economies, this approach would be applicable to most of the basic headings. However, in regions with many

economies "holes" in data are possible. In such a case, the Global Office identifies whether the linking feasibility is strong or weak using the criteria described.

#### **Check G3**

#### **Strong linking feasibility**

For each region, the basic heading linking factor is based on the GCL item prices provided by several economies whose total share of the total regional expenditure for the basic heading is equal to or higher than 75 percent. In this case, the linking factor represents most of the expenditure of the region. Linking to the other

regions would give robust results even if it is not ideal, as in check G2.

#### **Check G4**

#### **Weak linking feasibility**

For each region, if the basic heading linking factor is based on GCL item prices provided by only one economy, or the total basic heading expenditure share of the economies involved in the linking factor calculation is lower than 75 percent, the linking factor does not represent the total expenditure of region, and thus the linking factor would not be strong.

## Annex

### Summary of Validation Stages, Phases, and Steps for Availability and Importance Indicators, ICP 2011

Validation step	Description of validation steps	Validation level			
		National	Regional	Global	
Data and metadata availability checks	A1 Price availability	Each economy has provided prices for each item declared important in each basic heading (BH).	✓	✓	Global core list (GCL) products only
	A2 Basic heading coverage	Each economy has declared important at least one item in each BH.	✓	✓	
	A3 Basic heading heterogeneity	Each economy has declared important at least one item in each BH's homogeneous component (or subheading).	✓	✓	
	A4 Global core list compliance	Each economy has declared important at least one GCL item under each BH.	✓	✓	GCL products only
	A5 Consistency of relationship between importance and number of quotations	For each economy and under each BH, an important item displays a higher number of quotations than less important items in the same BH.	✓	✓	GCL products only
	A6 Year-long availability	For each economy, prices for each important item are provided for each quarter, except when the item is seasonal.	✓	✓	GCL products only
Relative price level checks	B1 Price importance reverse relativity in homogeneous BHs	For each economy and under each homogeneous BH, an important item displays lower prices than less important items in the same BH.	✓	✓	GCL products only
	B2 Price importance reverse relativity in heterogeneous BHs	For each economy and under each homogeneous subheading in a heterogeneous BH, an important item displays lower prices than less important items in the same subheading.	✓	✓	GCL products only
Finalization of data (national level)	C1–C2 Finalization of data at the economy level	Confirm that importance indicators are intra-economy validated and submit importance indicators together with prices to the regional coordinating agency.	✓		
Regional relevancy checks	D1 Regional binary comparability	Each item declared important by any economy is priced in at least one other economy in the region.		✓	GCL products only
Price level representativity checks	E1 Strong price level representativity	For a given economy, the price level of each important item is equal or very close to the BH price level.		✓	✓
	E2 Weak price level representativity	For a given economy, the (geometric) average of price levels of all important items in a BH is equal or very close to the BH price level.		✓	✓
Finalization of data (regional level)	F1–F2 Finalization of data at the regional level	Confirm that importance indicators are intra-economy validated and submit importance indicators together with prices to the Global Office.		✓	

**Annex (Continued)**

Validation step		Description of validation steps	Validation level		
			National	Regional	Global
Global linking checks	G1 Global relevancy or interregional binary comparability	Each GCL item is priced in at least two regions.			✓
	G2 Ideal linking feasibility	For each region, the BH linking factor is based on GCL item prices provided by all economies in the region.			✓
	G3 Strong linking feasibility	For each region, the BH linking factor is based on GCL item prices provided by several economies whose total share of the total regional expenditure for the BH is equal to or higher than 75 percent.			✓
	G4 Weak linking feasibility	For each region, the BH linking factor is based on GCL item prices provided by one economy only, or the total BH expenditure share of the economies involved in the linking factor calculation is lower than 75 percent.			✓

Source: ICP, <http://icp.worldbank.org/>.





# Validation of National Accounts Expenditures

Price data and national accounts data are the two pillars of the International Comparison Program (ICP). Because purchasing power parities (PPPs) are derived from price data using gross domestic product (GDP) expenditure values as weights, it is never possible to obtain sound PPP estimates without ensuring the quality of national accounts data. However, despite their importance, national accounts data did not receive as much attention in previous rounds of the ICP as in ICP 2011. In ICP 2011, a significant emphasis was placed on the quality of national accounts data and its validation to achieve soundness and consistency. This chapter deals with national accounts validation and follows on chapter 1 of this volume, which addresses the national accounts framework for the ICP.

## DATA COLLECTED

The 1993 System of National Accounts (SNA93) was the national accounts framework for ICP 2011 (Commission of the European Communities et al. 1993). The data requirements were exactly the same as those for the ICP 2005 round, but the 2011 round had the advantage of being able to use 2005 (and 2009) data as a starting point. However, it is not useful to simply apply 2005 splits to 2011 data for broad aggregates. In the 2011 round, economies compiled the 2011

expenditure data at the basic heading level using 2011 source data when available. Simply applying the 2005 splits to the 2011 broad expenditure categories was a last resort. The preferred approach was to use directly obtained data (e.g., from a household expenditure survey) to estimate values for each basic heading, but if data were not available, the commodity flow method or best "guesstimate" (but not an equal split) was used.

To obtain accurate expenditure information, the ICP asked economies to provide metadata sources as well as documentation on adjustments, if any. Each economy estimated its own expenditures, and for each basic heading expenditures were directly obtained from the economy's national accounts and were expressed in national currency for the latest year available.

## VALIDATION TOOLS

Based on the ICP national accounts forms (see the overall framework section in World Bank 2011), the ICP National Accounts Working Group (INAG) decided that a model reporting document for expenditure data and metadata—the Model Report on Expenditure Statistics (MORES)—should be used in the form of an economy case study that shows how basic expenditure values can be estimated at the basic heading level in practice.

Use of the MORES, as well as the National Accounts Quality Assurance Questionnaire and the Eurostat tabular approach to exhaustiveness, were ICP reporting requirements for the 2011 round. They were intended to support economies in their efforts to provide a detailed metadata report showing how expenditures were estimated for each basic heading.

MORES was mainly used for validation purposes in the following ways:

- *Economies*—to assist in splitting GDP, documenting the process, and reviewing the respective estimates and underlying metadata through edit and consistency checks during regular regional workshops. This two-year process sought to assist with the self-validation of each economy's data.
- *Regional coordinating agencies (RCAs)*—to review economy data and the underlying metadata during regular regional workshops, thereby providing a mechanism for making the inter-economy validation process smoother than the one in the ICP 2005 round. The RCAs ensured SNA93 compliance, consistency, and comparability.
- *Global Office*—to assist the regional offices and economies with the process of data validation (intra- and inter-) and to prepare a summary of the main findings and lessons learned and limitations of the basic heading estimates. These findings and lessons were reported on a regular basis to the Executive Board and the United Nations Statistical Commission (UNSC). A synthesis report was included in the final report. Overall, the global intereconomy validation included quality assurance, exhaustiveness, consistency, comparability, and a summary of main findings.

The National Accounts Quality Assurance Questionnaire was a set of 30 questions that covered 5 main subjects: (1) SNA93 compliance, (2) ICP requirements, (3) valuation rules, (4) price and national accounts consistency, and (5) recording rules (the full questionnaire appears in annex A).

The Eurostat tabular approach to exhaustiveness was designed by Eurostat, the statistical office of the European Union, in the late 1990s to identify potential sources of understatement

in the national accounts stemming from omissions from the statistical source data used in compiling the accounts. The tabular approach provides a consistent and complete conceptual framework by classifying adjustments into seven types of "nonexhaustiveness." It also links the available compilation methods—such as employment method, fiscal audits, or value added tax (VAT) comparisons—to the nonexhaustiveness types. The distinction between the seven different "N-types" is not important in the sense that some things could potentially be classified under one heading instead of another. Rather, the important aspects are to ensure that all potential sources of omission from the accounts are identified and included in one of the categories and that there is no duplication across categories (see details in annex B).

## VALIDATION PROCESS

The validation process for national accounts follows the same three-stage validation process (national, regional, and global) used for the household consumption survey and the price surveys for other GDP components (see table 21.1).

At each level or stage, the respective parties participate in the validation process. The national statistics offices conduct some data

**Table 21.1** National Accounts Validation Types, ICP 2011

Level	Type of validation
National	<i>Intra-economy validation</i> National statistics office (1) reviews and evaluates expenditures and relevant metadata and (2) validates against System of National Accounts requirements vis-à-vis 2005.
Regional	<i>Intereconomy validation</i> Regional office reviews the expenditure values across economies and regions.
Global	<i>Global validation</i> Global Office reviews expenditure values of all economies across regions and combines them into a global data set.

Source: ICP, <http://icp.worldbank.org/>.

analysis and checking before providing the respective regional offices with the national accounts data. The regional offices match the basic heading values with prices to identify any data anomalies, and then the Global Office checks more broadly the consistency among

regional data sets as they are combined into global results.

The sections that follow present an overview of, as well as the step-by-step process for, the different types of validation. Each arrow indicates a different type of action:



### National Level



Before the national accounts data are sent to the regional offices, simple edits can be applied at the national statistics offices to save time at the regional offices. Three main types of checks should be undertaken: (1) SNA compliance, including comparing GDP expenditure data with United Nations Statistics Division (UNSD) databases, conducting data completeness checks (nonzero values), checking any negative values, ensuring the allocation of financial intermediation services indirectly measured (FISIM), checking the allocation of net expenditures, and

conducting basic arithmetic checks; (2) price validation, including implementing price tracking for major products, verifying average price changes from 2005 to 2011, and checking the consistency of price level indexes (PLIs) across basic headings within an economy; and (3) an economic likelihood test such as verifying per capita basic heading expenditures and basic heading shares of GDP.

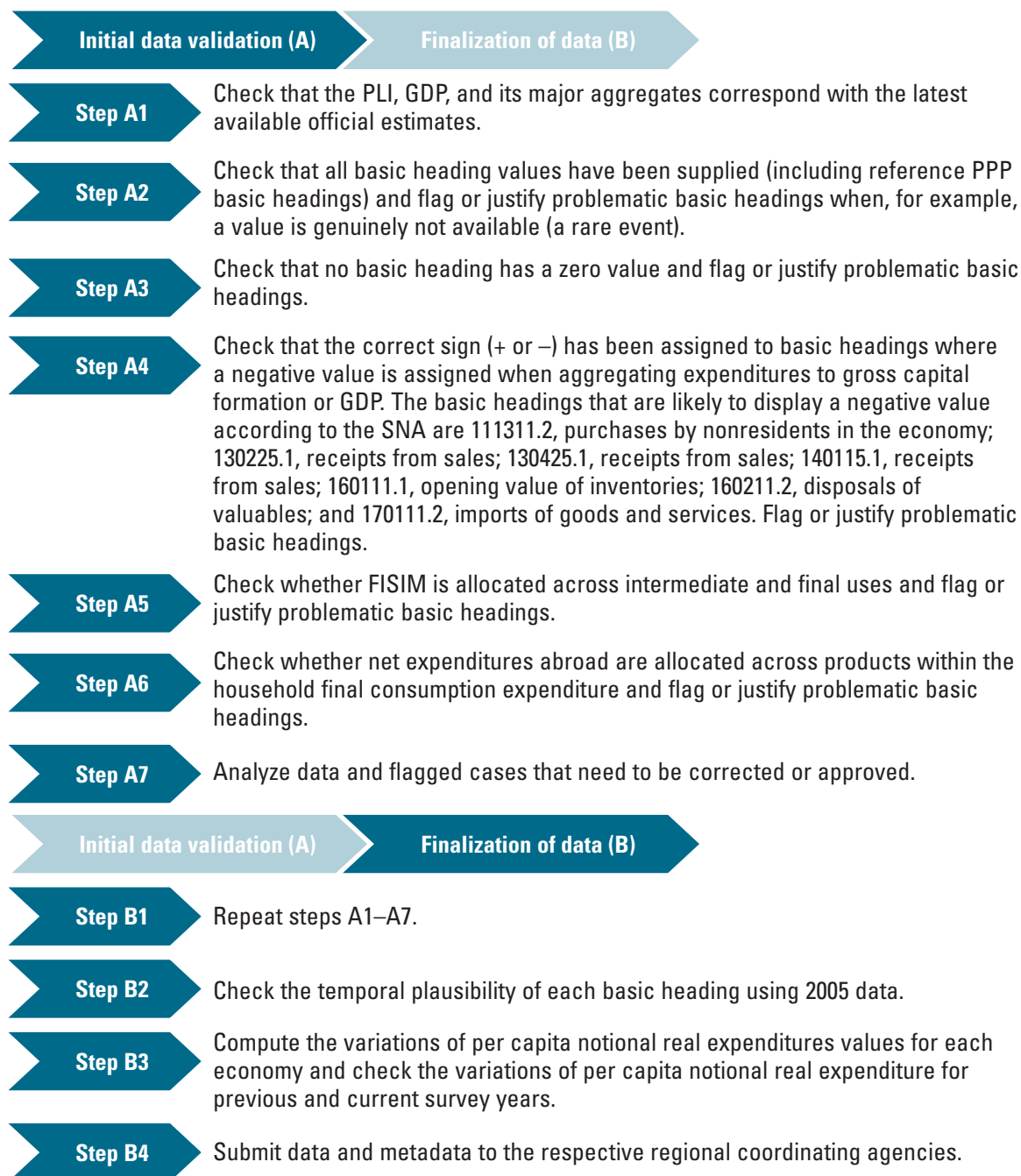
The Global Office recommends that the basic edits and consistency checks be conducted at the national level (table 21.2).

**Table 21.2** General Recommendations from Global Office for National Accounts Validation, ICP 2011

Basic edit	Consistency check
International databases	Prices and expenditures
Compare GDP and major aggregates with international databases.	<i>Check plausibility for each basic heading.</i> Notional real expenditures = nominal expenditures/geometric mean of prices
Aggregation	Temporal
Check aggregations. Check negative values.	<i>Check plausibility for each basic heading.</i> Data from ICP 2005 can be used to identify outliers that have changed significantly more than the average for all basic headings.
Completeness	
Completeness checks, such as all basic headings containing nonzero values	<i>Check variations.</i> Compare variations of per capita notional real expenditure.
Per capita checks	2005 → 2011
Deriving per capita value of real expenditures can also indicate areas that need to be examined for inconsistencies between prices and values.	

Source: ICP, <http://icp.worldbank.org/>.

What follows is the step-by-step process that is followed for the national accounts intra-economy validation.



### **Regional Level**



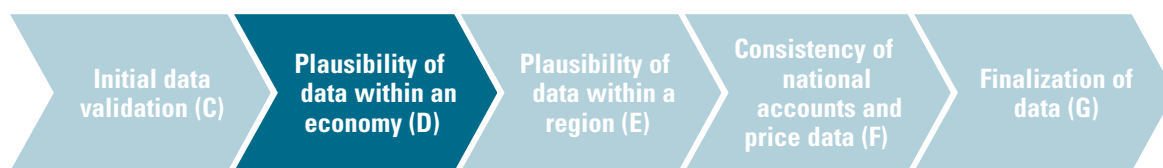
All validation edits at the national level must be repeated at the regional level. The aim of the regional validation is to compare the consistency of data from similar economies within a region.

The RCA identifies clusters of economies using economically based and regionally agreed-on criteria. GDP per capita in 2005 has served as a key indicator of the group to which an economy is allocated.

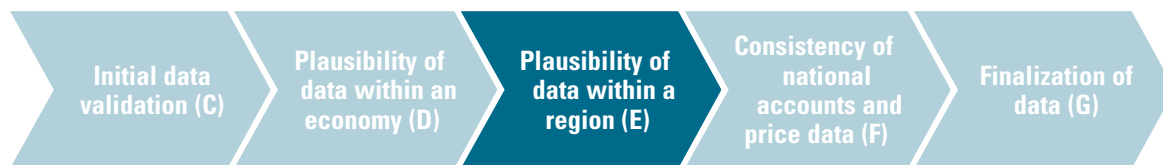
The step-by-step processes follow.



- Step C1** Repeat steps A1–A6.
- Step C2** Analyze data and correct or approve flagged cases.
- Step C3** After receiving the edited data, review the results and repeat steps C1–C3 until the data are considered final.

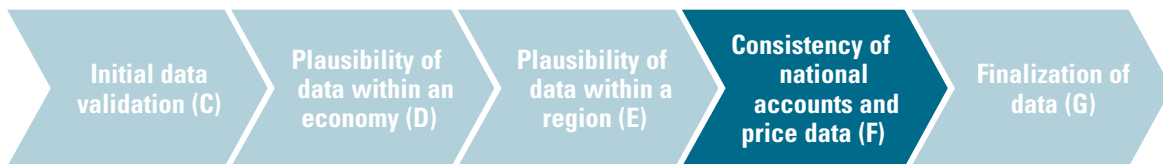


- Step D1** Check that the GDP and its major aggregates correspond with the latest published (official) version and flag or justify problematic basic headings.
- Step D2** Compare supplied national accounts data (GDP and its major aggregates) with the data of international organizations (stored in the UNSD database) and flag or justify problematic basic headings.
- Step D3** Conduct a temporal comparison between the previous and current ICP rounds of supplied national accounts data and flag or justify problematic basic headings.
- Step D4** Analyze data for flagged cases.
- Step D5** After receiving the edited data, review the results and repeat steps D1–D5 until the data are considered final.

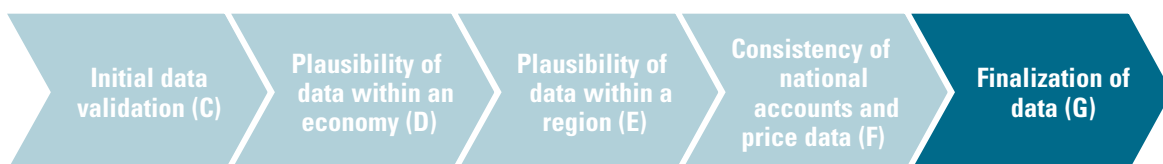


- Step E1** Form clusters of similar economies within a region—the 2005 GDP per capita or latest year data, for example, were a key indicator of the group to which an economy would be assigned.
- Step E2** Compare shares of GDP attributed to each basic heading among economies in each cluster and flag problematic basic headings.
- Step E3** Compare the basic heading shares of real expenditures (in national currency) among the economies in each cluster and flag problematic basic headings.
- Step E4** Compare per capita real expenditures and their variation for each basic heading among the economies in each cluster and flag problematic basic headings.
- Step E5** Analyze data for flagged cases and request either justification or correction.

- Step E6** Analyze the requests and correct or approve the data and submit.
- Step E7** After receiving the edited data, review the results and repeat steps E1–E7 until the data are considered final.



- Step F1** Repeat steps B2 and B3.
- Step F2** Analyze identified differences in the MORES and consider whether they derive from national accounts or price data. Query economies based on the analysis.
- Step F3** Analyze requests and correct or approve the data and submit.
- Step F4** After receiving the edited price data from the economies, review the results and repeat steps F1–F4 until the data are considered final.



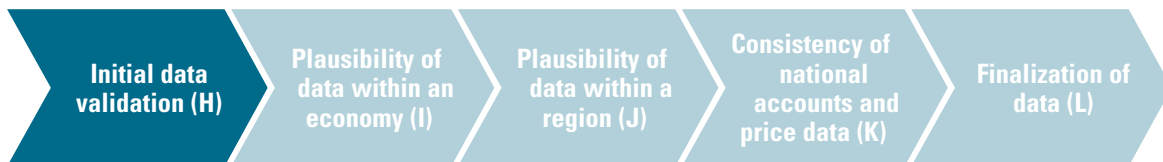
- Step G1** Confirm that data and metadata are intereconomy validated.
- Step G2** Submit price data and metadata to the Global Office.

### **Global Level**



The global comparison of real expenditures (and their per capita equivalents) is the result of the process of linking regional results together to produce worldwide results.

At the global level, the same intra-economy validation processes as previously defined are followed. The intereconomy validation process is also followed across economies and within and between regions.



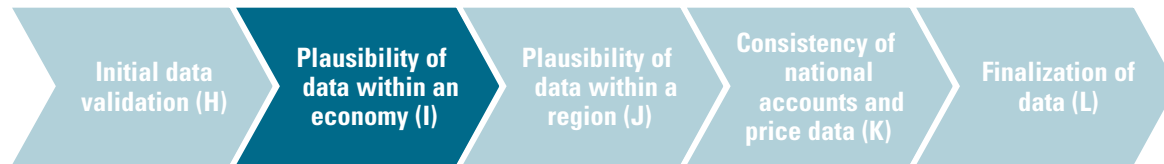
- Step H1** Repeat steps A1–A7.
- Step H2** Analyze requests and correct or approve data and submit.

**Step H3**

After receiving the edited data, review the results and repeat steps H1–H3.

**Step H4**

After receiving the edited price data, review the results and repeat steps H1–H4 until the data are considered final.

**Step I1**

Check that the GDP and its major aggregates correspond with the latest published (official) version and flag problematic cases.

**Step I2**

Compare the supplied national accounts data (GDP and its major aggregates) with the data of international organizations (stored in the UNSD database) and flag problematic cases.

**Step I3**

Conduct a temporal comparison between the previous and current ICP rounds of the supplied national accounts data and flag problematic cases.

**Step I4**

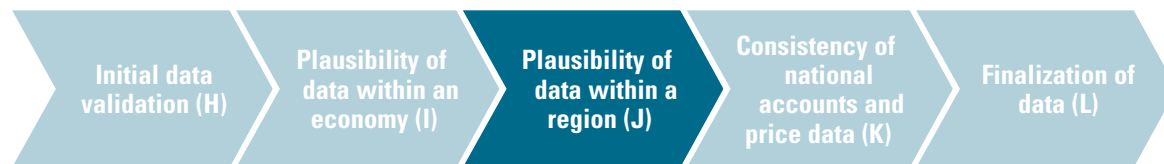
Analyze the data for flagged cases and request a justification or correction.

**Step I5**

Analyze requests and correct or approve data and submit.

**Step I6**

After receiving the edited data, review the results and repeat steps I1–I6 until the data are considered final.

**Step J1**

Form clusters of similar economies within a region using, for example, GDP per capita.

**Step J2**

Compare shares of GDP attributed to each basic heading among the economies in each cluster and flag problematic cases.

**Step J3**

Compare the basic heading shares of real expenditures (in national currency) among the economies in each cluster and flag problematic cases.

**Step J4**

Compare the per capita real expenditures for each basic heading between the economies in each cluster and flag problematic cases.

**Step J5**

Compare the variations in per capita real expenditures for each basic heading among the economies in each cluster and flag problematic cases.

**Step J6**

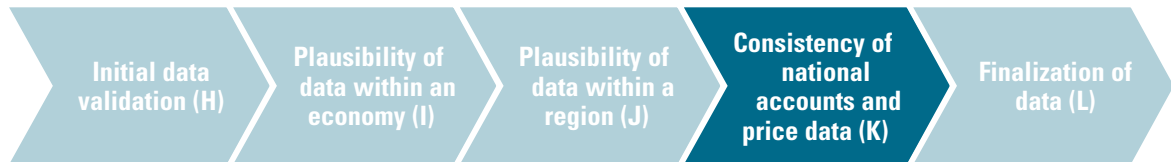
Analyze the data for flagged cases and request a justification or correction.

**Step J7**

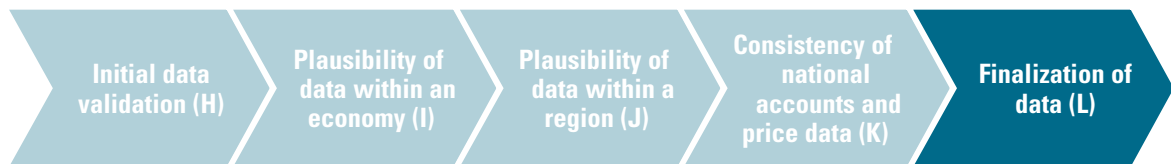
Analyze requests and correct or approve data and submit.

**Step J8**

After receiving the edited data, review the results and repeat steps J1–J8 until the data are considered final.



- Step K1** → Analyze identified differences in the MORES and consider whether they are derived from national accounts or price data.
- Step K2** → Analyze requests and correct or approve data and submit.
- Step K3** → After receiving the edited price data from the economies, repeat steps K1–K3 until the data are considered final.



- Step L1** → Confirm data and metadata as final.
- Step L2** → Use price data for final calculations.



## Annex A

### National Accounts Quality Assurance Questionnaire, ICP

Economy:		Yes	No	Comments
Q01	Do you implement the 1993 System of National Accounts (SNA)?	✓		
Q02	Does your estimate of GDP cover the full range of economic activities and transactions that are included in the production boundary of the 1993 SNA?	✓		
Q03	Do your estimates of final expenditures on GDP cover all basic headings as defined in the ICP expenditure classification and in line with the 1993 SNA?			
Q04	Does the price survey framework provide national annual average prices for the basic headings defined in the ICP expenditure classification that are consistent with the prices underlying the expenditures on the basic headings?			
Q05	Do you classify institutional sectors in line with the 1993 SNA?			
Q06	In general, are transactions valued at the actual prices agreed on by the transactors—that is, at purchasers' prices?		✓	
Q07	Are imputed rentals valued in accordance with the guidelines in the ICP Operational Material?			
Q08	Are goods produced on own account for consumption by the household valued at basic prices?			
Q09	Is income in kind valued at purchasers' prices if the employer has purchased the goods or services and at producers' prices if the goods or services have been produced by the enterprise itself?			
Q10	Is the individual consumption expenditure of nonprofit institutions serving households valued as the sum of the costs of production, including the consumption of fixed capital?			
Q11	Is the production of individual services by government valued as the sum of the costs of production, including the consumption of fixed capital?			
Q12	Are the purchases of goods and services by government that are passed on to households without any further processing by government valued at purchasers' prices?			
Q13	Is the collective consumption expenditure by government valued as the sum of the costs of production, including the consumption of fixed capital?			
Q14	Is gross fixed capital formation valued at purchasers' prices?			
Q15	Is own-account production of fixed capital assets valued at basic prices?			
Q16	Is change in inventories valued as the change in the physical quantities at the beginning and end of the year using either the average of prices over the year or the prices prevailing at the middle of the year?			
Q17	Are total imports and exports valued on an f.o.b. (free on board) basis?			
Q18	Are transactions in foreign currency converted using the midpoint exchange rate prevailing in the market at the moment they take place?			
Q19	Are the prices used in the national accounts national annual average prices, or, if they are not, are they adjusted to national annual average prices by accepted procedures?			
Q20	Are transactions and flows recorded on an accrual basis?			
Q21	Is work in progress recorded in the period it is produced?			
Q22	Are government-related transactions recorded on an accrual basis—in particular, taxes and subsidies on products and expenditures?			
Q23	Does gross fixed capital formation consist of net acquisitions (acquisitions less disposals) of fixed assets?	✓	✓	
Q24	Are valuables measured as acquisitions less disposals?		✓	
Q25	Are transaction prices measured net of discounts or rebates?		✓	

*table continues next page*

**Annex A** *(Continued)*

<b>Economy:</b>				
		<b>Yes</b>	<b>No</b>	<b>Comments</b>
Q26	Do the statistical procedures used by your office to adjust the country final expenditure data to meet ICP requirements follow a detailed, case-by-case approach, using specific sources that are those most closely related to the estimated variables and pertinent to the reference period?		✓	
Q27	Do you maintain and disseminate detailed methodological notes about your national accounts compilation process?		✓	
Q28	Has your country compiled supply-use tables (SUTs)?	✓		
		Reference year	Number of products	
Q29	If yes, please indicate the reference year of the latest one, as well as the number of products (rows) in the SUT.			
Q30	Please indicate the reference year of the most recent household expenditure survey.			

## Annex B

### Eurostat Tabular Approach to Exhaustiveness

#### Seven types of "nonexhaustiveness"

##### Not registered

###### ***N1—Producer deliberately not registered (underground activity)***

The producer does not register in order to avoid tax and social security obligations or to avoid losing some social benefits. Typically, this category includes small producers with incomes above the threshold set for registration. Producers who do not register because they are engaged in illegal activities should be classified as N2, and producers who deliberately misreport their activities should be classified as N6.

The methods that can be used to estimate the adjustments required include labor inputs (from household-based labor force surveys), commodity flows, and supply-use tables.

###### ***N2—Producer deliberately not registered (illegal activity)***

The producer deliberately fails to register because he or she is involved in illegal activities such as prostitution, selling stolen goods, dealing in drugs, smuggling, or illegal gambling. This category excludes any illegal production not reported by registered producers (which should be classified as N6) and illegal production by units not required to register (classified as N3).

The methods that can be used to estimate the adjustments are the quantity-price method, unit per input or use, and expert judgment.

###### ***N3—Producer not required to register***

Such producers are not required to register because they do not have any market output, or it is below a set threshold. Activities include production for own final consumption; own fixed capital formation, including construction of own dwelling; and repairs to dwelling. They also include market output of households that is below the level at which the producer is obliged to register as a business, paid domestic service, and so forth. No adjustment is necessary if the estimation method for a particular activity (or survey) implicitly takes into account the nonregistered activity.

The methods that can be used to estimate adjustments are household expenditure surveys, building permits, commodity flow methods, administrative data, and time use surveys.

##### Not surveyed

###### ***N4—Legal producers not surveyed***

Legal producers who may be registered can still be excluded from statistical surveys. For example, the producer may be newly registered and not yet recorded on the business register because the register-updating procedures may be slow or inadequate. On the other hand, a producer may be recorded on the business register but still excluded from the survey frames because the classification data used in developing the frames (e.g., activity code, size of business, geographic location) may be wrong, or there may be a size cutoff that precludes the producer from being selected to participate in a particular survey.

The methods that can be used to estimate adjustments are surveys of the quality of the business register, reviews of the lags involved in update procedures and whether they change over time, or cross-checks of the business register against other administrative sources of businesses.

###### ***N5—Registered entrepreneurs not surveyed***

Registered entrepreneurs (e.g., consultants, private writers, freelance journalists) may not be recorded in the business register either because of a deliberate failure to do so or because the register-updating sources do not include details on such persons. Even if their details are recorded in the business register, they may be excluded from statistical surveys either because of errors in the details recorded (e.g., activity code, size of business, geographic location) or because of the small size of their individual activities.

The methods that can be used to estimate adjustments are surveys of the quality of the register, cross-checks against other administrative sources (e.g., income tax statements), or specialized surveys.

##### Misreporting

###### ***N6—Misreporting by producer***

Misreporting involves underreporting gross output (and therefore revenues) or overreporting intermediate consumption (and therefore the costs of production) in order to avoid paying income tax, other taxes such as the value added tax (VAT), or social security contributions. Misreporting may involve maintaining two sets of books to conceal the full extent of sales, hidden secondary activities, cash settlements for sales that are unrecorded because no receipts are given, VAT fraud, salaries paid in cash to avoid overhead (so-called envelope salaries), or salaries recorded as external contractual services.

The methods that can be used to estimate adjustments are data from tax audits, comparisons of average salaries and profits for similar businesses, comparisons of input/output ratios with those of similar businesses, special surveys, or expert judgments on the accounting relationships expected to be observed in such businesses.

##### Other

###### ***N7—Other statistical deficiencies***

This category can be divided into two parts: data that are incomplete or cannot be directly collected from surveys or data that are incorrectly compiled during survey processing.

The items that should be considered in determining the adjustments to be made include how nonresponse was taken into account, the extent to which wages and salaries were paid in kind, production for own final use by market producers, tips, valuation techniques, and adjustments for accruals.

## Exhaustiveness Checks and Adjustments

Economy name:	Initial national accounts estimates	Adjustments		
		N1	N2	N3
		Nonregistration (underground activity)	Nonregistration (illegal activity)	Producer not required to register
	Complete for those accounts compiled.	Insert adjustment factor (in %) if available;		
<b>PRODUCTION APPROACH</b>				
<b>Output of goods and services (basic prices)</b>				
A Agriculture, hunting, and forestry				
B Fishing				
C Mining and quarrying				
D Manufacturing				
E Electricity, gas, and water supply				
F Construction				
G Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods				
H Hotels and restaurants				
I Transport, storage, and communications				
J Financial intermediation				
K Real estate, renting, and business activities				
L Public administration and defense; compulsory social security				
M Education				
N Health and social work				
O Other community, social, and personal service activities				
P Private households with employed persons				
Q Extraterritorial organizations and bodies				
<b>Intermediate consumption (purchasers' prices)</b>				
A Agriculture, hunting, and forestry				
B Fishing				
C Mining and quarrying				
D Manufacturing				
E Electricity, gas, and water supply				
F Construction				
G Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods				
H Hotels and restaurants				
I Transport, storage, and communications				
J Financial intermediation				
K Real estate, renting, and business activities				
L Public administration and defense; compulsory social security				
M Education				



Economy name:	Initial national accounts estimates	Adjustments		
		N1	N2	N3
		Nonregistration (underground activity)	Nonregistration (illegal activity)	Producer not required to register
	Complete for those accounts compiled.	Insert adjustment factor (in %) if available;		
N Health and social work				
O Other community, social, and personal service activities				
P Private households with employed persons				
Q Extraterritorial organizations and bodies				
<b>Gross value added (basic prices)</b>				
A Agriculture, hunting, and forestry				
B Fishing				
C Mining and quarrying				
D Manufacturing				
E Electricity, gas, and water supply				
F Construction				
G Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods				
H Hotels and restaurants				
I Transport, storage, and communications				
J Financial intermediation				
K Real estate, renting, and business activities				
L Public administration and defense; compulsory social security				
M Education				
N Health and social work				
O Other community, social, and personal service activities				
P Private households with employed persons				
Q Extraterritorial organizations and bodies				
<b>Taxes on products</b>				
<b>Value added–type taxes</b>				
<b>Other taxes on products</b>				
<b>Subsidies on products</b>				
<b>Residual item</b>				
<b>Gross domestic product</b>				
<b>EXPENDITURE APPROACH</b>				
<b>Total final expenditure</b>				
<b>Household final consumption</b>				
01 Food and nonalcoholic beverages				
02 Alcoholic beverages, tobacco, and narcotics				
03 Clothing and footwear				
04 Housing; water; electricity, gas, and other fuels				



Economy name:	Initial national accounts estimates	Adjustments		
		N1	N2	N3
		Nonregistration (underground activity)	Nonregistration (illegal activity)	Producer not required to register
	Complete for those accounts compiled.	Insert adjustment factor (in %) if available;		
05 Furnishings, household equipment, and routine household maintenance				
06 Health				
07 Transport				
08 Communication				
09 Recreation and culture				
10 Education				
11 Restaurants and hotels				
12 Miscellaneous goods and services				
<b>Final consumption, nonprofit institutions serving households (NPISHs)</b>				
<b>General government final consumption</b>				
<b>Gross capital formation</b>				
Gross fixed capital formation				
Changes in inventories				
Acquisition less disposals of valuables				
<b>Exports of goods and services</b>				
Goods				
Services				
<b>Imports of goods and services</b>				
Goods				
Services				
<b>Statistical discrepancy (residual item)</b>				
<b>Gross domestic product</b>				
<b>INCOME APPROACH</b>				
<b>Compensation of employees</b>				
<b>Gross operating surplus and mixed income</b>				
<b>Taxes on production and imports</b>				
<b>Subsidies</b>				
<b>Statistical discrepancy (residual item)</b>				
<b>Gross domestic product</b>				
<b>Compensation of employees received from rest of world (ROW)</b>				
<b>Compensation of employees paid to ROW</b>				
<b>Property income received from ROW</b>				
<b>Property income paid to ROW</b>				
<b>Taxes on production and imports subsidies</b>				
<b>Gross national income</b>				

Source: ICP, <http://icp.worldbank.org/>.





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## PPP Validation

Chapter 10 in *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)* adds a new dimension to data validation by introducing methods to examine the aggregation or averaging of basic heading purchasing power parities (PPPs) to the gross domestic product (GDP) (World Bank 2013). In the past, the average prices were subjected to vigorous data validation using Quaranta and Dikhanov analysis tables, but there was little validation of the resulting PPPs. Most of the literature on the estimation of PPPs is about the choice of index and aggregation methods, but it says very little about assessing the quality of those data.

It is assumed that the reader of this chapter is familiar with the estimation methods described in *Measuring the Real Size of the World Economy*. Chapter 4 in that volume estimates PPPs between economies within the same region, chapter 5 links them to other regions, and chapter 6 presents the global aggregation. Chapters 23 and 26 in this volume present the computation steps for each of these levels of estimation. The purpose of this chapter is to provide some guidelines for validating PPPs through each step of the aggregation to the GDP first within regions and then across regions to a global currency.

This chapter begins by reviewing the estimation and aggregation steps needed to obtain aggregate basic heading PPPs between

economies within each region and the basic validation of PPPs at each step. The validation steps should also be considered a form of data analysis that provides input for explanation of the final results.

This review is followed by a more thorough review of the methods used to validate the global PPPs. The basis for the review is the research data set from ICP 2005, which includes basic heading PPPs expressed in the global currency and expenditures in the national currency for 146 economies and 129 basic headings.

The chapter concludes with a discussion of how to deal with data from the participating economies that contain extreme outliers and suggestions on how to measure the impact of methodological changes on comparisons, with results from ICP 2005.

### WITHIN-REGION VALIDATION OF PPPs AND EXPENDITURE WEIGHTS

Within each region of ICP 2005, there is a vector of 129 basic heading PPPs for each of the  $C_r$  economies in region  $R$ , resulting in a matrix of  $C_r \times 129$ . These basic heading PPPs are base country-invariant and transitive. Another matrix of the same size contains basic heading expenditures in the national currency for each economy in the region.

## Validating Basic Heading PPPs

The analysis is based on the assumption that within-economy PPPs across the basic headings are consistent—a poor economy usually has lower price levels than a richer economy. Chapter 10 in *Measuring the Real Size of the World Economy* describes in detail how to construct box and whisker plots and tables designed to identify basic heading PPPs within each economy that are outliers. To simplify the comparisons across economies, PPPs are converted to price level indexes (PLIs) using as a base the U.S. dollar. The first step in completing the box and whisker plots is to sort the basic heading PLIs within each economy from the smallest value to the largest. The median is the PLI value for which half of the basic heading PLIs are larger and half are smaller. The median value is used because it is not affected by extremely large and small values. Annex A contains box and whisker plots for the 146 economies and 129 basic headings of ICP 2005. The boxes are constructed to represent the range of PLIs around the median that contain 80 percent of the values. The plot allows one to compare the relative size of the box for each economy and see the distance to the minimum and maximum values, or the "whiskers." Useful computations are the ratios of the maximum/minimum (max/min) values or the relative distance of the maximum and minimum values from the median.

The basic heading values can be reviewed from different dimensions. The national dimension depicted in annex A shows the range of the basic heading PPPs for each economy. A similar plot would show a box and whisker plot for each basic heading; in this case it would show the range of the PLIs across economies.

Some validation guidelines are as follows:

- Review basic headings with large within-economy max/min ratios (greater than 10). Basic headings with ratios of departures from the median greater than five should be reviewed. Determine whether a subset of basic headings account for most of the large ratios across economies, as this may indicate a specification problem.
- The distribution of economy PLIs by basic heading may identify a subset of economies

that account for most of the outlier observations. The Quaranta and Dikhanov tables should be reviewed for these economies.

- Some of the outlier PLIs may have been imputed using reference PPPs. This may signal that a review is needed of the basic headings used as references to impute other PPPs.

## Validating Basic Heading Expenditure Shares

The purpose of validating basic heading expenditure shares is to identify within an economy those that differ drastically from those of other economies. A simple check is to compute for each basic heading the median expenditure share and indicate the economies with the maximum and minimum values. For example, in ICP 2005 some economies had expenditure shares equal to or greater than 10 percent of GDP for milk, beer, and potatoes, suggesting that an additional review was required. The ratios of the maximum and minimum values of expenditure shares to the median should be reviewed. Analysis of the 2005 data suggests that basic heading expenditures with values greater than 25 times the median be reviewed. It also indicates that the size of the median to minimum ratios far exceeds the size of the maximum to median ratios, with over 78 of basic headings having minimum values of zero. In many cases, a review suggests that the minimum values indicate a failure of measurement rather than no consumption.

## Validating the Within-Region Aggregation to GDP

The aggregation or averaging of basic heading PPPs for each pair of economies ( $j$  and  $k$ ) to major aggregates and to GDP is obtained by using economy  $j$ 's basic heading weights (Laspeyres index) and then economy  $k$ 's basic heading weights (Paasche index). The Fisher index is the geometric mean of the Paasche and Laspeyres aggregated PPPs between each pair of countries. These computations are first completed separately for each region.

For each economy  $c$  within a region, there are  $c - 1$  bilateral Fisher PPPs at each level of aggregation and at GDP. The degree of similarity of the Paasche and Laspeyres results for each bilateral PPP is measured by the relative difference between the two indexes—also known as

the Paasche-Laspeyres spread (PLS). Small values indicate that the price and expenditure structures between the two economies are similar; large values indicate that the economic and price structures are different. Two validation steps follow:

- Identify the economies for which the PLS is greater than two and identify the economy with the largest PLS.
- For economy pairs with a large PLS, review the distributions of basic heading PPPs and expenditure shares—one or both may be outliers deserving additional inspection. One would expect that extreme values of PPPs would be associated with small expenditure shares; aggregates with large expenditure values should have PPPs clustered around the median.

The PPPs in the Fisher matrix are neither transitive nor base country-invariant. Therefore, the final step is to use the Gini-Éltető-Köves-Szulc (GEKS) method of aggregation, which provides final PPPs meeting both properties. Using the GEKS method, one computes the geometric mean of the direct Fisher PPP between each pair of economies and the indirect PPPs obtained through the other  $c - 2$  economies. For example, the PPP between Brazil and Chile is affected by the PPPs of each economy to every other economy in the region.<sup>1</sup> The variability between the indirect PPPs should be reviewed for each economy using the relative standard deviation of the indirect PPPs for each economy. Indirect PPPs that deviate from the median value may be the result of large PLSs, suggesting that those PPPs be reviewed. Economies with extreme differences should be removed from the matrix and the GEKS recomputed. If the resulting PPP is more than two standard deviations from the PPP, including the economy, then the GEKS should be based on the subset of economies with no extreme differences in indirect PPPs.

At this stage, there are six sets of within-region PPPs and real expenditures in a regional currency for the different levels of aggregation and GDP. The PPPs at all levels of aggregation are base country-invariant and transitive. The dilemma is that comparisons are only possible between economies within the same region.

The next section briefly describes the linking method in order to set the stage for the validation at this level.

## BETWEEN-REGION PPPs AND GLOBAL PPPs

For household consumption basic headings, each region establishes specifications for the products most commonly used by its consumers. For ICP 2005, the Global Office also established a set of specifications for products consumed widely across the world—the Ring list—and priced by two to four economies in each region. For ICP 2011, the Global Office trimmed the size of the global list and renamed it the global core list (GCL). Regions selected items from the GCL and added them to their set of regional products. The GCL is similar to the ICP 2005 Ring list; the main difference is that the GCL is embedded in the regional lists and is priced by every economy, whereas the Ring list was priced by only 18 economies in a separate price collection. Chapter 4 in *Measuring the Real Size of the World Economy* describes the linking method at the basic heading level, and chapter 8 provides results from the linking process (World Bank 2013).

The Ring/GCL average prices for items within each basic heading for each economy are converted into a regional average price using each economy's basic heading PPPs from the respective regional comparisons. In ICP 2005, this included Ring prices for 18 economies; in the 2011 round it included GCL prices for all economies. In either case, there is then a matrix of six sets of region-specific basic heading prices for the Ring or GCL items. The weighted country product dummy (CPD-W) regression<sup>2</sup> provides six between-region PPPs for each basic heading, which are used as linking factors to convert within-region basic heading PPPs to the global level. The linking is achieved by multiplying the between-region PPP for each basic heading by the within-region PPP for each basic heading for every economy in the region. Because the within-region PPPs for a given basic heading are multiplied by the same scalar value, the fixity principle is satisfied.<sup>3</sup> The quality of the between-region PPPs directly affects the overall quality of the

global PPPs. Because each within-region basic heading PPP for every economy in the region is converted to the global level by a scalar value, the global PPPs are base country–invariant and transitive.

Neither the Ring list nor the GCL was applied to difficult-to-measure basic headings such as dwelling rents, construction, equipment, and government services. Chapters 12–16 in *Measuring the Real Size of the World Economy* describe, respectively, how those linking factors were computed (World Bank 2013).

At this stage in ICP 2005, there was a  $6 \times 129$  matrix consisting of between-region PPPs for each of the 129 basic headings. Table 22.1 provides the basic heading linking factors for selected food basic headings from the 2005 comparison. In the Asia-Pacific region, the within-region basic heading PPP for rice for each economy was multiplied by 5.81, and the within-region PPPs for other cereals and flour

were multiplied by 14.10. The considerable variability across the basic headings is obvious.

Because of the critical nature of these between-region PPPs or linking factors, several validation steps are provided here with examples based on the 2005 comparison. Table 22.2 shows the median, maximum, and minimum values of the 129 basic heading linking factors for each region. Note that the maximum linking factor is 10 times larger than the median value in Africa and over six times larger in Western Asia. Also, in four of the six regions the maximum value is associated with the basic heading passenger transport by air, suggesting that the underlying data for that basic heading be more closely reviewed.

The linking factor with the smallest value in five of the six regions is associated with the basic heading production of health services: compensation of employees. Compensation of employees linking factors were also the basis for

**Table 22.1** Between-Region Linking Factors for Selected Food Basic Headings, ICP 2005

Basic heading	Africa	Asia-Pacific	CIS	Eurostat-OECD	South America	Western Asia
110111.1 Rice	4.84	5.81	15.52	0.65	1.26	0.23
110111.2 Other cereals, flour, and other cereal products	7.23	14.10	18.66	0.59	2.74	0.45
110111.3 Bread	1.96	7.24	8.12	0.43	1.26	0.15
110111.4 Other bakery products	5.79	8.22	16.05	0.65	2.16	0.26
110111.5 Pasta products	9.57	13.39	13.51	0.67	2.32	0.40
110112.1 Beef and veal	4.33	8.12	12.13	0.68	0.76	0.24
110112.2 Pork	3.00	6.32	17.14	0.66	1.05	0.22
110112.3 Lamb, mutton, and goat	2.36	7.59	9.67	0.49	1.82	0.14
110112.4 Poultry	5.75	5.29	20.42	0.92	1.16	0.38
110112.5 Other meats and meat preparations	7.36	8.63	28.08	1.22	2.17	0.46
110113.1 Fresh, chilled, or frozen fish and seafood	3.22	4.45	13.19	0.46	1.30	0.14
110113.2 Preserved or processed fish and seafood	11.85	14.82	18.17	0.75	3.72	0.34
110114.1 Fresh milk	4.71	10.59	12.99	0.58	1.22	0.35
110114.2 Preserved milk and other milk products	7.62	11.44	20.44	0.75	2.16	0.31
110114.3 Cheese	6.73	12.12	17.95	0.54	3.16	0.32
110114.4 Eggs and egg-based products	7.72	5.98	19.06	1.02	1.52	0.26
110115.1 Butter and margarine	4.49	9.50	17.36	0.51	1.66	0.26
110115.3 Other edible oils and fats	6.19	10.16	19.59	0.57	2.73	0.45
110116.1 Fresh or chilled fruit	4.56	7.23	15.53	0.61	1.12	0.15
110116.2 Frozen, preserved, or processed fruit or fruit-based products	7.25	8.42	22.08	0.55	3.11	0.26

Source: ICP, <http://icp.worldbank.org/>.

Note: CIS = Commonwealth of Independent States; OECD = Organisation for Economic Co-operation and Development.

**Table 22.2** Between-Region Basic Heading Median, Maximum, and Minimum Linking Factors, ICP 2005

Region	Median linking factor	Ratio, max/median linking factor	Basic heading/ max value	Ratio, median/min linking factor	Basic heading/min value
Africa	5.2 (0.72) <sup>a</sup>	10.2	Passenger transport by air	7.3	Compensation of employees <sup>b</sup>
Asia-Pacific	6.6 (0.61) <sup>a</sup>	4.3	Passenger transport by air	4.5	Compensation of employees <sup>b</sup>
CIS	15.9 (0.66) <sup>a</sup>	2.3	Passenger transport by air	22.5	Compensation of employees <sup>b</sup>
Eurostat-OECD	0.7 (0.38) <sup>a</sup>	3.2	Fuels and lubricants	2.9	Compensation of employees <sup>b</sup>
South America	1.8 (0.54) <sup>a</sup>	2.4	Electricity	9.1	Compensation of employees <sup>b</sup>
Western Asia	0.2 (0.69) <sup>a</sup>	6.2	Passenger transport by air	5.4	Repair of audiovisual

Source: ICP, <http://icp.worldbank.org/>.

Note: CIS = Commonwealth of Independent States; OECD = Organisation for Economic Co-operation and Development.

a. Relative standard deviation.

b. Basic heading 130221, production of health services: compensation of employees.

the production of education services and general government basic headings, with values considerably below the median as well. The median value for production of health services (compensation) in the Commonwealth of Independent States (CIS) region was over 22 times larger than the minimum value. Recall that productivity adjustments were used in the Africa, Asia-Pacific, and Western Asia regions. However, no similar productivity adjustments were applied to the between-region linking factors, which is likely the main cause of the size of the minimum values. However, the underlying compensation data should be reviewed.

The figure in annex A can be used to assess the relative position of the economies in each region. The Asia-Pacific economies generally show the lowest overall median price levels. Nearly half of the African economies have price levels approaching those in the Eurostat–Organisation for Economic Co-operation and Development (OECD) region. The questions here would be whether the Ring products and prices are representative of the Africa region and whether this is an outcome of the inability to use the representativity classification.

Validation of the between-region basic heading linking factors should include the following analysis:

- The relative size of each basic heading linking factor should be compared with the within-region basic heading PPPs across economies in the region. For example, rice is a staple food in the Asia-Pacific region with a linking factor below the median. Milk, by contrast, is

not widely consumed and has a linking factor that is more than twice the median value. Is this a general pattern across the 23 economies and their within-region PPPs for rice and milk? If not, the question is whether the Ring prices are representative of the overall regional prices.

- One would expect the extreme values of the linking factors to be associated with basic headings with relatively small expenditure shares. Special attention should be given to outlier basic heading linking factors that also may have large expenditure shares.
- Use of the importance classification should be reviewed in basic headings where the linking factors were outliers.

Once the linking factors have been validated, the next step is to use them to convert within-region basic heading PPPs to a global PPP based on a global currency. The next section briefly describes the steps needed to validate basic heading PPPs after they have been linked.

## VALIDATING BASIC HEADING PPPs AFTER LINKING

For ICP 2005, there were now two matrixes: one of 146 economies times 129 basic heading PPPs calibrated to the global currency and another of the same size for basic heading expenditures in national currencies. These data are used to illustrate validation and analysis methods for the remaining stages of estimation. The basic heading PPPs that have been calibrated to the global

level by the linking factors should be reviewed using the same analysis methods described earlier for validating the within-region PPPs, except that now all economies are reviewed together. The issue is that a basic heading PPP may become an outlier—not because of the within-region comparison, but because of the between-region linking factors. A starting point is the box and whisker plots in annex A. So that one can more easily compare levels across economies and regions, the PPPs are calibrated to price level indexes with the world equal to 100.

Ideally, the general ranking of the PLIs of the economies within a region would remain the same after the basic heading PPPs are calibrated to the global currency using the linking factors. One would also expect the maximum and minimum values to generally reflect the same basic headings. Departures in either case are reason for a more thorough review of the linking factors.

## VALIDATING THE AGGREGATION TO GDP

The same steps just described for the within-region aggregation are used for the global aggregation. The difference is that the global aggregation includes all economies, not just the economies in the same region. The geometric mean of the Paasche and Laspeyres indexes for major aggregates and GDP becomes the Fisher index, which is made transitive by the GEKS method.

The Fisher matrix contains PPPs aggregated to GDP for all bilateral combinations of economies. The PLS provides a simple way to evaluate the Fisher matrix. The tables in annexes B–E were extracted from the  $146 \times 146$  matrix of the bilateral PLSs. Specifically:

- Annexes B and C show the bilateral PLS between economies in the South America and CIS regions, respectively. Note that the maximum value in South America is 1.3 and in the CIS region 2.2. Only two bilateral pairs in the CIS have a PLS greater than 2. Recall that the PPPs being aggregated are now in the global currency. These tables demonstrate why economies are first grouped into regions with similar price and economic structures.
- Annex D shows the bilateral PLS for economies in the South America and CIS regions. Note that the spreads become considerably larger between economies in different regions. The intersection of the Argentina and Tajikistan row and column (PLS = 4.9) simply means that the aggregation of the PPPs using Argentina's weights differ by a factor of five from the aggregation using Tajikistan's weights.
- Annex E shows the PLS for the CIS and Western Asia regions. Here the PLS values indicate a difference of more than 12 times for Tajikistan and Qatar. These large values raise two questions. Is there a problem with these data, or do the two economies simply have very different economic and price structures?

The global Fisher matrix is not transitive or base country-invariant, and thus the GEKS method is used at each stage of the aggregation. The method is the same as described for the within-region PPPs, except that the GEKS PPP in the global case is the geometric mean of the direct PPPs and the 144 indirect PPPs through every other economy. The global PPP between Brazil and Chile is affected by the PPPs of each to every other economy in the global comparison. Therefore, a final review is needed to examine the variability of the direct/indirect PPPs for each economy relative to the base.

Annex F is a review of the variability of the direct/indirect PPPs for economies in the South America and CIS regions. The first set of columns shows the GEKS PPP, standard deviation, and relative standard deviation for the direct/indirect PPPs between economies in the same region. The second set of columns shows the same measures, but includes direct/indirect PPPs in each case with the 144 other economies.

The within-region variability in the South America region is considerably less than the variability when all economies are included. In addition, the relative standard deviations are below 0.10 for all but one economy despite the tremendous variability in price and economic structures around the world, pointing to the robustness of the GEKS method.

The picture is different for the CIS region, where the variability between economies within the region is greater than when all economies



are included. This indicates that the increase in the variability of the direct and indirect PPPs in the South America region was caused by the variability from the CIS economies.

Four economy pairs have PLS values greater than 10. These economies also show much variability between the direct and indirect PPPs. Two economies in the CIS region have relative standard deviations of the direct/indirect PPPs that are greater than 0.15. One of these economies also has a PLS greater than 10. Consideration should be given to undertaking the global aggregation in two stages: (1) omitting economies with PLS values greater than 10 and relative standard deviations of the direct/direct PPPs greater than 0.15 to fix the volume shares for the remaining economies, and (2) including all economies.

The resulting PPPs are base country-invariant and transitive. However, the relative ranking of

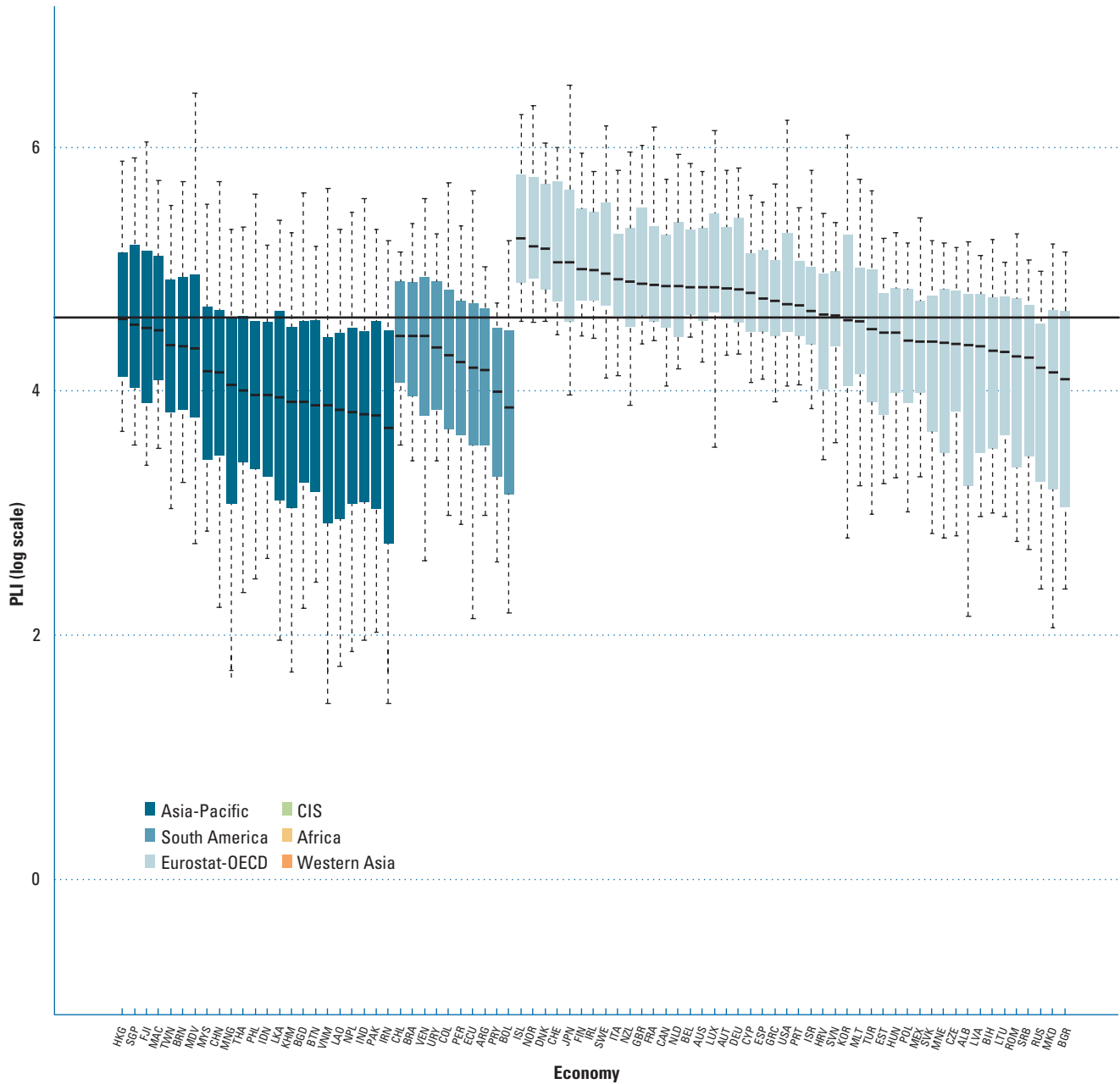
aggregate volumes will be different from that determined by the within-region aggregation. To preserve the within-region rankings (fixity principle), regional volumes from the global aggregation are distributed within each region according to the distribution from the within-region comparison.

## SUMMARY

The estimation of global PPPs and real expenditures involves many different steps. This chapter offers suggestions on how to review and validate the outcome of each. Because economies differ widely in price and economic structures, it is important that the validation process not only improve the quality of the results but also provide information that explains why the results are what they are.

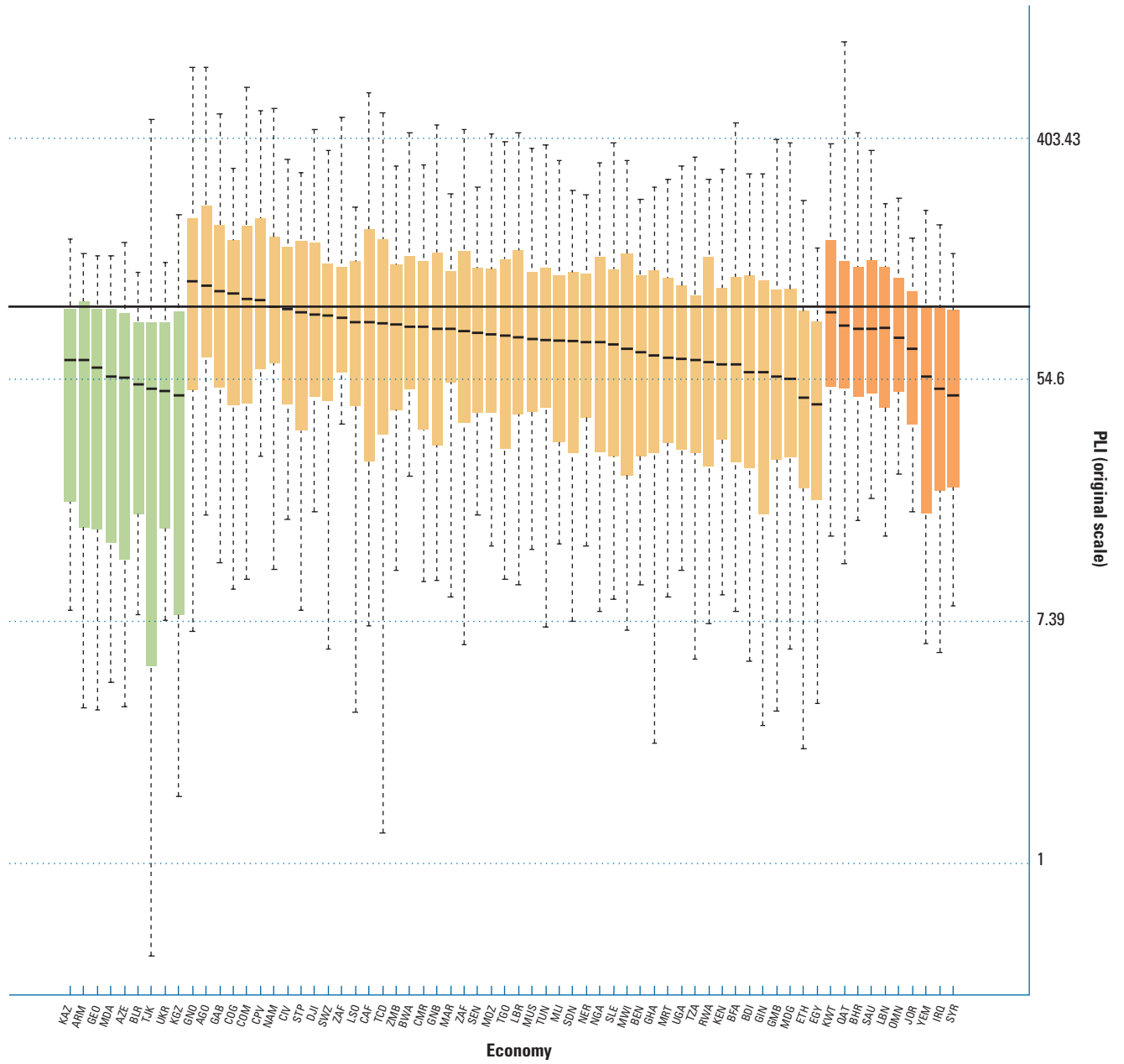
## Annex A

### Box and Whisker Plots of Price Level Indexes by Region and Economy (World = 100), ICP 2005



Source: World Bank 2013.

Note: For economy abbreviations, see annex G.



## Annex B

### Paasche-Laspeyres Spreads, South America, ICP 2005

	ARG	BOL	BRA	CHL	COL	ECU	PER	PRY	URY	VEN
ARG	1	1.31665	1.057702	1.115938	1.064895	1.068455	1.103903	1.120691	1.013246	1.112728
BOL	1.31665	1	1.377596	1.539258	1.239741	1.205684	1.318717	1.213287	1.286113	1.460253
BRA	1.057702	1.377596	1	1.109759	1.094407	1.102385	1.121606	1.162527	1.029482	1.036336
CHL	1.115938	1.539258	1.109759	1	1.124806	1.133895	1.103721	1.307738	1.076289	1.119576
COL	1.064895	1.239741	1.094407	1.124806	1	1.095609	1.056984	1.13101	1.043712	1.137037
ECU	1.068455	1.205684	1.102385	1.133895	1.095609	1	1.100222	1.228884	1.064959	1.182747
PER	1.103903	1.318717	1.121606	1.103721	1.056984	1.100222	1	1.15575	1.034154	1.229124
PRY	1.120691	1.213287	1.162527	1.307738	1.13101	1.228884	1.15575	1	1.087342	1.380457
URY	1.013246	1.286113	1.029482	1.076289	1.043712	1.064959	1.034154	1.087342	1	1.064451
VEN	1.112728	1.460253	1.036336	1.119576	1.137037	1.182747	1.229124	1.380457	1.064451	1

Source: ICP, <http://icp.worldbank.org/>.

Note: For economy abbreviations, see annex G.

## Annex C

### Paasche-Laspeyres Spreads, Commonwealth of Independent States, ICP 2005

	RUS	ARM	AZE	BLR	GEO	KAZ	KGZ	MDA	TJK	UKR
RUS	1	1.156332	1.04637	1.096709	1.069631	1.048618	1.510834	1.321048	2.224834	1.100797
ARM	1.156332	1	1.002692	1.096271	1.027008	1.290903	1.075173	1.029191	1.445546	1.008342
AZE	1.04637	1.002692	1	1.058156	1.091535	1.003626	1.136758	1.047706	1.45611	1.014986
BLR	1.096709	1.096271	1.058156	1	1.022946	1.12406	1.310351	1.122973	1.830289	1.055239
GEO	1.069631	1.027008	1.091535	1.022946	1	1.078561	1.110155	1.050316	1.359243	1.04433
KAZ	1.048618	1.290903	1.003626	1.12406	1.078561	1	1.509852	1.793821	2.05949	1.111386
KGZ	1.510834	1.075173	1.136758	1.310351	1.110155	1.509852	1	1.0853	1.185617	1.161495
MDA	1.321048	1.029191	1.047706	1.122973	1.050316	1.793821	1.0853	1	1.692394	1.027738
TJK	2.224834	1.445546	1.45611	1.830289	1.359243	2.05949	1.185617	1.692394	1	1.708188
UKR	1.100797	1.008342	1.014986	1.055239	1.04433	1.111386	1.161495	1.027738	1.708188	1

Source: ICP, <http://icp.worldbank.org/>.

Note: For economy abbreviations, see annex G.

## Annex D

### Paasche-Laspeyres Spreads, South America and Commonwealth of Independent States (CIS), ICP 2005

South America	CIS									
	RUS	ARM	AZE	BLR	GEO	KAZ	KGZ	MDA	TJK	UKR
ARG	1.166405	1.554904	1.36059	1.318396	1.479403	1.338206	2.452447	2.156894	4.945738	1.433951
BOL	1.253178	1.152595	1.148516	1.280109	1.297194	1.316462	1.642873	1.491612	2.280409	1.288632
BRA	1.184107	1.709418	1.344583	1.421331	1.837032	1.64302	2.784674	2.410244	4.268999	1.61109
CHL	1.169768	1.800086	1.389528	1.461554	1.775949	1.609805	3.00581	2.339125	4.766103	1.6261
COL	1.216883	1.48151	1.320647	1.379996	1.494564	1.452585	2.389413	2.027958	4.802931	1.432659
ECU	1.197029	1.607624	1.266112	1.373042	1.673923	1.492626	2.526658	2.118103	4.275489	1.494898
PER	1.285941	1.710609	1.365371	1.461409	1.642233	1.523868	2.606969	2.137423	4.286244	1.569204
PRY	1.266648	1.27484	1.344114	1.250301	1.425904	1.433984	1.961846	1.685958	3.494484	1.33489
URY	1.086743	1.482451	1.164737	1.247678	1.553641	1.446381	2.372494	2.120788	4.243366	1.388119
VEN	1.195583	1.765868	1.467517	1.510348	1.690273	1.517071	2.672622	2.480659	4.001218	1.593058

Source: ICP, <http://icp.worldbank.org/>.

Note: For economy abbreviations, see annex G.

## Annex E

### Paasche-Laspeyres Spreads, Commonwealth of Independent States (CIS) and Western Asia, ICP 2005

CIS	Western Asia									
	BHR	IRQ	JOR	KWT	LBN	OMN	QAT	SAU	SYR	YEM
RUS	1.882274	1.598612	1.274406	2.040124	1.191151	1.667545	2.75002	1.737359	1.213552	1.466745
ARM	4.146485	2.623799	2.160079	4.188857	1.573469	3.276141	7.494846	3.233661	1.741219	2.012911
AZE	2.275729	1.82132	1.20481	2.549382	1.118015	2.127999	3.677071	2.284481	1.218209	1.491297
BLR	2.565791	2.015793	1.376299	2.863267	1.383273	2.344557	3.933416	2.50126	1.388362	1.667022
GEO	3.253278	2.334077	1.776418	3.317772	1.554209	2.654242	5.332384	2.780262	1.562486	1.909313
KAZ	2.157349	1.815344	1.342644	2.344691	1.422312	1.889272	3.071244	2.107879	1.337475	1.596017
KGZ	5.719801	3.760991	2.509048	6.397663	2.357683	5.002608	9.362165	5.362731	2.250464	2.838451
MDA	4.881874	3.509346	2.469319	5.270089	2.271009	3.949941	8.236267	4.125672	2.007816	2.6449
TJK	8.514919	6.10093	4.069531	10.50332	4.133148	7.874649	12.30539	8.467857	3.383474	4.04478
UKR	2.989005	2.134471	1.453276	3.243473	1.353821	2.636262	4.93163	2.793987	1.449073	1.758211

Source: ICP, <http://icp.worldbank.org/>.

Note: For economy abbreviations, see annex G.

## Annex F

### Variability of Direct/Indirect GEKS PPPs within Region (South America and Commonwealth of Independent States) and World, ICP 2005

Economy	Within region			World		
	GEKS	SD	RSD	GEKS	SD	RSD
ARG	1.263655	0.065859	0.052118	1.231976	0.114915	0.093277
BOL	2.267774	0.153865	0.067848	2.185557	0.260475	0.119180
BRA	1.376821	0.063485	0.046110	1.351944	0.091109	0.067391
CHL	338.6043	17.29101	0.051066	332.9837	24.01878	0.072132
COL	1093.277	44.77194	0.040952	1065.563	80.87126	0.075895
ECU	0.429039	0.023139	0.053932	0.419524	0.039175	0.093379
PER	1.507882	0.077281	0.051251	1.476491	0.122252	0.082799
PRY	2033.032	116.3549	0.057232	1919.083	224.7851	0.117132
URY	13.47374	0.592133	0.043947	13.02919	0.984454	0.075558
VEN	1182.313	85.25294	0.072107	1160.581	118.0617	0.101726
RUS	9.526267	1.261491	0.132422	11.11319	1.479327	0.133115
ARM	131.9735	19.46702	0.147507	139.3829	16.36745	0.117428
AZE	1215.089	223.9282	0.18429	1419.117	213.722	0.150602
BLR	580.393	82.45987	0.142076	635.8988	83.44207	0.131219
GEO	0.54744	0.076572	0.139873	0.569593	0.065309	0.114659
KAZ	45.80653	5.710424	0.124664	48.66976	5.802214	0.119216
KGZ	8.381572	1.41954	0.169364	8.292754	1.146323	0.138232
MDA	3.199232	0.447422	0.139853	3.099418	0.407247	0.131395
TJK	0.576701	0.088595	0.153624	0.490684	0.078134	0.159234
UKR	1.237421	0.201095	0.162511	1.356288	0.19433	0.143281

Source: ICP, <http://icp.worldbank.org/>.

Note: For economy abbreviations, see annex G. GEKS = Gini-Éltető-Köves-Szulc; SD = standard deviation; RSD = relative standard deviation.

## Annex G

### Three-Letter Economy Codes, International Organization for Standardization

ABW	Aruba
AFG	Afghanistan
AGO	Angola
ALB	Albania
AND	Andorra
ARE	United Arab Emirates
ARG	Argentina
ARM	Armenia
ATA	Antarctica
ATG	Antigua and Barbuda
AUS	Australia
AUT	Austria
AZE	Azerbaijan
BDI	Burundi
BEL	Belgium
BEN	Benin
BFA	Burkina Faso
BGD	Bangladesh
BGR	Bulgaria
BHR	Bahrain
BHS	Bahamas, The
BIH	Bosnia and Herzegovina
BLR	Belarus
BLZ	Belize
BMU	Bermuda
BOL	Bolivia
BRA	Brazil
BRB	Barbados
BRN	Brunei Darussalam
BTN	Bhutan
BWA	Botswana
CAF	Central African Republic
CAN	Canada
CHE	Switzerland
CHL	Chile
CHN	China
CIV	Côte d'Ivoire
CMR	Cameroon
COD	Congo, Dem. Rep.
COG	Congo, Rep.
COL	Colombia

## Annex G (Continued)

COM	Comoros
CPV	Cabo Verde
CRI	Costa Rica
CUB	Cuba
CYM	Cayman Islands
CYP	Cyprus
CZE	Czech Republic
DEU	Germany
DJI	Djibouti
DMA	Dominica
DNK	Denmark
DOM	Dominican Republic
DZA	Algeria
ECU	Ecuador
EGY	Egypt, Arab Rep.
ERI	Eritrea
ESP	Spain
EST	Estonia
ETH	Ethiopia
FIN	Finland
FJI	Fiji
FRA	France
FSM	Micronesia, Fed. Sts.
GAB	Gabon
GBR	United Kingdom
GEO	Georgia
GHA	Ghana
GIB	Gibraltar
GIN	Guinea
GLP	Guadeloupe
GMB	Gambia, The
GNB	Guinea-Bissau
GNQ	Equatorial Guinea
GRC	Greece
GRD	Grenada
GRL	Greenland
GTM	Guatemala
GUF	French Guiana
GUM	Guam
GUY	Guyana
HKG	Hong Kong SAR, China
HND	Honduras
HRV	Croatia

table continues next page

**Annex G (Continued)**

HTI	Haiti
HUN	Hungary
IDN	Indonesia
IND	India
IRL	Ireland
IRN	Iran, Islamic Rep.
IRQ	Iraq
ISL	Iceland
ISR	Israel
ITA	Italy
JAM	Jamaica
JOR	Jordan
JPN	Japan
KAZ	Kazakhstan
KEN	Kenya
KGZ	Kyrgyz Republic
KHM	Cambodia
KIR	Kiribati
KNA	St. Kitts and Nevis
KOR	Korea, Rep.
KWT	Kuwait
LAO	Lao PDR
LBN	Lebanon
LBR	Liberia
LBY	Libya
LIE	Liechtenstein
LKA	Sri Lanka
LSO	Lesotho
LTU	Lithuania
LUX	Luxembourg
LVA	Latvia
MAC	Macao SAR, China
MAR	Morocco
MCO	Monaco
MDA	Moldova
MDG	Madagascar
MDV	Maldives
MEX	Mexico
MHL	Marshall Islands
MKD	Macedonia, FYR
MLI	Mali
MLT	Malta
MMR	Myanmar

**Annex G (Continued)**

MNE	Montenegro
MNG	Mongolia
MOZ	Mozambique
MRT	Mauritania
MSR	Montserrat
MTQ	Martinique
MUS	Mauritius
MWI	Malawi
MYS	Malaysia
NAM	Namibia
NCL	New Caledonia
NER	Niger
NGA	Nigeria
NIC	Nicaragua
NLD	Netherlands
NOR	Norway
NPL	Nepal
NRU	Nauru
NZL	New Zealand
OMN	Oman
PAK	Pakistan
PAN	Panama
PCN	Pitcairn
PER	Peru
PHL	Philippines
PLW	Palau
PNG	Papua New Guinea
POL	Poland
PRI	Puerto Rico
PRK	Korea, Dem. People's Rep.
PRT	Portugal
PRY	Paraguay
PYF	French Polynesia
QAT	Qatar
ROU	Romania
RUS	Russian Federation
RWA	Rwanda
SAU	Saudi Arabia
SDN	Sudan
SEN	Senegal
SGP	Singapore
SLB	Solomon Islands
SLE	Sierra Leone



### Annex G (Continued)

SLV	El Salvador
SMR	San Marino
SOM	Somalia
SRB	Serbia
SSD	South Sudan
STP	São Tomé and Príncipe
SUR	Suriname
SVK	Slovak Republic
SVN	Slovenia
SWE	Sweden
SWZ	Swaziland
SYC	Seychelles
SYR	Syrian Arab Republic
TCD	Chad
TGO	Togo
THA	Thailand
TJK	Tajikistan
TKM	Turkmenistan
TLS	Timor-Leste
TON	Tonga
TTO	Trinidad and Tobago

### NOTES

1. For example, the PPP between Brazil and Chile (*B/C*) is affected by the PPP of Brazil and Chile to Peru (*B/P*) and (*C/P*), with the indirect PPP between Brazil and Chile through Peru =  $(B/P)/(C/P)$ .
2. Weights are based on the "importance" classification, which is applied to each national annual average price. An important product is one that has a large expenditure share within the basic heading to which it belongs. It may have a very small expenditure share within household consumption as a whole but still be important

### Annex G (Continued)

TUN	Tunisia
TUR	Turkey
TUV	Tuvalu
TWN	Taiwan, China
TZA	Tanzania
UGA	Uganda
UKR	Ukraine
URY	Uruguay
USA	United States
UZB	Uzbekistan
VEN	Venezuela, RB
VGB	Virgin Islands, British
VIR	Virgin Islands (U.S.)
VNM	Vietnam
VUT	Vanuatu
WSM	Samoa
YEM	Yemen, Rep.
ZAF	South Africa
ZMB	Zambia
ZWE	Zimbabwe

within its basic heading. The weight equals 3 for important products and 1 for all other products.

3. The relative volumes from the regional comparison are maintained after the calibration to the global currency.

### REFERENCE

World Bank. 2013. *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)*. [http://site.resources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/10\\_ICPBook\\_Validation\\_F.pdf](http://site.resources.worldbank.org/ICPINT/Resources/270056-1255977254560/6483625-1291755426408/10_ICPBook_Validation_F.pdf).



# Elementary Aggregation Using the Country Product Dummy (CPD) Method

The country product dummy (CPD) regression has been used by the International Comparison Program (ICP) since the program was in its infancy. The need for an index that could deal with multiple gaps in price data was obvious because of the many missing prices. The CPD index was first introduced by Summers (1973) for use in elementary aggregation (i.e., at the level of basic heading) and for filling gaps in prices. It can be presented in two equivalent forms, with the intercept and without.<sup>1</sup>

The regression equation for the CPD can be written as

$$\ln p_{cp} = y_{cp} = x_{cp}\beta + \varepsilon_{cp} \quad (23.1)$$

where  $P_{cp}$  is the price of product  $p$  in country  $c$ ;  $Dc_j$  and  $Dp_i$  are country and product dummies, respectively;  $Np$  and  $Nc$  are number of products and countries, respectively; and

$$x_{cp} = [Dc_2 \dots Dc_{Nc} Dp_1 Dp_2 \dots Dp_{Np}]$$

and

$$\beta = [\alpha_2 \dots \alpha_{Nc} \gamma_1 \gamma_2 \dots \gamma_{Np}]^T. \quad (23.2)$$

In matrix notation, by stacking individual observations, equation (23.1) can be rewritten as

$$y = \mathbf{X}\beta + \varepsilon. \quad (23.3)$$

The first country dummy is dropped from the system because matrix  $\mathbf{X}$  is of rank  $(Np + Nc - 1)$ . (In fact, one could drop any variable from the system; dropping the first country's dummy simply makes it the base.)

The solution is given (under the conditions of independently and identically distributed random disturbances) by

$$\hat{\beta} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T y. \quad (23.4)$$

In addition, one could drop one product variable (e.g., the first product dummy) and introduce the intercept. This is the second form of the CPD. In this case,<sup>2</sup>

$$x'_{cp} = [Dc_2 \dots Dc_{Nc} 1 Dp_2 \dots Dp_{Np}]$$

$$\beta' = [\alpha'_2 \dots \alpha'_{Nc} c_{\text{intercept}} \gamma'_2 \dots \gamma'_{Np}]^T \quad (23.5)$$

and

$$y = \mathbf{X}'\beta' + \varepsilon. \quad (23.6)$$

The solutions of systems (23.4) and (23.6)—the country and product price relatives—are identical up to a scalar. In the case with the intercept,  $\alpha_j = \alpha'_j$ ;  $\gamma_1 = c_{\text{intercept}}$ ; and  $\gamma_i = \gamma'_i + c_{\text{intercept}}$ , for  $i = 2 \dots Np$ ,  $j = 2 \dots Nc$ , where  $\gamma'_i$  and  $\alpha'_j$  are the product coefficients for product  $i$  and country  $j$ , respectively.

## PRACTICAL CONSIDERATIONS IN COMPUTING THE CPD

System (23.6) is quite computer-intensive in general. This chapter presents a simpler, mathematically equivalent version of system (23.6).

In the case of the full price matrix, matrix  $(\mathbf{X}^T\mathbf{X})$  becomes

$$\mathbf{X}^T\mathbf{X} = \begin{bmatrix} Np & 0 & \dots & 0 & 1 & 1 & \dots & 1 \\ 0 & Np & \dots & 0 & 1 & 1 & \dots & 1 \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & Np & 1 & 1 & \dots & 1 \\ 1 & 1 & \dots & 1 & Nc & 0 & \dots & 0 \\ 1 & 1 & \dots & 1 & 0 & Nc & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & 1 & \dots & 1 & 0 & 0 & 0 & Nc \end{bmatrix} \quad (23.7)$$

However, computation of matrix  $(\mathbf{X}^T\mathbf{X})$  in the general case with a sparse matrix can still be simplified. Moreover, in solving for  $\hat{\beta} = (\mathbf{X}^T\mathbf{X})^{-1}\mathbf{X}^T\mathbf{y}$ , there is no need to invert matrixes;<sup>3</sup> it is only important to simplify  $(\mathbf{X}^T\mathbf{X})$  in order to significantly speed up the computations.

In general, the matrix in expression (23.7) corresponds to the case in which the price matrix is full, and thus the solution of the CPD system becomes a simple geometric mean. This means there is no need to solve system (23.4), and thus this case is not interesting.

In the case with missing price observations, expression (23.7) becomes

$$\mathbf{X}^T\mathbf{X} = \begin{bmatrix} Np(c_2) & 0 & 0 & \delta_2^1 & \delta_2^i & \delta_2^{Np} \\ 0 & Np(c_j) & 0 & \delta_j^1 & \delta_j^i & \delta_j^{Np} \\ 0 & 0 & Np(c_{Nc}) & \delta_{Nc}^1 & \delta_{Nc}^i & \delta_{Nc}^{Np} \\ \delta_2^1 & \delta_j^1 & \delta_{Nc}^1 & Nc(p_1) & 0 & 0 \\ \delta_2^i & \delta_j^i & \delta_{Nc}^i & 0 & Nc(p_i) & 0 \\ \delta_2^{Np} & \delta_j^{Np} & \delta_{Nc}^{Np} & 0 & 0 & Nc(p_{Np}) \end{bmatrix} \quad (23.8)$$

where  $Np(c_j)$  is the number of products that country  $j$  priced;  $Nc(p_i)$  is the number of countries that priced product  $i$ ; and  $\delta_j^i$  is equal to 1 if the price of product  $i$  is observed in country  $j$ ; otherwise, it is 0.

### Country Product Representative Dummy (CPRD)

The CPRD was first introduced by Cuthbert and Cuthbert (1988) to adjust for biases arising from the varying representativity of the products being compared in different countries.

Matrix  $\mathbf{X}$  becomes in this case

$$\mathbf{x}'_{cp} = [Dc_2 \dots Dc_{Nc} Dp_1 \dots Dp_{Np} R_{cp}] \quad (23.9)$$

$$\boldsymbol{\beta}' = [\alpha'_2 \dots \alpha'_{Nc} \gamma'_1 \dots \gamma'_{Np} \rho]^T$$

and

$$\mathbf{y} = \mathbf{X}'\boldsymbol{\beta}' + \boldsymbol{\varepsilon}, \quad (23.10)$$

where  $R_{cp}$  is the representativity dummy, and  $\rho$  is its respective regression coefficient.

Expression (23.8) can be augmented with one extra row and one extra column to yield

$$\mathbf{X}^T\mathbf{X} = \begin{bmatrix} Np(c_2) & 0 & 0 & \delta_2^1 & \delta_2^i & \delta_2^{Np} & Nrep(c_2) \\ 0 & Np(c_j) & 0 & \delta_j^1 & \delta_j^i & \delta_j^{Np} & Nrep(c_j) \\ 0 & 0 & Np(c_{Nc}) & \delta_{Nc}^1 & \delta_{Nc}^i & \delta_{Nc}^{Np} & Nrep(c_{Nc}) \\ \delta_2^1 & \delta_j^1 & \delta_{Nc}^1 & Nc(p_1) & 0 & 0 & Nrep(p_1) \\ \delta_2^i & \delta_j^i & \delta_{Nc}^i & 0 & Nc(p_i) & 0 & Nrep(p_i) \\ \delta_2^{Np} & \delta_j^{Np} & \delta_{Nc}^{Np} & 0 & 0 & Nc(p_{Np}) & Nrep(p_{Np}) \\ Nrep(c_2) & Nrep(c_j) & Nrep(c_{Nc}) & Nrep(p_1) & Nrep(p_i) & Nrep(p_{Np}) & Nrep \end{bmatrix} \quad (23.11)$$

where  $Nrep(c_j)$  is the number of representative products priced by country  $j$ ;  $Nrep(p_i)$  is the number of countries in which product  $i$  was found to be representative; and  $Nrep$  is the total number of representative observations.

It is important to note that the CPRD can be easily generalized to incorporate generic weights and not just the representativity dummies.

### Weighted Country Product Dummy (CPD-W)

The Diewert formulation of the weighted CPD (CPD-W) can be written in this notation as

$$\mathbf{X}^T\mathbf{X} = \begin{bmatrix} 1 & 0 & 0 & \delta_2^1 s_2^1 & \delta_2^i s_2^i & \delta_2^{Np} s_2^{Np} \\ 0 & 1 & 0 & \delta_j^1 s_j^1 & \delta_j^i s_j^i & \delta_j^{Np} s_j^{Np} \\ 0 & 0 & 1 & \delta_{Nc}^1 s_{Nc}^1 & \delta_{Nc}^i s_{Nc}^i & \delta_{Nc}^{Np} s_{Nc}^{Np} \\ \delta_2^1 s_2^1 & \delta_j^1 s_j^1 & \delta_{Nc}^1 s_{Nc}^1 & \sum_{\forall s \in S(p_1)} S_s & 0 & 0 \\ \delta_2^i s_2^i & \delta_j^i s_j^i & \delta_{Nc}^i s_{Nc}^i & 0 & \sum_{\forall s \in S(p_i)} S_s & 0 \\ \delta_2^{Np} s_2^{Np} & \delta_j^{Np} s_j^{Np} & \delta_{Nc}^{Np} s_{Nc}^{Np} & 0 & 0 & \sum_{\forall s \in S(p_{Np})} S_s \end{bmatrix} \quad (23.12)$$

where  $S(p_i)$  is a set of observations for product  $i$ , and  $s_j^i$  is weight of product  $i$  in country  $j$  (see Diewert 2004).

Sample code for the CPRD and CPD-W systems is presented in annexes A, B, and C.

## Numerical Example of CPD Computation

Table 23.1 contains a set of prices in which eight prices are missing.

The log price vector and matrix  $\mathbf{X}$  are written as in table 23.2 (the country and product dummies are designated by  $c1$  to  $c4$  and  $p1$  to  $p5$ ).

The first column is the logarithm of price. The first entry in matrix  $\mathbf{X}$  corresponds to the

price in country 1 of item 1. Thus the dummy variables are 1 for  $c1$  and  $p1$ , and other lines are computed in the same way.

The result (vector  $\beta$ ) in accordance with equation (23.4) can be computed, for example, in Excel using Worksheet Function LinEst,<sup>4</sup> or with a corresponding function from any other statistical package (see table 23.3 for the result).

**Table 23.1** Original Price Data, Five Items and Four Countries

	Country 1	Country 2	Country 3	Country 4
Item 1	1.500	4.000	2.000	3.000
Item 2	—	—	—	4.000
Item 3	—	—	1.500	—
Item 4	1.500	4.000	4.000	2.000
Item 5	—	—	5.000	2.000

Source: ICP, <http://icp.worldbank.org/>.

Note: — = not available.

**Table 23.2** Matrix  $\mathbf{X}$

$\ln(p)$	$c1$	$c2$	$c3$	$c4$	$p1$	$p2$	$p3$	$p4$	$p5$
0.405465	1	0	0	0	1	0	0	0	0
0.405465	1	0	0	0	0	0	0	1	0
1.386294	0	1	0	0	1	0	0	0	0
1.386294	0	1	0	0	0	0	0	1	0
0.693147	0	0	1	0	1	0	0	0	0
0.405465	0	0	1	0	0	0	1	0	0
1.386294	0	0	1	0	0	0	0	1	0
1.609438	0	0	1	0	0	0	0	0	1
1.098612	0	0	0	1	1	0	0	0	0
1.386294	0	0	0	1	0	1	0	0	0
0.693147	0	0	0	1	0	0	0	1	0
0.693147	0	0	0	1	0	0	0	0	1

Source: ICP, <http://icp.worldbank.org/>.

**Table 23.3** Result, Vector  $\beta$

	Country 1	Country 2	Country 3	Country 4
PPP	1	2.666667	2.144695	1.435729

Source: ICP, <http://icp.worldbank.org/>.

## Annex A

### Pseudo-Code (Algorithm) of Simple Country Product Representative Dummy (CPRD) Calculation, According to Equation (23.4)

'function body, Prices and Weights are inputs,  
CPD coefficients are outputs

Function CPD(Prices, Weights)

'**STEP 1:** finding dimensions of regression by counting the number of non-zero prices

'Nc is number of countries, Np is number of products

```
For j = 1 To Nc
  For i = 1 To Np
    If (Prices(i, j) > 0) Then n = n + 1
  Next i
Next j
```

'**STEP 2:** building matrix **X** [dummies] and vector **Y** [log prices] for regression

```
k = 1
For j = 1 To Nc
  For i = 1 To Np
    If Prices(i, j) > 0 Then
      Y(k) = Log(Prices(i, j))
      If j > 1 Then X(k, j - 1) = 1
      If i > 1 Then X(k, Nc - 1 + i - 1) = 1
      X(k, Nc - 1 + Np) = Weights(i, j)
      k = k + 1
    End If
  Next i
Next j
```

'**STEP 3:** calling Regressor function with intercept [specific to environment: WorksheetFunction.LinEst in Excel, [X\Y] in MATLAB, regress in STATA, etc.]

Regression = Regressor(Y(), X(), intercept)

'**STEP 4:** preparing output – vector of regression coefficients, inserting zeroes for one item and one product dummy coefficient

Output() <- Regression() + zeros for two coefficients

'function returns results

CPD = Output

End Function

## Annex B

### Actual VBA/Excel Code of Simple Country Product Representative Dummy (CPRD) Calculation, According to Equation (23.4)

'general settings

Option Base 1

Option Explicit

'function body

Function CPD(Prices, Weights)

'local definitions of variables

Dim P#(), W#(), Output#(), Regression, X#(), Y#(), Nc&, Np&, i&, j&, k&, n&

'finding the boundaries of arrays

Np = UBound(Prices, 1): Nc = UBound(Prices, 2)

'dimensioning arrays of prices and weights

ReDim P(Np, Nc), W(Np, Nc)

'**STEP 1:** assigning data to working arrays and finding dimensions of regression

```
For j = 1 To Nc
  For i = 1 To Np
    P(i, j) = Prices(i, j)
    W(i, j) = Weights(i, j)
    If (P(i, j) > 0) Then n = n + 1
  Next i
Next j
```

'dimensioning arrays for regression

ReDim X(n, Nc - 1 + Np - 1 + 1), Y(n, 1), Output(1, Nc + Np + 2)

'**STEP 2:** building matrix **X** and vector **Y** for regression

```
k = 1
For j = 1 To Nc
  For i = 1 To Np
    If P(i, j) > 0 Then
      Y(k, 1) = Log(P(i, j))
      If j > 1 Then X(k, j - 1) = 1
      If i > 1 Then X(k, Nc - 1 + i - 1) = 1
      X(k, Nc - 1 + Np) = W(i, j)
      k = k + 1
    End If
  Next i
Next j
```

'**STEP 3:** calling built-in Excel regressor

Regression = WorksheetFunction.LinEst(Y(), X(), 1, 0)

'STEP 4: preparing output – vector of regression coefficients

```
For j = 1 To Nc - 1: Output(1, j + 1) =
Regression(Nc + Np - j): Next j
For i = 1 To Np - 1: Output(1, Nc + i + 1) =
Regression(Np - i + 1): Next i
Output(1, Nc + Np + 2) = Regression(Nc + Np)
Output(1, Nc + Np + 1) = Regression(1)
```

'function returns results

CPD = Output

End Function

### Annex C

#### Pseudo-Code (Algorithm) of Simple Weighted Country Product Dummy (CPD-W) Calculation, According to Equation (23.12)

'function body, Prices and Weights are inputs, CPD coefficients are outputs

Function CPDW(Prices, Weights)

'STEP 1: finding dimensions of regression by counting the number of non-zero prices

'Nc is number of countries, Np is number of products

```
For j = 1 To Nc
  For i = 1 To Np
    If (Prices(i, j) > 0) Then n = n + 1
  Next i
Next j
```

'STEP 2: building matrix Xty and vector XtX according to  $\hat{\beta} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{y}$

k = 1

```
For j = 1 To Nc
  For i = 1 To Np
    yy = P(i, j): xx = W(i, j)
    If (yy > 0) Then
      yy = Math.Log(yy)
      Xty(i + Nc - 1) = Xty(i + Nc - 1) + yy * xx
      XtX(Nc - 1 + i, Nc - 1 + i)
        = XtX(Nc - 1 + i, Nc - 1 + i) + xx
    If j > 1 Then
      Xty(j - 1) = Xty(j - 1) + yy * xx
      XtX(j - 1, j - 1) = XtX(j - 1, j - 1) + xx
      XtX(j - 1, Nc - 1 + i) = xx
```

End If

End If

Next i

Next j

'STEP 3: calling Regressor function with intercept [specific to environment: WorksheetFunction.LinEst in Excel, [X\Y] in MATLAB, regress in STATA, etc.]

Regression = Regressor(Xty(), XtX(), intercept)

'STEP 4: preparing output – vector of regression coefficients, inserting zeroes for one item and one product dummy coefficient

Output() <- Regression() + zeros for two coefficients

'function returns results

CPDW = Output

End Function

### NOTES

1. The variant with intercept appears in chapter 11 of the *ICP Methodological Handbook* (World Bank 2008). Rao (2004) and Diewert (2004) use one without the intercept.
2. Note that the sign (') does not mean transpose. The sign (<sup>T</sup>) is used for that purpose.
3. Modern methods of computational matrix algebra find solving a linear system via matrix inversion very inefficient. Other methods such as Cholesky decomposition and LU decomposition are judged to be superior.
4. If the log price vector is located in range (O3:O14) and matrix **X** is in range (Q3:X14), then the formula will be invoked as = EXP(LINEST(O3:O14,Q3:X14,0,0)). Note that the result is in logs and needs to be exponentiated.

### REFERENCES

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- Summers, R. 1973. "International Price Comparisons Based upon Incomplete Data." *Review of Income and Wealth* 19: 1–16.
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## Reference PPPs

In the 2005 round of the International Comparison Program (ICP), prices were not collected for goods and services representing all 155 basic headings. This decision was based on the realization that it would have been too expensive and time-consuming to collect prices for all 155 basic headings and that for some basic headings, such as gross operating surplus of government, no prices were available. For those basic headings for which no price data were collected, purchasing power parities (PPPs) were calculated using reference PPPs.

Another option was to calculate overall PPPs without taking into account the basic headings for which no prices were collected. The expenditure shares of these PPPs would be dropped, and the PPPs would be calculated only for the remaining basic headings for which prices were actually collected. However, this was not a preferred option because one of the main objectives of the program is to obtain results that reflect the full gross domestic product (GDP).

The use of reference PPPs continued into the 2011 round of the ICP.

### KINDS OF REFERENCE PPPs

Reference PPPs can be categorized as

- Price-based reference PPPs, specific or neutral
- Volume-based reference PPPs
- Exchange rate reference PPPs.

Virtually all of the reference PPPs used for the ICP are price-based rather than volume-based. They are price relatives (PPPs) that have already been calculated by comparing the prices of goods and services classified under other basic headings. Some are PPPs of basic headings that are thought to be similar to the basic headings for which no prices have been collected. "Similar" means that if the missing prices were available, their price relatives vis-à-vis other countries would be close to the PPPs of the basic headings selected. Here these PPPs are referred to as *specific* reference PPPs. They may be the PPPs for a single basic heading or an average of the PPPs for several basic headings, and in this case they will be geometric averages of the selected PPPs weighted by expenditure shares.

In other cases, the reference PPPs are the PPPs of a large group of basic headings such as all the basic headings under gross fixed capital formation for which prices have been collected. The purpose here is to ensure that the use of reference PPPs will not change the PPP for that larger group. These are known as *neutral* reference PPPs because they should have no impact on the PPPs of the larger group of basic headings.

In previous rounds of the ICP, reference PPPs were mostly based on PPPs—that is, on price relatives. In ICP 2005, Asia and Africa used reference volume relatives for the basic heading actual and imputed rentals for housing.

Exchange rate reference PPPs were used for the basic headings exports of goods and services

and imports of goods and services, as well as for the basic headings final consumption expenditure of resident households in the rest of the world and final consumption expenditure of nonresident households in the economic territory.

For exports and imports, it would be very expensive to collect prices in order to calculate PPPs in the same way as for the other items of final expenditure, and the use of exchange rates can be justified on practical grounds. For net purchases by residents abroad, however, there may be better alternatives to the use of exchange rates. In any event, it appears to be correct to regard exchange rates as reference PPPs rather than as true measured PPPs.

### REFERENCE PPPs FOR ICP 2011

The annex to this chapter lists the reference PPPs recommended by the Global Office for use

for each basic heading during the 2011 round of the ICP. It also lists the reference PPPs used in the 2005 round. Specific reference PPPs are highlighted in the table.

The distinction between specific and neutral reference PPPs is usually obvious, but there are some borderline cases. For example, the PPPs for production of education services by government are used as reference PPPs for the basic heading net taxes on production: education. Here they are shown as specific PPPs on the assumption that they have been selected because their price relatives are similar to those of the production of education services. However, it is just as likely that the PPPs for production of education services by government were selected as reference PPPs because that would have a neutral effect on the overall PPP for government education services.

## Annex

### Reference PPPs, ICP 2005 and ICP 2011

Basic heading (BH)	Reference PPP, ICP 2005	Reference PPP, ICP 2011	2005/2011	Comments	
110231.1	Narcotics	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	Unweighted geometric average of PPPs for tobacco (110221.1) and pharmaceutical products (110611.1)	Change (specific)	Narcotics usually include drugs similar to marijuana and qat, which can be compared to tobacco, as well as opium, cocaine, morphine, and heroin, which in turn can be compared to pharmaceuticals. If the national accounts expenditure data for this basic heading include all these forms of narcotics, then the reference PPP would be the unweighted geometric average of PPPs for tobacco (110221.1) and pharmaceutical products (110611.1). If the national accounts expenditure data include expenditures on qat only, for example, then a more suitable reference PPP would be the PPP for tobacco (110221.1).
110442.1	Miscellaneous dwelling services	PPPs for actual and imputed rents	Weighted geometric average of PPPs for maintenance and repair of the dwelling (110431.1) and water supply (110441.1)	Change (specific)	
110631.1	Hospital services	PPPs for production of health services by government without net taxes on production and receipts from sales	PPPs for outpatient health services (110620.0)	Change (specific)	
110714.1	Animal-drawn vehicles	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for bicycles (110713.1)	Change (specific)	
110734.1	Passenger transport by sea and inland waterway		PPPs for transport services (110730.0), excluding reference PPP BHs	New (neutral)	This reference PPP would apply to regions where the product lists do not specify services under this basic heading.
110735.1	Combined passenger transport		Weighted geometric average of PPPs for passenger transport by railway (110731.1) and passenger transport by road (110732.1)	New (specific)	This reference PPP would apply to regions where the product lists do not specify services under this basic heading.
110736.1	Other purchased transport services		Weighted geometric average of PPPs for passenger transport by railway (110731.1) and passenger transport by road (110732.1)	New (specific)	This reference PPP would apply to regions where the product lists do not specify services under this basic heading.
110923.1	Maintenance of other major durables		Weighted geometric average of PPPs for maintenance and repair of personal transport equipment (110723.1) and repair of audiovisual, photographic, and information processing equipment (110915.1)	New (specific)	

*table continues next page*

**Annex (Continued)**

Basic heading (BH)		Reference PPP, ICP 2005	Reference PPP, ICP 2011	2005/2011	Comments
110943.1	Games of chance	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for recreational and sporting services (110941.1)	Change (specific)	
110961.1	Package holidays	Weighted average of PPPs for transport services and restaurants and hotels	Weighted geometric average of PPPs for transport services (110730) and restaurants and hotels (111100), excluding reference PPP BHs	Same	
111221.1	Prostitution	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for individual consumption expenditure by households (110000), excluding health and education BHs and reference PPP BHs	Same	
111241.1	Social protection	PPPs for government final consumption expenditure, excluding social protection, recreation and culture, and housing	PPPs for collective consumption expenditure by government (140000), excluding reference BHs	Change (specific)	
111251.1	Insurance	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for individual consumption expenditure by households (110000), excluding health and education BHs and reference PPP BHs	Same	
111261.1	Financial intermediation services indirectly measured (FISIM)	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for individual consumption expenditure by households (110000), excluding health and education BHs and reference PPP BHs	Same	
111311.1	Purchases by residential households in the rest of the world	Exchange rates	Exchange rates	Same	
111311.2	Purchases by nonresidential households in the economic territory	Exchange rates	Exchange rates	Same	
120111.1	NPISH (nonprofit institution serving households) consumption	PPPs for government final consumption expenditure, excluding social protection, recreation and culture, and housing	PPPs for individual consumption expenditure by government (130000), excluding reference PPP BHs	Change (specific)	The proposed reference PPP should be applied only when all countries are reporting expenditures on NPISH consumption. If some countries fail to report expenditures on NPISH consumption, the NPISH expenditures for countries that have reported would be reallocated to the relevant BHs under individual household consumption, and then there would be no need for reference PPPs for NPISH consumption.
130111.1	Housing (government)	PPPs for actual and imputed rents	PPPs for actual and imputed rents (110411.1)	Same	

**Annex (Continued)**

Basic heading (BH)		Reference PPP, ICP 2005	Reference PPP, ICP 2011	2005/2011	Comments
130212.4	Hospital services (government)	PPPs for production of health services by government without net taxes on production and receipts from sales	PPPs for production of health services by government without net taxes on production and receipts from sales	Same	The proposed reference PPP should be applied only when all countries are reporting expenditures on hospital services (government). If some countries fail to report expenditures on hospital services (government), the hospital services (government) expenditures for countries that have reported would be reallocated to the relevant BHs under individual household consumption, and then there would be no need for reference PPPs for hospital services (government).
130222.1	Intermediate consumption: health services	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for individual consumption expenditure by households (110000), excluding health and education BHs and reference PPP BHs	Same	
130223.1	Gross operating surplus: health services	PPPs for gross fixed capital formation	PPPs for gross fixed capital formation (150000), excluding reference PPP BHs	Same	
130224.1	Net taxes on production: health services	PPPs for production of health services by government without net taxes on production and receipts from sales	PPPs for production of health services by government without net taxes on production and receipts from sales	Same	
130225.1	Receipts from sales: health services	PPPs for production of health services by government without net taxes on production and receipts from sales	PPPs for production of health services by government without net taxes on production and receipts from sales	Same	
130311.1	Recreation and culture (government)	PPPs for government final consumption expenditure, excluding social protection, recreation and culture, and housing	Weighted geometric average of PPPs for recreational and sporting services (110941.1) and cultural services (110942.1)	Same	The proposed reference PPP should be applied only when all countries are reporting expenditures on recreation and culture (government). If some countries fail to report expenditures on recreation and culture (government), the recreation and culture (government) expenditures for countries that have reported would be reallocated to the relevant BHs under individual household consumption, and then there would be no need for reference PPPs for recreation and culture (government).
130411.1	Education benefits and reimbursements	PPPs for production of education services by government without net taxes on production and receipts from sales	PPPs for production of education services by government without net taxes on production and receipts from sales	Same	The proposed reference PPP should be applied only when all countries are reporting expenditures on education benefits and reimbursements. If some countries fail to report expenditures on education benefits and reimbursements, the education benefits and reimbursements expenditures for countries that have reported would be reallocated to the relevant BHs under individual household consumption, and then there would be no need for reference PPPs for education benefits and reimbursements.

*table continues next page*

Annex (Continued)

Basic heading (BH)		Reference PPP, ICP 2005	Reference PPP, ICP 2011	2005/2011	Comments
130422.1	Intermediate consumption: education	PPPs for individual consumption expenditure by households, excluding health and education basic headings and reference PPP basic headings	PPPs for individual consumption expenditures by households (110000), excluding health and education BHs and reference PPP BHs	Same	
130423.1	Gross operating surplus: education	PPPs for gross fixed capital formation	PPPs for gross fixed capital formation (150000), excluding reference PPP BHs	Same	
130424.1	Net taxes on production: education	PPPs for production of education services by government without net taxes on production and receipts from sales	PPPs for production of education services by government without net taxes on production and receipts from sales	Same	
130425.1	Receipt from sales: education	PPPs for production of education services by government without net taxes on production and receipts from sales	PPPs for production of education services by government without net taxes on production and receipts from sales	Same	
130511.1	Social protection (government)	PPPs for government final consumption expenditure, excluding social protection, recreation and culture, and housing	PPPs for individual consumption expenditure by government, excluding social protection, recreation and culture, and housing	Change (specific)	
140112.1	Intermediate consumption: collective services	PPPs for individual consumption expenditure by households, excluding health and education BHs and reference PPP BHs	PPPs for individual consumption expenditure by households (110000), excluding health and education BHs and reference PPP BHs	Same	
140113.1	Gross operating surplus: collective services	PPPs for gross fixed capital formation	PPPs for gross fixed capital formation (150000), excluding reference PPP BHs	Same	
140114.1	Net taxes on production: collective services	PPPs for production of collective services by government without net taxes on production and receipts from sales	PPPs for production of collective services by government without net taxes on production and receipts from sales	Same	
140115.1	Receipts from sales: collective services	PPPs for production of collective services by government without net taxes on production and receipts from sales	PPPs for production of collective services by government without net taxes on production and receipts from sales	Same	
150121.2	Other road transport		PPPs for motor vehicles, trailers, and semitrailers (150121.1)	New (specific)	
150122.1	Other transport equipment	PPPs for gross fixed capital formation	PPPs for machinery and equipment (150100), excluding reference PPP BHs	Change (neutral)	
160111.1	Opening value of inventories	Weighted average of PPPs for consumer goods and equipment goods	PPPs for goods	Same	Refer to the ICP Classification for goods BHs
160111.2	Closing value of inventories	Weighted average of PPPs for consumer goods and equipment goods	PPPs for goods	Same	Refer to the ICP Classification for goods BHs
160211.1	Acquisitions of valuables	PPPs for jewelry, clocks, and watches	Exchange rates	Change (specific)	

### Annex (Continued)

Basic heading (BH)		Reference PPP, ICP 2005	Reference PPP, ICP 2011	2005/2011	Comments
160211.2	Disposals of valuables	PPPs for jewelry, clocks, and watches	Exchange rates	Change (specific)	
170111.1	Exports of goods and services	Exchange rates	Exchange rates	Same	
170111.2	Imports of goods and services	Exchange rates	Exchange rates	Same	

Source: ICP, <http://icp.worldbank.org/>.

Note: The number in parentheses is the basic heading (BH) code. *Specific* stands for specific price-based reference PPPs, which are the PPPs for a single basic heading or an average of the PPPs for several basic headings. *Neutral* stands for neutral price-based reference PPPs, which would not affect the PPPs for higher aggregates.





# PPP Aggregation Above the Basic Heading Level Using the GEKS Method

This chapter describes the steps required in the International Comparison Program (ICP) to aggregate, using the Gini-Éltető-Köves-Szulc (GEKS) method, purchasing power parities (PPPs) above the basic heading (BH) level within regions. The GEKS method is one of several multilateral comparison methods used to construct aggregate PPPs and relative volumes for countries within each region. This method is nonadditive and consists of two steps:

1. Aggregate the basic heading PPPs using the country's national accounts expenditure structures to obtain the bilateral PPPs for each pair of countries. Usually, Fisher-type PPPs will be used, which requires calculating the Paasche-type and Laspeyres-type PPPs. The Fisher-type binary PPPs will simply be the geometric mean of the Laspeyres-type and Paasche-type PPPs.
2. Average the Fisher-type PPPs obtained to arrive at the final vector of GEKS PPPs.

The GEKS calculations are performed separately for each aggregation level and for each category within a given aggregation level.

Consider an example of four countries (Cou1, Cou2, Cou3, Cou4) for a category consisting of three basic headings (BH1, BH2, BH3) that will be aggregated (weighted with their expenditure structure) into a higher-level aggregate (aggregate 1).

## INPUTS AND PRELIMINARY CHECK

The inputs consist of the following:

1. A matrix of  $M$  basic heading multilateral PPPs recorded for  $N$  countries.  $PPP(j)_i$  is the PPP between country  $j$  and the base country for basic heading  $i$ . Cou1 is the base country in this example, but all BH PPPs are transitive and invariant.

BH-PPPs	Cou1	Cou2	Cou3	Cou4
BH1-PPPs	1.00	0.85	0.11	2.78
BH2-PPPs	1.00	1.04	0.20	3.44
BH3-PPPs	1.00	0.96	0.20	3.80

2. A matrix of  $M$  basic heading expenditure structures recorded for  $N$  countries.  $E(j)_i$  represents the expenditure structure corresponding to basic heading  $i$  and country  $j$ .

BH-Expenditures	Cou1	Cou2	Cou3	Cou4
BH1-Exp	170.92	10.02	90.71	3,308.99
BH2-Exp	198.62	3.22	45.30	9,690.60
BH3-Exp	1,922.74	97.13	241.82	31,671.72

The next step is to perform a preliminary check of the basic heading PPPs: for any given basic heading, the recorded PPPs must be either different from 0 for all countries or 0 for all of them. No "mixed content" is allowed throughout the aggregation procedure. Reference PPPs

will be used where PPPs are missing for a given basic heading.

## CALCULATING THE CROSS-COUNTRY REAL VOLUMES MATRIX

The first step in the PPP aggregation consists of calculating a matrix of cross-country real volumes. These will be used later to compute the Laspeyres-type and Paasche-type indexes.

Each country's expenditure for a given basic heading is converted to the currency of the numéraire country. It is called a "notional quantity" because it serves the function of a quantity with its values at numéraire country prices (United Nations 1992). The real volume is simply an aggregate of a group of notional quantities. For example,  $q(j, k)_i = E(j)_i \times \frac{PPP(k)_i}{PPP(j)_i}$ , also equal to  $\frac{E(j)_i}{PPP(j, k)_i}$ , represents the country

$j$  "notional quantity" for basic heading  $i$  at country  $k$  prices (it serves the function of quantity with its values at country  $k$  prices). The aggregate of the notional quantities over the group of  $M$  basic headings is the real volume of country  $j$  with its values at country  $k$  prices (Diewert 2013):

$$RV(j, k) = \sum_{i=1}^{M^*} E(j)_i \times \frac{PPP(k)_i}{PPP(j)_i} = \sum_{i=1}^{M^*} q(j, k)_i, \quad (25.1)$$

where  $E(j)_i$  is the country  $j$  expenditure expressed in its national currency for the basic heading  $i$ , and  $M^*$  represents the number of basic headings for which the basic heading PPPs are different from 0 (thus  $M^* \leq M$ ). A diagonal element in the real volumes matrix, such as  $RV(k, k)$ , is simply the sum of country  $k$  expenditures in the category expressed in its own national currency. For example, the real volume of country Cou2 with its values at country Cou3 prices is calculated as

$$\begin{aligned} RV(2, 3) &= \sum_{i=1}^{M^*} E(2)_i \times \frac{PPP(3)_i}{PPP(2)_i} \\ &= \left( 10.02 \times \frac{0.11}{0.85} \right) + \left( 3.22 \times \frac{0.20}{1.04} \right) \\ &\quad + \left( 97.13 \times \frac{0.20}{0.96} \right) = 22.56. \quad (25.2) \end{aligned}$$

Cross-country real volumes	Cou1	Cou2	Cou3	Cou4
Cou1	2,292.28	2,188.96	448.70	8,466.09
Cou2	116.54	110.38	22.56	429.74
Cou3	2,275.44	2,101.12	377.82	7,693.31
Cou4	12,338.91	11,895.11	2,376.10	44,671.31

## CALCULATING THE BINARY PPPs

The second step consists of calculating the binary parities for each pair of countries based on the cross-country real volumes matrix.

Laspeyres-type and Paasche-type binary PPPs are calculated first. Fisher-type binary PPPs are deduced from them as their geometric mean.

The Laspeyres-type binary PPPs between countries  $j$  and  $k$  are calculated as

$$L(j, k) = \frac{RV(k, j)}{RV(k, k)}, \quad (25.3)$$

where  $RV$  represents the cross-country real volume, and  $RV(k, k)$  represents the country  $k$  expenditure in its own national currency. For example, the Laspeyres-type PPP between countries Cou2 and Cou3 is calculated as

$$L(2, 3) = \frac{RV(3, 2)}{RV(3, 3)} = \frac{2,101.2}{377.82} = 5.56. \quad (25.4)$$

Laspeyres-type PPPs	Cou1	Cou2	Cou3	Cou4
Cou1	1.00	1.06	6.02	0.28
Cou2	0.95	1.00	5.56	0.27
Cou3	0.20	0.20	1.00	0.05
Cou4	3.69	3.89	20.36	1.00

Similarly, the Paasche-type binary PPPs between countries  $j$  and  $k$  are obtained as

$$P(j, k) = \frac{RV(j, j)}{RV(j, k)}. \quad (25.5)$$

For example, the Paasche-type PPP between countries Cou3 and Cou2 is calculated as

$$P(3, 2) = \frac{RV(3, 3)}{RV(3, 2)} = \frac{377.82}{2,101.2} = 0.18. \quad (25.6)$$

Paasche-type PPPs	Cou1	Cou2	Cou3	Cou4
Cou1	1.00	1.05	5.11	0.27
Cou2	0.95	1.00	4.89	0.26
Cou3	0.17	0.18	1.00	0.05
Cou4	3.62	3.76	18.80	1.00

Note that the Paasche-type PPPs are related to the Laspeyres-type PPPs through

$$P(j, k) = \frac{1}{L(k, j)}. \quad (25.7)$$

The Fisher-type binary PPPs are simply the geometric mean of the Laspeyres-type and Paasche-type PPPs:

$$F(j, k) = \sqrt{P(j, k) \times L(j, k)}. \quad (25.8)$$

For example, the Fisher-type PPPs between countries Cou2 and Cou3 are calculated as

$$\begin{aligned} F(2, 3) &= \sqrt{P(2, 3) \times L(2, 3)} \\ &= \sqrt{4.89 \times 5.56} = 5.22. \end{aligned} \quad (25.9)$$

Fisher-type PPPs	Cou1	Cou2	Cou3	Cou4
Cou1	1.00	1.05	5.55	0.27
Cou2	0.95	1.00	5.22	0.26
Cou3	0.18	0.19	1.00	0.05
Cou4	3.66	3.82	19.57	1.00

The GEKS procedure requires the full matrix of Fisher-type PPPs. If expenditure data are missing for the whole category for a given country  $j$ , then the real volumes of country  $j$  with its values at any other country  $k$  prices are all equal to 0 ( $RV(j, k), RV(j, j) = 0$ ). In such a case, the Laspeyres-, Paasche-, and Fisher-type binary PPPs between the two countries  $j$  and  $k$  can be approximated as the geometric mean of the basic heading PPPs between each of the two countries  $j$  and  $k$  and the base country:

$$\begin{aligned} L(j, k) &= P(j, k) = F(j, k) \\ &= \frac{\left( \prod_{i=1}^{N_j} PPP(j)_i \right)^{1/N_j}}{\left( \prod_{i=1}^{N_k} PPP(k)_i \right)^{1/N_k}}. \end{aligned} \quad (25.10)$$

The matrix of Fisher-type PPPs (25.8) obtained is intransitive and will be made

transitive by means of the last step of the GEKS procedure.

## CALCULATING THE GEKS PPPs

The third and last step in the PPP aggregation consists of calculating the GEKS PPPs between each country  $j$  and the base country.

The GEKS PPPs for country  $j$  with respect to the base country is equal to the geometric mean of the Fisher-type PPP relatives between each of the two countries and the remaining countries:

$$GEKS\_PPPs(j) = \left( \prod_{l=1}^N \frac{F(j, l)}{F(1, l)} \right)^{1/N}. \quad (25.11)$$

For example, the GEKS PPPs of country Cou2 with respect to the base country is

$$\begin{aligned} GEKS_{PPPs}(2) &= \left( \prod_{l=1}^N \frac{F(2, l)}{F(1, l)} \right)^{\frac{1}{N}} \\ &= \left( \frac{F(2, 1)}{F(1, 1)} \times \frac{F(2, 2)}{F(1, 2)} \right. \\ &\quad \left. \times \frac{F(2, 3)}{F(1, 3)} \times \frac{F(2, 4)}{F(1, 4)} \right)^{\frac{1}{4}} \\ &= \left( \frac{0.95}{1} \times \frac{1}{1.05} \times \frac{5.22}{5.55} \times \frac{0.26}{0.27} \right)^{\frac{1}{4}} \\ &= 0.95. \end{aligned} \quad (25.12)$$

GEKS PPPs	Cou1	Cou2	Cou3	Cou4
Cou1	1.00	<b>0.95</b>	0.18	3.62

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## Linking and Calculation of Global Results

This chapter describes the steps and procedures used to calculate global purchasing power parities (PPPs) in the 2011 round of the International Comparison Program (ICP). The steps and procedures were recommended by the ICP's Technical Advisory Group (TAG).

To calculate the global PPPs, the ICP regions and the Eurostat–Organisation for Economic Co-operation and Development (OECD) PPP Programme provided for the economies in their regions the following inputs:

- Global core list (GCL) item prices in national currency
- Within-region PPPs at the basic heading (BH), aggregate, and analytical category levels (hereafter referred to as regional PPPs) following the ICP Classification
- National accounts expenditures at the basic heading level in national currency
- The 2011 annual average exchange rates to the U.S. dollar and population data.

The first two sections that follow describe the linking steps for the standard linking approach. The next section deals with the nonstandard linking approaches and special participation cases. The standard ICP regions in ICP 2011 were Africa, Asia and the Pacific, Latin America, and Western Asia, as well as the Eurostat-OECD region. Special participation cases were the two singleton economies, the Islamic Republic of Iran and Georgia; the Commonwealth of

Independent States (CIS); the Caribbean; Cuba; the Pacific Islands; and the dual-participation economies: the Russian Federation, the Arab Republic of Egypt, and Sudan.

### LINKING AT THE BASIC HEADING LEVEL

Regional BH PPPs were calculated using either the Éltető-Köves-Szulc\* (EKS\*) method (Eurostat-OECD and CIS regions) or the weighted country product dummy (CPD-W)<sup>1</sup> method (other ICP regions except Asia and the Pacific, which used the unweighted country product dummy [CPD] method). Interregional linking factors were calculated using the CPD-W method. In this method, explicit weights of 3:1 were used to weight the important items and the less important ones.

Calculation of the BH PPPs in the global comparison involves four steps:

- *Step A1.* Calculate the regional BH PPPs based on both the regional and GCL items, using either the EKS\* method or the CPD-W method.<sup>2</sup> BH PPPs must follow the ICP BH classification. When a region is not following the ICP BH classification,<sup>3</sup> calculate the BH PPPs according to this classification by aggregating the BH PPPs using the respective national accounts expenditures.
- *Step A2.* Convert all GCL item prices in national currency for the economies in a region into a

- common regional numéraire using the economy's regional BH PPPs from step A1.
- *Step A3.* Using the CPD-W method, process the converted GCL item prices for all regions resulting from step A2 to generate the interregional linking factors for the basic headings. These interregional linking factors are interregional BH PPPs, expressed in the regional numéraires to the world numéraire.
  - *Step A4.* To calculate the global economy's PPPs to the world numéraire and ensure fixity of an economy's regional BH PPPs in the global comparison, multiply each economy's regional BH PPP from step A1 by the interregional linking factor resulting from step A3. The PPPs derived from this step are the global BH PPPs with regional fixity.

## LINKING AT THE AGGREGATE LEVEL

The Gini-Éltető-Köves-Szulc (GEKS)<sup>4</sup> aggregation method, with further redistribution of regional volumes in accordance with an economy's regional volume shares (known as the country aggregation with volume redistribution procedure, CAR-volume), was used to obtain real expenditures (hereafter referred to as volumes) and indirect aggregated PPPs with regional fixity. All economies in the standard ICP regions participated simultaneously and equally in the global aggregation using the GEKS method.

The steps for linking at the aggregate levels are the following:

- *Step B1.* Calculate the regional PPPs by applying the GEKS<sup>5</sup> aggregation to the regional BH PPPs from step A1 and the BH national accounts data derived in accordance with the regional fixity schema.<sup>6</sup> Economy regional volumes are derived as nominal values in national currency divided by the regional aggregated PPPs.<sup>7</sup>
- *Step B2.* Obtain an economy's volume shares in the regional results for each level of aggregation up to the gross domestic product (GDP) using data from step B1. These data for aggregated headings and ICP analytical categories were supplied by the regions.

- *Step B3.* Calculate an economy's aggregated PPPs in the global comparison by applying the unrestricted GEKS aggregation to the global BH PPPs derived from step A4 and the national accounts BH expenditures in national currency for each level of aggregation up to GDP. The starting point is a matrix of 150-plus global BH PPPs for 140-plus economies from the standard ICP regions and another matrix of the same size containing BH national accounts expenditures in national currency. Economy volumes in the global unrestricted comparison in a global numéraire are derived as nominal values in national currency divided by the aggregated PPPs from the unrestricted global comparison.
- *Step B4.* Obtain the regional volume totals in the global comparison by summing up the total volumes for individual economies for each region derived from step B3 for each level of aggregation up to GDP.
- *Step B5.* Distribute the regional volume totals from step B4 among the economies in the regions according to the economy shares in the regional results derived from step B2 in order to uphold regional fixity for each level of aggregation up to GDP.
- *Step B6.* Calculate the aggregated global PPPs' national currency/world numéraire *indirectly* by dividing economies' nominal expenditures by the volumes derived from step B5 for each level of aggregation up to GDP.

## SPECIAL CASES

In ICP 2011, in two categories of special linking cases the linking approach differed from the one just described. The first category covered nonstandard survey methodologies; the second covered nonstandard regional or economy participation.

### Nonstandard Linking Approaches

#### *Housing*

All economies participating in ICP 2011 were asked to collect annual average rents for a global list of dwelling types and dwelling stock data: number of dwellings, usable surface area in

square meters, and information on three quality indicators—availability of electricity, water supply, and in-house toilet. National accounts expenditure data on actual and imputed rentals were collected by means of expenditure questionnaires. However, not all economies were able to report rents and dwelling stock data, and some economies were only able to provide rents for a limited subset of dwelling types or limited dwelling stock data. Each regional coordinating agency then decided on the best way to use the collected data for its region:

- The Africa, Latin America, Caribbean, and Western Asia regions calculated their regional PPPs on the basis of the rents collected for the global list of dwelling types, relying on the same CPD method used for the rest of household consumption but without the importance indicators.
- The Asia and the Pacific region, after in-depth analysis of the available data, resorted to using a reference volume approach and the respective indirect PPPs. This implies that the relative volumes of housing services between economies were equal to the relative volumes of household expenditure, excluding rents.
- The Eurostat-OECD region used a mix of rents and dwelling stock data. Generally, for economies that have a well-developed rental market—that is, those economies that use the stratification method for rents in national accounts—PPP were determined on the basis of the rental data, whereas for other economies dwelling stock data were used to obtain estimates of PPPs indirectly—that is, for those economies that were using the cost approach for rents in national accounts. Indirect PPPs are based on the relationship  $\text{price} \times \text{quantity} = \text{expenditure}$ . An indirect PPP can be derived by dividing the expenditure on rents from an economy's national accounts by the real expenditure on rents estimated using dwelling stock data adjusted for quality. This is known as the quantity approach of estimating real expenditures directly and the PPPs indirectly.
- The quantity approach was used in the CIS region, which was then linked to other regions using Russia, a member of the OECD comparison, as the bridge economy.

The rental data used to link the Africa, Latin America, and Western Asia regions were the same as those that entered the calculation of their regional PPPs. The linking factors for these three regions were calculated by means of the same CPD method used for the link of the rest of household expenditures.

The Asia and the Pacific and the Eurostat-OECD regions were linked to each other and to the rest of the world by the quantity approach through use of the dwelling stock data.

The plausibility of each economy's estimate of number of dwellings was evaluated by calculating the ratio of the number of dwellings to the total population. Economies with very high or very low ratios were not included in the linking process. For each economy with a plausible estimate of number of dwellings, the data on housing quality were reviewed. Three quality indicators were available: share of dwellings with electricity, share of dwellings with inside water, and share of dwellings with a private toilet. Only economies for which a plausible estimate for all three indicators was available or could be consciously imputed were included in the linking process.

### ***Government Compensation***

Adjustments for productivity differences were taken into account in some regional comparisons as well as in the global linking. Adjustments were made to the PPPs and respectively to the real expenditure estimates for government in the Africa, Asia and the Pacific, Latin America, and Caribbean regions. No productivity adjustments were applied to the Eurostat-OECD, CIS, and Western Asia regions because differences in labor productivity within each of those regions were considered not very high. However, productivity adjustments were made to all regions when the interregional linking factors were estimated to maintain consistency in the global comparison.

For education, the Eurostat-OECD region applied an output approach in which volumes are based on numbers of students and average student scores from the Programme for International Student Assessment (PISA). Within-region PPPs were linked to the rest of the world using five Latin American economies—Brazil, Colombia, Panama, Peru,

and Uruguay—that had data for both the input approach used by ICP regions and the Eurostat-OECD output approach. The specific linking steps were as follows:

- Global education basic heading PPPs<sup>8</sup> for the standard ICP regions, excluding Eurostat-OECD, were obtained by multiplying regional PPPs by the productivity-adjusted linking factors.
- The global basic heading PPPs for the standard ICP regions, excluding Eurostat-OECD, were aggregated using the GEKS method to obtain the total education PPPs.
- The total education linking factor for the Eurostat-OECD region was calculated via five Latin American economies for which the output approach was feasible as the ratio of the geometric mean of PPPs from the output approach to the geometric mean of PPPs from the input approach. The result was the total education linking factor for each region.
- For global aggregation covering all five standard regions, the six basic headings under the individual government consumption expenditure for education were collapsed into one. The result was one basic heading under household consumption expenditure and one heading under individual government consumption expenditure.<sup>2</sup> The global aggregation resulted in linked global PPPs, maintaining regional fixity for all regions.

For health, the Eurostat-OECD comparison applied an output approach for government health providers (hospitals) to its regional comparison, which was based on quasi-prices for a set of hospital services. Basic heading weights from the health accounts were used for the health PPP aggregation. For linking, Eurostat-OECD provided input data for government health providers based on the former input cost approach. Input data for the other health basic headings were identical to those produced by the standard ICP method.<sup>10</sup> However, when fixity of regional results was applied in the country aggregation with redistribution (CAR) procedure, the fixity preserved was that of the aggregate analytical categories resulting from the current health approach used by the Eurostat-OECD comparison.

### ***Construction and Civil Engineering***

The standard ICP 2011 approach for estimating construction and civil engineering PPPs covered four separate but consecutive steps:

- Input prices collected for materials, labor, and hire of equipment were allocated to the three construction category basic headings (residential buildings, nonresidential buildings, and civil engineering works) using product relevancy information.
- PPPs for the input groups (materials, labor, and equipment), or subheadings under the three basic headings, were calculated using the CPD, resulting in nine sets of subheading PPPs.
- The subheading PPPs were aggregated using resource mixes as weights, resulting in three sets of basic heading PPPs.
- PPPs for the three basic headings were aggregated using national accounts expenditure data as weights, resulting in PPPs for the construction category.

The Eurostat-OECD approach to estimating construction and civil engineering PPPs differs from the ICP approach,<sup>11</sup> and thus several economies in the Eurostat-OECD comparison conducted the ICP survey, which provided a link for construction between the Eurostat-OECD economies and the rest of the world. Because of the peculiarities of the available input data, a modified approach was used for linking:

- Prices collected for the machinery and equipment items were used to calculate reference PPPs for the equipment hire subheading at the global level.
- Regional GCL prices in local currency were used to calculate linking factors instead of prices converted to a common regional numéraire with the regional PPPs, as is done in the standard linking approach. More concretely, economies' PPPs were calculated by applying the unrestricted, unweighted CPD method.
- Linking factors for the basic headings were calculated as the geometric mean of the subheading PPPs for the economies in a region.<sup>12</sup>

### ***Nonstandard Participation***

Following TAG's recommendation, the two singleton economies (the Islamic Republic of Iran and Georgia), the CIS economies, the Caribbean



economies, Cuba, and the Pacific Islands were included in the global linking process in a way that had no effect on the multilateral PPPs for all other economies in the global comparison. This was achieved by the special linking approaches, as explained in the sections that follow.

### ***Singleton Economies: The Islamic Republic of Iran and Georgia***

PPPs for the Islamic Republic of Iran (IRN) and Georgia (GEO) were calculated by means of a bilateral comparison with Turkey (TUR), a participant of the Eurostat-OECD comparison, and Armenia (ARM), a CIS economy, respectively. The Islamic Republic of Iran is thus linked in the global comparison through Turkey's results and Georgia through Armenia's results.

The Eurostat-OECD item list was used as the basis for the IRN-TUR comparison,<sup>13</sup> and the CIS 2011 list was used as the basis for the GEO-ARM comparison.<sup>14</sup> National annual average prices for the Islamic Republic of Iran and Georgia were computed based on the price surveys. These prices were used for the calculation of bilateral IRN-TUR and GEO-ARM BH PPPs. Bilateral PPPs for the Islamic Republic of Iran and Georgia were bridged to the global comparison using Turkey's and Armenia's results in the global comparison, which were derived using the "standard" approach described earlier.

Calculation of the bilateral BH and aggregated PPPs requires the following steps:

- *Step C1.* Use the Eurostat-OECD item list as the basis for the IRN-TUR comparison. Reclassify the items from the Eurostat list priced by the Islamic Republic of Iran and Turkey to follow the ICP BH classification.<sup>15</sup> Carry out a similar procedure for the GEO-ARM comparison.
- *Step C2.* Calculate bilateral PPPs for the IRN-TUR and GEO-ARM comparisons on the basis of the national annual average prices in national currency from step C1 using the EKS\* method.<sup>16</sup> Turkey is the numéraire in the IRN-TUR bilateral comparison (i.e., Turkey's PPPs equal 1). Similarly, Armenia is the numéraire in the GEO-ARM bilateral (i.e., Armenia's PPPs equal 1).
- *Step C3.* Aggregate the bilateral BH PPPs for the IRN-TUR and GEO-ARM comparisons

using the GEKS procedure for each level of aggregation up to GDP and for ICP analytical categories. Turkey is the numéraire in the IRN-TUR comparison, and Armenia is the numéraire in the GEO-ARM comparison.

The following steps are needed to link the bilateral aggregated PPPs (from step C3) for the Islamic Republic of Iran and Georgia to the global comparison:

- *Step D1.* Obtain the BH and aggregated PPPs for the Islamic Republic of Iran and Georgia in the global comparison by using Turkey's and Armenia's final PPPs from step B6 in the global comparison (after the CAR-volume redistribution) as a bridge to the Islamic Republic of Iran's and Georgia's PPPs from step C3. The Islamic Republic of Iran's global PPP is thus the bilateral PPP with Turkey multiplied by Turkey's global PPP in the global comparison (world = 1). Georgia's global PPP is the bilateral PPP with Armenia multiplied by Armenia's global PPP in the global comparison (world = 1).
- *Step D2.* Calculate volumes for the Islamic Republic of Iran and Georgia by dividing the nominal expenditures in national currency by the PPPs obtained from step D1.

For the Islamic Republic of Iran, the linking method just described was possible for the GDP components for which the bridge economy, Turkey, followed the same comparison approach. An alternative linking method was required for housing and construction and civil engineering because Turkey followed the Eurostat approach, whereas the Islamic Republic of Iran followed the ICP approach. For these components, the Islamic Republic of Iran was linked through economies using the ICP housing and construction and civil engineering surveys.

### ***Commonwealth of Independent States***

The CIS economies were linked to the global comparison via Russia. Russia participated in both the CIS and Eurostat-OECD comparisons. Because of the need for regional fixity, which is impossible for dual participants, in accordance with an agreement the results for Russia from the Eurostat-OECD comparison were used as official results. The CIS economies, except

Russia, were excluded from the calculation of the interregional linking factors.

The following steps are required to calculate the regional and aggregate level PPPs:<sup>17</sup>

- *Step E1.* Calculate the PPPs for the CIS on the basis of the national annual average prices in national currency using the EKS\* method. For nonstandard ICP BHs, aggregate the specific CIS BH PPPs using the EKS procedure, with the respective national accounts expenditures as weights, to follow the ICP BH classification. Russia is the numéraire (i.e., Russia = 1).
- *Step E2.* Calculate the aggregated PPPs for the CIS by applying an unrestricted GEKS aggregation to the BH PPPs obtained from step E1 for each level of aggregation up to GDP.

The following steps are required to link at the aggregate level:

- *Step F1.* Obtain the BH and aggregated PPPs for the CIS economies in the global comparison by using as a bridge Russia's PPPs from step B6 in the final global comparison, after the CAR-volume redistribution is used as a bridge. Global PPPs for the CIS economies are thus their PPPs from the CIS comparison (Russia = 1) multiplied by Russia's global PPPs in the global comparison (world = 1).
- *Step F2.* Calculate the volumes for the CIS economies by dividing the nominal expenditures in national currency by the PPPs obtained from step F2.

### **The Caribbean**

The Caribbean was linked to the global comparison via the Latin American economies. As an initial step, the 22 Caribbean economies were linked to the 16 Latin American economies at the basic heading level. Linking at the basic heading level was carried out by calculating separate sets of CPD-W PPPs for Latin America and the Caribbean, by subsequently calculating a combined set of respective PPPs, and finally by re-indexing the combined set of PPPs in accordance with the intraregional results (the CAR-PPP approach<sup>18</sup>) in order to maintain fixity of both the Latin America and Caribbean basic heading PPPs.

Linking at the aggregate level was carried out using the CAR-volume approach. The GEKS

aggregation was carried out first for Latin America and the Caribbean separately and then for the combined set of data. Finally, subregional totals of real expenditures were redistributed in accordance with the economies' real expenditure shares from separate Latin America and the Caribbean aggregations in order to maintain fixity of both the Latin America and the Caribbean results at all aggregate levels. As for the standard ICP regions, the aggregated PPPs were calculated indirectly by dividing the nominal expenditures by the real expenditures. This approach enabled regional linking of the Caribbean economies, using the Latin American economies as a base, while maintaining base economy invariance and fixity of results for both subregions. As a second step, the Caribbean results were linked to the global comparison using Latin America's global results as a bridge.

### **Cuba**

Cuba was linked to the Latin America comparison via Peru for household consumption, government compensation, machinery and equipment, and construction. For housing, Cuba was linked via República Bolivariana de Venezuela, which had a typical housing volume index per capita for the Latin America comparison as well as the dwelling stock quantity and quality data needed for the bilateral comparison. The price and expenditure data used for Cuba in the calculations were expressed in convertible pesos. The linking steps for the PPPs were similar to those described for the Islamic Republic of Iran and Georgia.<sup>19</sup>

### **The Pacific Islands**

The Pacific Islands participated in ICP 2011 on a limited basis. Twenty islands provided price data on some 87 household consumption items. No specific national accounts activities were conducted, but there was an opportunity to use existing household income and expenditure survey (HIES) data for the purpose of compiling consumption data. The Pacific Islands were bridged to the ICP via economies participating in other regions:

- Fiji participated in both the Asia and the Pacific and the Pacific Islands comparisons.
- New Zealand and Australia participated in both the OECD and ICP Pacific Islands comparisons.

The weighted geometric mean of PPPs to the bridge economies was used in the linking (the weights were Fiji, 0.5; Australia and New Zealand, 0.25) in order to have symmetry between Asia and the Pacific and the OECD in regional influence.

### Dual Participation

In ICP 2011, Russia participated in both the CIS and Eurostat-OECD comparisons. To preserve the fixity of Russia's results within the Eurostat-OECD region, it was agreed that for the global comparison Russia would be included only in the Eurostat-OECD region. Thus Russia's dual participation did not pose any computational issues.

Egypt and Sudan required special treatment because both the Africa (AF) and Western Asia (WA) regions included these economies in their regional results. Because it was not possible to maintain fixity for these economies in both regional comparisons, a suggested approach was to use geometric averages from the regional results as was done for Egypt in the 2005 round of the ICP.

Two sets of price data for Egypt and Sudan for each region were included in the computations of the interregional BH PPPs (linking factors) using the CPD-W method. One set included their GCL prices expressed in the AF numéraire on the basis of the BH PPPs from the AF comparison. Another set included their GCL prices expressed in the WA numéraire on the basis of the BH PPPs from the WA comparison. The use of these two sets was logical in the regional approach because both economies participated in both comparisons, and all interregional PPPs should be based on input data from both regional comparisons for Egypt and Sudan.

The global PPPs from regions were calculated for Egypt and Sudan using the standard approach as follows:

$$PPP_1 \text{ "Egypt/ world"} = \frac{PPP \text{ "Egypt/ AF"}}{[regional \ comparison]} \times \frac{PPP \text{ "AF/ world"}}{[interregional \ linking \ factor]}$$

$$PPP_2 \text{ "Egypt/ world"} = \frac{PPP \text{ "Egypt/ WA"}}{[regional \ comparison]} \times \frac{PPP \text{ "WA/ world"}}{[interregional \ linking \ factor]}$$

The geometric means of PPP<sub>1</sub> and PPP<sub>2</sub> were considered final global BH PPPs for Egypt:

$$PPP \text{ "Egypt/ world"} = \left( \frac{PPP_1 \text{ "Egypt/ world"}}{\text{"Egypt/ world"}} \times \frac{PPP_2 \text{ "Egypt/ world"}}{\text{"Egypt/ world"}} \right)^{1/2}$$

The same procedure was carried out for Sudan:

$$PPP_1 \text{ "Sudan/ world"} = \frac{PPP \text{ "Sudan/ AF"}}{[regional \ comparison]} \times \frac{PPP \text{ "AF/ world"}}{[interregional \ linking \ factor]}$$

$$PPP_2 \text{ "Sudan/ world"} = \frac{PPP \text{ "Sudan/ WA"}}{[regional \ comparison]} \times \frac{PPP \text{ "WA/ world"}}{[interregional \ linking \ factor]}$$

The geometric means of PPP<sub>1</sub> and PPP<sub>2</sub> were considered final global BH PPPs for Sudan:

$$PPP \text{ "Sudan/ world"} = \left( \frac{PPP_1 \text{ "Sudan/ world"}}{\text{"Sudan/ world"}} \times \frac{PPP_2 \text{ "Sudan/ world"}}{\text{"Sudan/ world"}} \right)^{1/2}$$

This was a symmetrical way to include Egypt and Sudan in the global comparison at the basic heading level on the basis of input data from both regions.

The CAR-volume approach was used for the global linking at the aggregate level. Therefore one set of input data for each economy in question was used in the unrestricted GEKS method to avoid these economies having a double impact on the global linking through use of the CAR-volume approach.

Egypt and Sudan had the same national accounts expenditure data in both regions. BH-PPPs were derived as described earlier. Aggregated PPPs for Egypt and Sudan from the unrestricted global GEKS were used in the further computations. Regional volumes for both regions, volume AF and volume WA, were calculated with the inclusion of Egypt and Sudan, and two volumes from both regions were calculated for Egypt and Sudan using the standard procedure. Aggregated volumes for Egypt and Sudan were then obtained as follows:

$$\text{volume}_1 \text{ "Egypt"} = \frac{\text{volume "AF"}}{[global \ comparison]} \times \frac{\text{volume share "Egypt/AF"}}{[regional \ comparison]}$$

$$\text{volume}_2 \text{ "Egypt"} = \frac{\text{volume "WA" [global comparison]}}{\text{volume share "Egypt/WA" [regional comparison]}}$$

$$\text{volume}_1 \text{ "Sudan"} = \frac{\text{volume "AF" [global comparison]}}{\text{volume share "Sudan/AF" [regional comparison]}}$$

$$\text{volume}_2 \text{ "Sudan"} = \frac{\text{volume "WA" [global comparison]}}{\text{volume share "Sudan/WA" [regional comparison]}}$$

Geometric means from volume<sub>1</sub> and volume<sub>2</sub> were considered volumes in the global comparison for Egypt and Sudan:

$$\text{volume "Egypt"} = (\text{volume}_1 \text{ "Egypt"} \times \text{volume}_2 \text{ "Egypt"})^{1/2}$$

$$\text{volume "Sudan"} = (\text{volume}_1 \text{ "Sudan"} \times \text{volume}_2 \text{ "Sudan"})^{1/2}$$

The indirect global PPPs for Egypt and Sudan were derived after this in the standard way as PPPs = expenditures in national accounts/volumes.

## Annex A

### Weighted Country Product Dummy Method

The weighted country product dummy (CPD-W) method uses explicit weights.<sup>20</sup>

Representative/important items receive higher weights, such as 2 or 3, than the weights, such as 1, assigned to nonrepresentative/less important items.<sup>21</sup>

The unweighted original country product dummy (CPD) derives estimators of regression parameters (26A.1) through minimization of the squares in logarithmic terms using a standard least squares procedure:

$$\sum_{i=1}^n \sum_{j=1}^r \sum_{l=1}^{c_j} [\ln(p_{ij}) - \alpha'_j - \beta'_n - k']^2; \quad (26A.1)$$

$$\alpha'_{j1} = 0; \beta'_1 = 0.$$

Representative/important items and nonrepresentative/less important items receive the same weight, 1, in the unweighted CPD.

The CPD-W approach suggests that each price corresponding to a product in a given economy in a region be given a prespecified weight in the least squares estimation depending on the representativity/importance of the product. Suppose  $w$  is a set of weights for representative/important ( $w^{repr}$ ) and nonrepresentative/less important ( $w^{nonrepr}$ ) items to be applied to the price  $p_{ij}$  (Rao 2004). The weighted least squares (WLS) approach applied to (26A.1) can then be presented as

$$\sum_{i=1}^n \sum_{j=1}^r \sum_{l=1}^{c_j} w [\ln(p_{ij}) - \alpha'_j - \beta'_n - k']^2; \quad (26A.2)$$

$$\alpha'_{j1} = 0; \beta'_1 = 0.$$

It is often declared that the advantage of the stochastic CPD approach is that it allows one to derive standard errors for the CPD estimates of PPPs, common prices, and so forth.<sup>22</sup> However, it is not easy to implement these standard errors in the analysis because there are numerous problematic points.<sup>23</sup> In effect, standard errors of the CPD parameters are not used in the ICP.

Therefore, to make the CPD method more transparent and understandable for a broad array of users, the CPD-W method is presented in the equations that follow in a more traditional index form specific to the Geary-Khamis

(GK) method in geometric (logarithmic) terms (Diewert 2002; Sergeev 2004):

$$\pi_i = \left\{ \prod_{r=1}^R \prod_{j=1}^{N(r)} [P_{ijr}/PPP_r]^{q_{ijr}} \right\}^{1/r \sum q_{ijr}}; \quad (26A.3)$$

$$i = 1, 2, \dots, M$$

and

$$PPP_r = \left\{ \prod_{i=1}^M \prod_{j=1}^{N(r)} [P_{ijr}/\pi_i]^{q_{ijr}} \right\}^{1/i \sum q_{ijr}}; \quad (26A.4)$$

$$r = 1, 2, \dots, R-1 \quad (PPP_R = 1)$$

where

$\pi_i$  is the international average price of item  $i$  in the currency of the numéraire region (here region  $R$ );

$\pi_i$  is an analogue of  $\alpha_i$  from the CPD regression;

$PPP_r$  is the PPP of region  $r$  relative to the base region  $R$  ( $PPP_R = 1$ );

$PPP_r$  is an analogue of  $\beta_r$  from the CPD regression;

$R$  is the number of regions;

$N(r)$  is the number of economies in region  $r$ ;

$M$  is the number of products within a basic heading;

$P_{ijr}$  is the price for product  $i$  in economy  $j$  from region  $r$  in the regional numéraire (by economy's regional PPPs);

$q_{ijr}$  is the weight for product  $i$  in economy  $j$  from region  $r$ —the appropriate values can be 3 (for important products) and 1 (for less important products);

$r \sum q_{ijr}$  is the cumulative value of the importance of item  $i$  among all economies in all regions; and

$i \sum q_{ijr}$  is the cumulative value of the importance of items priced in all economies of region  $r$ .

The average "international price" of the  $i$ -th item ( $\pi_i$ ) is presented as an implicit quantity-weighted geometric average of the PPP-adjusted national prices (indicators of importance are used as weights).<sup>24</sup>

The PPP for the  $j$ -th region ( $PPP_j$ ) is presented as the geometric average (implicit expenditure weighted) deviation of its regional prices from the international prices.

The system shown in (26A.3) and (26A.4) can be efficiently solved by an iterative method.<sup>25</sup> The geometric mean of the price ratios or simply the exchange rates of the economy selected as the base can be used as an initial set of unknown PPPs.

## Annex B Using the GEKS Method for Aggregation

The Gini-Éltető-Köves-Szulc (GEKS) method was recommended by the ICP's Technical Advisory Group for calculating aggregations within the regions as well as for the global comparison.<sup>26</sup> All calculations by the GEKS method are carried out for each aggregated heading separately.

First, calculate the bilateral Fisher PPPs (F-PPPs)<sup>27</sup> for all pairs of economies. For any two economies  $j$  and  $k$ , the binary F-PPP (price index) is computed as

$$P_{F_{j,k}} = \left( \left( \frac{\sum_i p_j^i q_k^i}{\sum_i p_k^i q_j^i} \right) \left( \frac{\sum_i p_j^i q_j^i}{\sum_i p_k^i q_j^i} \right) \right)^{1/2}. \quad (26B.1)$$

Second, average geometrically all direct and indirect F-PPPs (equally, all F-PPPs of economy  $j$  to all other economies) to obtain the transitive GEKS-PPPs. The GEKS-PPP is computed as

$$P_{GEKS_{j,k}} = \left( \prod_l P_{F_{j,l}} / P_{F_{k,l}} \right)^{1/K}, \quad (26B.2)$$

where  $K$  is the total number of economies. The respective volume is calculated as

$$Q^j \equiv p^j \cdot q^j / P^j. \quad (26B.3)$$

Economies within and across regions can be very different. The bilateral indexes for the economies with different price and quantity structures can be unreliable.<sup>28</sup> In this aspect, analysis of the Paasche-Laspeyres spread (PLS) is very important—for details, see Vogel (2013).

## Annex C The Country Aggregation with Redistribution (CAR) Method of Linking above the Basic Heading Level

The Technical Advisory Group of the International Comparison Program (ICP) recommended that the country aggregation with volume redistribution

(CAR-volume) approach<sup>29</sup> serve as the official ICP 2011 method (Sergeev 2011).

In this method, the unrestricted global Gini-Éltető-Köves-Szulc (GEKS) purchasing power parities (PPPs) for the aggregates are used to recalculate the economy aggregates in national currencies (NCs) into volumes (real expenditure) measured in a world numéraire. Economy volumes are summed up by the region, and these regional volumes are redistributed in accordance with the economy shares of volumes in the regional comparisons to preserve the regional fixity:

$$\begin{array}{rcl} & \text{volume} & \text{share} \\ \text{volume} & \text{"region in"} & \text{"economy/"} \\ \text{"economy in"} & \text{the world"} & \text{region"} \\ \text{the world"} & = & \\ & \frac{[global]}{[regional]} & \times \frac{[regional]}{[regional]} \\ & \text{comparison]} & \text{comparison]} \end{array}$$

Because the indicator volume share of an economy within the region can be also considered the volume index "economy/region" and the volume share of a region within the world total can be considered the volume index "region/world," this procedure can also be presented in the form of volume indexes (VIs):

$$\begin{array}{rcl} \text{VI} & \text{VI "region/"} & \text{VI "economy/"} \\ \text{"economy/"} & \text{world"} & \text{region"} \\ \text{world"} & = & \\ & \frac{[global]}{[regional]} & \times \frac{[regional]}{[regional]} \\ & \text{comparison]} & \text{comparison]} \end{array}$$

The respective PPPs (with fixity) are calculated in an indirect way as

$$\text{PPPs "national currency/"} = \frac{\text{expenditures in}}{\text{world numéraire"}} = \frac{\text{NC/volumes.}}{\text{NC/volumes.}}$$

## NOTES

1. Annex A describes the CPD-W method.
2. These PPPs were supplied by the regions.
3. When different, the region-specific and ICP BH classifications have hierarchical relations. Therefore region-specific basic headings can be aggregated to the ICP basic heading using the Gini-Éltető-Köves-Szulc (GEKS) procedure (with national accounts expenditure weights). For example, if the regional

- classification has three separate basic headings for coffee, tea, and cocoa, but the ICP Classification has only one combined basic heading, it is possible to run the GEKS procedure for these three basic headings in order to obtain the region-specific PPPs for the ICP basic heading coffee, tea, and cocoa. In addition, in ICP 2011 treatment of nonprofit institutions serving households (NPISHs) had some specificities. NPISH expenditures were distributed among the respective household consumption expenditure categories in the global comparison. However, to maintain regional fixity, the final linking steps were carried out using expenditures as per the regional practice for distribution.
4. Annex B describes the GEKS method.
  5. The GEKS method was recommended by TAG for the aggregation within the regions as well as for the global comparison. However, it is likely that the differences in the regional methodologies and the classifications will have some marginal impact on the (in)comparability of the global results with fixity.
  6. For example, the Eurostat-OECD program used fixity for the 37 economies in its comparison.
  7. These PPPs were supplied by the regions.
  8. In total seven basic headings, of which one was under the household consumption expenditure, and the remaining six were under the individual government consumption expenditure.
  9. An equal way would be use of the same PPPs for the education total of all education BHs.
  10. Much of the former data were used in the Eurostat-OECD approach—for example, all prices of pharmaceuticals, medical products, and outpatient medical services by private providers were used for the respective basic headings. The impact of the new approach on GDP PPPs was generally not very high.
  11. The CIS applies a different regional approach, however. The CIS economies were linked via Russia in the Eurostat-OECD exercise.
  12. This approach is similar to the country approach method with the reindexation of PPPs (CAR-PPP). See note 33 in annex C for further information.
  13. The BH classification used in the Eurostat-OECD comparison differs from the ICP BH classification.
  14. The CIS BH classification is based on the Eurostat-OECD classification, but it has a few differences.
  15. Because national accounts expenditure data for the Islamic Republic of Iran are available only for the ICP BH classification, the ICP BH PPPs are calculated by reclassifying the items rather than by aggregating the BH PPPs.
  16. The EKS\* method was selected because it is the official PPP calculation method of the Eurostat-OECD and CIS programs.
  17. These PPPs were provided by the region.
  18. See note 33 in annex C for further information on the CAR-PPP approach.
  19. Volumes were not calculated for Cuba because of peculiarities in the national accounts expenditure data.
  20. The version used in regional linking—an economy's prices in regional numéraires as an input basis—is presented here. This annex is based on Sergeev (2011), with inputs from Yuri Dikhanov.
  21. The weights 3 and 1 were recommended by the ICP's TAG. The weights 1 and 0 are applicable to the EKS\* method—1 for representative items with an asterisk (\*) and 0 for nonrepresentative items without an asterisk. The weights are not applicable, however, to the CPD method because the items with 0 weights are items not priced, and they are eliminated from the calculations.
  22. It is unclear how the stochastic estimations should be used in practice. In addition, the estimations of errors depend on the regression specification.
  24. Theoretically, quantity weights should be used here, but this information is not available.
  25. The numerical results by (26A.3) and (26A.4) are identical to the results by (26A.1) and (26A.2).
  26. This annex is based on Sergeev (2011) with inputs from Yuri Dikhanov.
  27. The same can be applied to the volume/quantity indexes because the Fisher index is

- relatively symmetrical to variables (prices and quantities). The product of  $PPP(F)$  and  $Q(F)$  is the expenditure ratio. In principle, each bilateral index (e.g., Tornqvist) can be used in the GEKS procedure. The Fisher indexes, but not the Törnqvist indexes, are used traditionally because the product of  $PPP(T)$  and  $Q(T)$  is not equal to the expenditure ratio.
28. The so-called selective GEKS procedure can be used to eliminate the impact of "weak" bilateral links. In accordance with this, bilateral F-PPPs with a high PLS and a PLS of less than 1 are eliminated and replaced by indirect PPPs calculated via a third economy. Such an approach was used during the linking of Group I and II in the 1993 round of the European Comparison Program. For details, see United Nations Economic Commission on Europe (1997).
29. This method is described in chapter 15 of the *ICP 2005 Methodological Handbook* as calculation of the regional linking factors (between-region PPPs) by the weighted harmonic mean method (World Bank 2007). It is also possible to use the country approach method with the reindexation of PPPs (CAR-PPP method), in which regional PPPs from the global comparison are combined with the economy's regional PPPs:

$$\begin{array}{r}
 \text{PPP "econo-} \\
 \text{my/world"} \\
 \\
 \text{PPP "econo-} \\
 \text{my/world"} = \frac{\text{PPP "economy/} \\
 \text{region"} \\
 \text{[regional} \\
 \text{comparison}]}{\text{region}} \times \frac{\text{PPP "region/} \\
 \text{world"} \\
 \text{[global} \\
 \text{comparison}]}{\text{world}}
 \end{array}$$

PPP "region/world" is calculated as the unweighted geometric mean from the economy's PPPs belonging to the region. This method was described in chapter 15 of the *ICP 2005 Methodological Handbook* as calculation of the regional linking factors (between-region PPPs) by the unweighted geometric mean method (World Bank 2007). Also, a modification of the CAR-PPP

method is used in the Eurostat–Organisation for Economic Co-operation and Development (OECD) comparison in order to preserve the fixity of the Eurostat comparison. Both CAR methods (CAR-volume and CAR-PPP) maintain the fixity of the regional results, but the between-region results obtained by these methods can be slightly different.

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## Glossary

**accounting period.** The period to which estimates of GDP refer, usually a calendar year or a quarter. For ICP comparisons of GDP, the accounting period is a calendar year.

**actual individual consumption.** The total value of the individual consumption expenditures of households, nonprofit institutions serving households, and general government. It is a measure of the individual goods and services that households actually consume as opposed to what they actually purchase.

**additive.** An aggregation method is additive if, for each economy being compared, it provides real expenditures for aggregates that are equal to the sum of the real expenditures of their constituent basic headings. An additive aggregation method provides real expenditures that satisfy the average test for volumes but are subject to the Gerschenkron effect.

**aggregate.** A set of transactions related to a specified flow of goods and services in a given accounting period, such as the total purchases of consumer goods and services by resident households or the total expenditure on collective services by government or the total value of gross fixed capital formation.

**aggregation.** The process of weighting and averaging basic heading PPPs to obtain PPPs for each level of aggregation up to GDP.

**analytical categories.** GDP, main aggregates, expenditure categories, expenditure groups, and expenditure classes for which the results of a comparison are published.

**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 indexes.

**base country invariance.** The property whereby the relativities between the PPPs, price level indexes, and volume indexes of economies are not affected by either the choice of national currency as numéraire or the choice of reference economy.

**basic heading (BH).** The lowest aggregation level in the ICP expenditure classification. In theory, a basic heading is defined as a group of similar well-defined goods or services. In practice, it is defined by the lowest level of final expenditure for which explicit expenditure weights can be estimated. Thus an actual basic heading can cover a broader range of products than is theoretically desirable and include both goods and services. It is at the level of the basic heading that expenditures are defined and estimated, products are selected for pricing, prices are collected and validated, and PPPs are 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, the 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).

**bias.** A systematic error in a PPP or volume index. Bias can arise for a number of reasons, including failure to respect importance, comparability, or consistency; the price collection and measurement procedures followed; and the calculation and aggregation formula employed.

**bilateral or binary comparison.** A price or volume comparison between two economies that draws on data only for those two economies.

**bilateral or binary PPP.** A PPP between two economies calculated using only the prices and weights for those two economies.

**bridge economy.** An economy that provides the link or bridge between two or more separate comparisons involving different groups of economies. The bridge economy participates in all comparisons and by doing so enables the economies in one comparison to be compared with the economies in the other comparisons. An alternative to linking groups of economies through bridge economies is to combine them using core products.

**change in inventories.** The acquisition less disposals of stocks of raw materials, semifinished goods, and finished goods that are held by producer units prior to being further processed or sold or otherwise used. Semifinished goods cover work in progress (partially completed products whose production process will be continued by the same producer in a subsequent accounting period), including the natural growth of agricultural crops prior to harvest and the natural growth in livestock raised for slaughter. Inventories also cover all raw materials and goods stored by government as strategic reserves.

**change in valuables.** The acquisition less disposals of valuables. Valuables are defined as produced assets such as nonmonetary gold, precious stones, antiques, paintings, sculptures,

and other art objects 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 value.

**characteristics.** The technical parameters and price-determining properties of a product listed in a product specification.

**Classification of the Functions of Government (COFOG).** Classification of transactions by general government, including outlays on the final consumption expenditures, intermediate consumption, gross fixed capital formation, and capital and current transfers, 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.

**Classification of Individual Consumption According to Purpose (COICOP).** Classification of the individual consumption expenditures of three institutional sectors—households, non-profit institutions serving households (NPISHs), and general government—by the ends that they wish to achieve through these expenditures. Individual consumption expenditures are those that 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 by government.** The final consumption expenditure of general government on collective services. It is a measure of the services that general government provides to the community as a whole and that households consume collectively. It is also called actual collective consumption.

**collective services.** Services provided by general government that benefit the community as a whole: general public services, defense, public order and safety, economic affairs, environmental protection, and housing and community amenities. They also include the overall policy-making, planning, budgetary, and coordinating

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.

**comparability.** The requirement that economies price products that are identical or, if not identical, equivalent. Products are said to be comparable if they have identical or equivalent technical parameters and price-determining properties. Equivalent means that they meet 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 economies for a product reflect actual price differences and are not affected by differences in quality. If differences in quality are not avoided or corrected, they can be mistaken for apparent price differences leading to an underestimation or overestimation of price levels and an overestimation or underestimation of volume levels.

**comparison-resistant.** A term first used to describe nonmarket services that are difficult to compare across economies 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 conditions of payment differ from economy to economy, and their quality varies between economies 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 economy specificity make it difficult to price them comparably across economies.

**compensation of employees.** All payments in cash and in kind made by employers to employees in return for work carried out 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 or services or both that make up some defined aggregate.

**consistency.** The requirement that the prices collected by economies be consistent with the prices underlying their estimates of GDP and its component expenditures. In most cases, this means that prices should be national annual purchasers' prices for actual market transactions. The basis of a comparison is an identity, expenditure = price × volume, and volumes are obtained by dividing expenditures by prices. Using prices that do not correspond to those used to derive the expenditures would result in volumes that are 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.

**core product.** A product that appears on the product lists of two or more separate groups of economies for the purpose of combining the groups in a single multilateral comparison. The use of core products is an alternative to linking groups of economies through bridge economies.

**cost, insurance, and freight (c.i.f.) value.** The price of a good delivered at the customs frontier of the importing economy 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 economy.

**country aggregation with redistribution (CAR) procedure.** A means of obtaining for a specified aggregate global volumes and PPPs for economies within each region that retain the relativities established between the economies in the regional comparison. In other words, each region's results for the aggregate remain fixed when linked with the results of other regions. The procedure is as follows. The global basic heading PPPs for all economies in the comparison are aggregated to the level of the aggregate. The global PPPs for the aggregate are used to calculate global real expenditure for each economy, with which the total global real expenditure on the aggregate for each region can be determined. The total global real expenditure of each region is

redistributed across the economies in the region in line with the distribution of the real expenditures in the regional comparison. Global PPPs for economies are calculated indirectly with the redistributed global real expenditure.

**country product dummy (CPD) method.**

The multilateral method used to obtain transitive PPPs at the basic heading level through regression analysis. It treats the calculation of PPPs as a matter of statistical inference—that is, 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 economies. In other words, it is assumed that the pattern of the relative prices of the different products within a given basic heading is the same in all economies. It is also assumed that each economy has its own overall price level for the basic heading and that this overall price level fixes the levels of absolute prices of the products in the basic heading for the economy. By treating the prices observed in the economies for the basic heading as random samples, the PPPs between each pair of economies and the common pattern of relative prices can be estimated using classical least square methods. This method allows the estimation of sampling errors for the PPPs.

**country product dummy-weighted (CPD-W) method.**

A variant of the CPD in which important products receive a higher weight in the calculation than less important products. For example, important products could have a weight of 2 or 3 and less important products a weight of 1. The choice of weights is arbitrary as it is in the Gini-Éltető-Köves-Szulc\* (GEKS\*) method. However, the weight of 1 for an important product and 0 for a less important product used in the GEKS\* method cannot be used in a weighted CPD because the assignment of 0 to prices of less important products will remove them from the calculation. In ICP 2011, important products were given a weight of 3 and less important products a weight of 1.

**country product representativity dummy (CPRD) method.**

A variant of the CPD method

that has an additional dummy variable to denote whether or not the product is important. The assumption is that the ratio of price levels for important and less important products is the same for all products within a basic heading. In theory, the ratio should be less than 1 because less important products are expected to be more expensive than important products.

**deflation.** The division of the current value of an aggregate by a price index—the deflator—in order to value its volumes at the prices of the price reference period.

**Dikhanov editing procedure.** The iterative intereconomy validation procedure developed by Yuri Dikhanov to edit the average survey prices reported by economies. It can be viewed as an alternative or as a complement to the Quaranta editing procedure. Both procedures provide similar measures of price variation for products and economies employing either basic heading PPPs for editing basic headings individually or PPPs for an aggregate for editing across the basic headings constituting the aggregate. In practice, the Quaranta procedure is employed to edit prices within basic headings, and the Dikhanov procedure is used to edit prices within aggregates. The Dikhanov procedure is specific to the CPD-based methods of calculating PPPs, whereas the Quaranta table has a broader application that includes Gini-Éltető-Köves-Szulc GEKS-based methods as well as CPD-based methods.

**Dikhanov table.** The intereconomy validation table generated by the Dikhanov editing procedure.

**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 an economy 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 extraterritorial enclaves—that is, the parts of the economy's own geographical

territory used by government agencies of other economies or by international organizations under international treaties or agreements between states.

**editing.** The first step of validation, which entails scrutinizing data for errors. It is the process of checking survey prices for nonsampling 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 certain criteria. The price may score a value for a given test that exceeds a predetermined critical value, or its value may fall outside some prespecified range of acceptable values. Both are standard ways of detecting errors in survey data, and both are employed by the ICP. 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 they are actual errors.

**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.

**error.** The difference between the observed value of a PPP or volume index and its correct value. Errors may be random or systematic. Random errors are generally called errors; systematic errors are called biases.

**exhaustiveness.** The extent to which an economy's estimate of GDP covers all economic activity in its economic territory.

**expenditure weight.** The share of the expenditure on a basic heading in nominal GDP.

**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.

**financial intermediation services indirectly measured (FISIM).** An indirect measure of the value of the financial intermediation services that financial institutions provide clients but for which the institutions do not charge explicitly.

**Fisher-type PPP.** The PPP for a basic heading or an aggregate between two economies 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 Laspeyres-type PPP and Paasche-type PPP (their formulation depends on whether they are being used to calculate basic heading PPPs or to aggregate basic heading PPPs).

**fixity.** The convention whereby the relativities between a group of economies that were established in a comparison covering just that group of economies remain unchanged, or fixed, when the economies of the group are included in comparisons with a wider group of economies. For example, the price and volume relativities of the ICP regions and Eurostat-OECD remain unchanged in the global comparison. If fixity were not observed, there would be two sets of relativities for the participating economies that would not necessarily be in agreement because the relativities and ranking of economies can change as the composition of the group of economies being compared changes. Fixity ensures that participating economies have only one set of results to explain to users.

**free on board (f.o.b.) value.** The price of a good delivered at the customs frontier of the exporting economy. It includes the freight and insurance charges incurred to that point and any export duties or other taxes on exports levied by the exporting economy.

**Geary-Khamis (GK) method.** An average price aggregation method for computing PPPs and real expenditures above the basic heading level. It entails valuing a matrix of quantities using a vector of international prices. The vector is obtained by averaging national prices across participating economies after they have been converted to a common currency with PPPs and weighted by economy quantity shares. The economy PPPs are obtained by averaging the ratios of national and international prices weighted by economy expenditure shares. The international prices and the PPPs are defined by a system of interrelated linear equations that must be solved simultaneously. The GK method produces PPPs that are transitive and

real expenditures that are additive. One of its disadvantages is that a change in the composition of the group can alter significantly the international prices as well as the relationships between economies. Another is that the real expenditures are subject to the Gerschenkron effect, which can be large. GK results are considered better suited to the analysis of price and volume structures across economies.

**general government.** The institutional sector that consists of federal, central, regional, state, and local government units together with the social security funds imposed and controlled by those units. It includes nonprofit institutions engaged in nonmarket production that are controlled and mainly financed by government units or social security funds.

**Gerschenkron effect.** An effect applicable only to aggregation methods that use either a reference price structure, whereby each economy's quantities are valued by a uniform set of prices to obtain volumes, or a reference volume structure, whereby each economy's prices are used to value a uniform set of quantities to obtain PPPs. For methods employing a reference price structure, an economy's share of total GDP—that is, the total for the group of economies being compared—will rise as the reference price structure becomes less characteristic of its own price structure. For methods employing a reference volume structure, an economy'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.

**Gini-Èltetö-Köves-Szulc (GEKS) method.** A method to calculate PPPs for basic headings or to aggregate basic heading PPPs to obtain PPPs for each level of aggregation up to GDP. There are two versions of the GEKS at the basic heading level: one that takes account of the importance of the products priced and one that does not. The version that takes the importance of products into consideration is referred to as GEKS\* in the literature.

Strictly speaking, the GEKS is a procedure whereby any set of intransitive binary index numbers are made transitive and multilateral

while respecting characteristicity (the property in which the resulting multilateral indexes differ as little as possible from the original binary indexes). The procedure is independent of the method used to calculate the intransitive binary indexes. But as used in the current literature, GEKS covers both the way in which the intransitive binary PPPs are calculated and the procedure used to make them transitive and multilateral.

The intransitive binary PPPs for a basic heading or an aggregate are obtained by calculating first a matrix of Laspeyres-type PPPs and 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 GEKS procedure, which involves replacing the Fisher-type PPP between each pair of economies by the geometric mean of itself squared and all the corresponding indirect Fisher-type PPPs between the pair obtained using the other economies as bridges. The resulting GEKS PPPs provide real expenditures that are not subject to the Gerschenkron effect and that are not additive. GEKS results are considered better suited to comparisons across economies of the price and volume levels of individual basic headings or aggregates. See Laspeyres-type PPP and Paasche-type PPP (their formulation depends on whether they are being used to calculate basic heading PPPs or to aggregate basic heading PPPs).

**global core product.** A product priced for the specific purpose of providing a link or overlap between regional comparisons at the basic heading level in order to combine them in a single world comparison. For ICP 2011, lists of global core products were compiled for consumer goods and services, government services, and capital goods by the Global Office in consultation with the regions, participating economies, and subject matter experts. Regions selected products from the global core product lists and added them to their regional product lists in line with product availability and importance in their region. The global core products priced by the regions were included in the regional comparisons as well as the world comparison.

**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. Goods 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.

**government final consumption expenditure.** The actual and imputed final consumption expenditure incurred by general government on individual goods and services and collective services. It is the total value of the individual consumption expenditure and collective consumption expenditure by general government.

**gross capital formation.** The total value of gross fixed capital formation, changes in inventories, and acquisitions less disposals of valuables.

**gross domestic product (GDP).** When estimated from the expenditure side, GDP is defined as the total value of the final consumption expenditures of households, nonprofit institutions serving households, and general government plus gross capital formation plus the balance of exports and imports.

**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 nonproduced assets realized by the productive activity of resident institutional units.

**gross operating surplus.** The surplus or deficit accruing from production before taking into account (1) consumption of fixed capital by the enterprise; (2) any interest, rent, or similar charges payable on financial or tangible nonproduced assets borrowed or rented by the enterprise; or (3) any interest, rent, or similar charges receivable on financial or tangible nonproduced assets owned by the enterprise.

**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.

**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.

**Iklé method.** An average price aggregation method similar to the Geary-Khamis (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 economies after the prices have been converted to a common currency with PPPs and weighted. The GK method uses quantity shares as weights, whereas 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 economies with large expenditures from dominating the average prices. Because the sum of expenditure shares in each economy is equal to one, the Iklé method can be regarded as equi-representative of all economies. The Iklé method produces PPPs that are transitive and real expenditures that are additive. Compared with the GK method, the Iklé method minimizes the Gerschenkron effect.

**importance.** A concept that is defined in terms of a specific economy within a basic heading. A product is either important or less important in the economy for the given basic heading. An important product is one that accounts for a significant share of the expenditure on the basic heading in the economy in question. Formerly, important products were called representative products.

**imputed expenditure.** Some transactions that are desirable to include in GDP do not take place in money terms and so cannot be measured directly. Expenditures on these nonmonetary 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 System of National Accounts.

**imputed rent.** Owner-occupiers use the dwelling they own and occupy to produce housing

services for themselves. Thus they are in effect renting the dwelling to themselves and the value of the rent has to be imputed. The imputed rent should be valued at the estimated rent a tenant pays for a dwelling of the same size and quality in a comparable location with similar neighborhood amenities. When markets for rented accommodation are virtually nonexistent or unrepresentative, the value of the imputed rent has to be derived by some other objective procedure such as the user cost method.

**imputed social contributions.** The imputations that have to be made when employers provide social benefits directly to their employees, former employees, or employees' 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 economies made through a third economy. For example, for economies 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 so that  $PPP_{A/C} = PPP_{A/B} / PPP_{C/B}$ .

**individual consumption expenditure by government.** The actual and imputed final consumption expenditure incurred by general government on individual goods and services.

**individual consumption expenditure by households.** The actual and imputed final consumption expenditure incurred by resident households on individual goods and services. It includes expenditures 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.

**individual consumption expenditure by nonprofit institutions serving households (NPISHs).** The actual and imputed final consumption expenditure incurred by NPISHs on individual goods and services. Because most final consumption expenditures of NPISHs are individual, all final consumption expenditures of NPISHs are treated by convention as individual.

**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 nonprofit institutions serving households and general government. Such services include housing, health care, recreation and culture, education, and social protection. They do not include the overall policy-making, planning, budgetary, and coordinating responsibilities of the government ministries overseeing individual services. Nor do they include government research and development for individual services. These activities are considered to benefit households collectively and are therefore classified under collective services.

**input price approach.** The approach used to obtain PPPs for nonmarket 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 nonmarket services by summing the costs of the inputs required to produce them. PPPs for nonmarket services are calculated using input prices because these are the prices that are consistent with the prices underlying the estimated expenditures. In practice, prices are only collected for labor, which is by far the largest and most important input.

**institutional sector.** The System of National Accounts identifies five institutional sectors: nonfinancial corporations, financial corporations, general government, households, and nonprofit institutions serving households.

**intereconomy validation.** The validation that takes place after participating economies have completed their intra-economy validation and submitted their survey prices to the regional coordinator. It is an iterative process consisting of several rounds of questions and answers between the regional coordinator and participating economies. It involves editing and verifying the average survey prices reported by participating economies 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 importance indicators is correct. In other words, it seeks to ascertain whether economies have interpreted the product specifications in the same way and whether their price collectors have priced them without error. The Quaranta and Dikhanov editing procedures are employed for this purpose. Both procedures entail detecting outliers among the average survey prices by identifying outliers among the corresponding price ratios. Economies verify the outliers found in order to ascertain whether they are valid observations. If they are not, the economy 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.

**intra-economy validation.** The validation that precedes intereconomy validation. It is undertaken by participating economies prior to submitting their survey prices to the regional coordinator. Each economy edits and verifies its own prices without reference to the price data of other economies. Validation is carried out at the product level. The objective is to establish that price collectors within the economy have priced items that match the product specifications and that the prices they have reported are accurate. This entails an economy 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 economy verifies the outliers found in order to ascertain whether they are valid observations. If they are not, the economy either corrects or suppresses them.

**Laspeyres-type PPP.** A PPP for a basic heading or an aggregate between two economies, economy B and economy A, where the reference economy is economy A and the weights are those of economy A. At the basic heading level, the PPP is defined as a quasi-weighted geometric average of the price relatives between economy B and economy A for the important products of economy A. At the aggregate level,

the PPP is defined as the weighted arithmetic average of the PPPs between economy B and economy A for the basic headings covered by the aggregate. The expenditure shares of economy A are used as weights.

**market price.** The amount of money a willing buyer pays to acquire a good or service from a willing seller—that is, the actual price for a transaction agreed to by the transactors. It is the net price inclusive of all discounts, surcharges, and rebates applied to the transaction. It is also called the transaction price.

**material well-being.** The volume of goods and services that households consume to satisfy their individual needs.

**Model Report on Expenditure Statistics (MORES).** A set of worksheets designed to help economies participating in a comparison break down their expenditure on GDP for the reference year to the basic heading level and, at the same time, document how each basic heading expenditure was estimated.

**multilateral comparison.** A price or volume comparison of more than two economies simultaneously that is made with price and expenditure data from all economies covered and that produces consistent relations among all pairs of participating economies—that is, one that satisfies the transitivity requirement, among other requirements.

**national annual price.** A price that has been averaged both over all localities of an economy in order to take into account the regional variations in prices and over the whole of the reference year in order to allow for seasonal variations in prices as well as general inflation and changes in price structures.

**net taxes on production.** Taxes less subsidies on production.

**nominal expenditure.** An expenditure that is valued at national price levels. It can be expressed in national currencies or in a common currency to which it has been converted with exchange rates. It reflects both volume and price differences between economies.

**nonmarket service.** A service that is provided to households for free or at a price that is not

economically significant by nonprofit institutions serving households or by general government.

**nonobserved 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. These activities also include those that are missed because of deficiencies in the statistical system. Such deficiencies include out-of-date survey registers, surveys whose reporting thresholds are too high or that have high rates of nonresponse, poor survey editing procedures, and lack of surveys of informal activities such as street trading.

**nonprofit institution serving households (NPISH).** A nonprofit institution that is not predominantly financed and controlled by government, that provides goods or services to households for free or at prices that are not economically significant and whose main resources are voluntary contributions by households.

**numéraire currency.** The currency unit selected to be the common currency in which PPPs and real and nominal expenditures are expressed.

**observation.** An individual price, or one of a number of individual prices, collected for an item at an outlet.

**outlet.** A shop, market, service establishment, Internet site, mail order service, or other place from where goods or services can be purchased and from where the purchasers' or list prices of the products sold can be obtained.

**outlier.** A term 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.

**Paasche-Laspeyres spread.** The ratio of the Paasche-type index to the Laspeyres-type index in a binary comparison.

**Paasche-type PPP.** A PPP for a basic heading or an aggregate between two economies, economy B and economy A, where the reference economy is economy A and the weights are those of economy B. At the basic heading level, the PPP is defined as a quasi-weighted geometric average of the price relatives between

economy B and economy A for the important products of economy B. At the aggregate level, the PPP is defined as the weighted harmonic average of the PPPs between economy B and economy A for the basic headings covered by the aggregate. The expenditure shares of economy B are used as weights.

**Penn effect.** The overstatement of the economic size of high-income economies with high price levels and the understatement of the economic size of low-income economies with low price levels that result when exchange rate-converted GDPs are used to establish the relative sizes of economies. It arises because exchange rates do not take into account price level differences between economies when used to convert their GDPs to a common currency.

**price approach.** The approach whereby the price comparison between two or more economies is made by comparing the prices for a representative sample of comparable products. PPPs are generally derived using the price approach.

**price error.** An error that arises when price collectors price products that match the product specification, but record the price incorrectly or record the price correctly and error is introduced afterward in the process of reporting and transmitting the price. A price error can also arise because the quantity priced is recorded incorrectly (or error is introduced later during processing). Thus when the price collected is standardized and adjusted to a reference quantity, it will not be correct.

**price level index (PLI).** PLIs are the ratios of PPPs to exchange rates. They provide a measure of the differences in price levels between economies by indicating for a given aggregation level the number of units of the common currency needed to buy the same volume of the aggregation level in each economy. At the level of GDP, they provide a measure of the differences in the general price levels of economies.

**price measure.** Price measures are the PPPs and the price level indexes to which they give rise.

**price relative.** The ratio of the price of an individual product in one economy to the price of

the same product in some other economy. It shows how many units of currency A must be spent in economy A to obtain the same quantity and quality—that is, the same volume—of the product that X units of currency B purchase in economy B.

**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, for final consumption, or for investment.

**product error.** An error that occurs when price collectors price products that do not match the product specification and neglect to report having done so. Price collectors may not have been aware of the mismatch, such as when the product specification is too loose, or they may have priced a substitute product as required by the pricing guidelines but failed to mention that they had done so on the price reporting form.

**productivity adjustment.** An adjustment made to the prices paid by nonmarket producers for labor, capital, and intermediate inputs so that they correspond to a common level of multifactor productivity. In practice, it is an adjustment made to the prices (compensation of employees) paid by nonmarket producers for labor so that they represent the same level of labor productivity.

**product list.** The common list of well-defined goods and services from which economies participating in a comparison make a selection of products to price for the purpose of compiling PPPs.

**product specification.** A list of the physical and economic characteristics that can be used to identify a product selected for pricing, thereby ensuring that economies price comparable items. A product specification can be either brand- and model-specific—that is, a specification in which a particular brand and model is stipulated—or generic—that is, a specification in which only the relevant price-determining and technical characteristics are given and no brand is designated.

**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 value added tax (VAT) (or similar deductible tax on products) that purchasers can deduct from their own VAT liability with respect to the VAT invoiced to their customers. It includes suppliers' retail and wholesale margins, separately invoiced transport and insurance charges, and any VAT (or similar deductible tax on products) that purchasers cannot deduct from their own VAT liability. For equipment goods, it would also include the installation costs, if applicable. The purchaser's price is the price most relevant for decision making by buyers.

**purchasing power parity (PPP).** Spatial deflators and currency converters that eliminate the effects of the differences in price levels between economies, thereby allowing volume comparisons of GDP and GDP component expenditures.

PPPs are calculated in three stages: (1) for individual products, (2) for groups of products or basic headings, and (3) for groups of basic headings or aggregates. The PPPs for individual products are the ratios of national prices in national currencies for the same good or service. The PPPs for basic headings are the unweighted averages of the PPPs for individual products. And the PPPs for aggregates are the weighted averages of the PPPs for basic headings. The weights used are the expenditures on the basic headings.

At all stages, PPPs are price relatives. They show how many units of currency A need to be spent in economy A to obtain the same volume of a product or a basic heading or an aggregate that X units of currency B purchases in economy B. In the case of a single product, the same volume means an 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 among economies according to their economic, social, and cultural differences, but each basket will provide equivalent satisfaction or utility.

**quality adjustment.** An adjustment to the prices of a product whose characteristics are broadly similar but not the same in all economies

pricing it. The aim of the adjustment is to remove from the price differences observed between economies that part of the difference due to the difference in the characteristics of the product priced. The adjustment is made so that the price differences between economies reflect only pure price differences.

**quantity approach.** The approach whereby a volume comparison between two or more economies is made by comparing the volumes of a representative sample of comparable products. Volume comparisons are not usually made directly, but rather indirectly by dividing the expenditure ratios between economies by their corresponding price ratios.

**Quaranta editing procedure.** The iterative intereconomy validation procedure proposed by Vincenzo Quaranta that is used to edit the average survey prices reported by economies 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 economies (the average survey prices are expressed in the same currency unit for this purpose) and by analyzing the dispersion of the price ratios across economies and across products (the price ratios are standardized for this purpose). It is thus both an editing tool and an analytical tool. As an editing tool, it identifies among the average survey prices outliers that have to be returned to the participating economies for verification. As an analytical tool, it provides a range of coefficients of variation—at the product, economy, and basic heading levels—that can be used to assess the reliability of completed price surveys and assist the planning of future price surveys.

**Quaranta table.** The intereconomy validation table generated by the Quaranta editing procedure.

**real expenditure.** An expenditure that has been converted to a common currency and valued at a uniform price level with PPPs. It reflects only volume differences between economies.

**reference economy.** The economy, or group of economies, 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 are set at 100.

**reference PPP.** The PPP used for a basic heading for which no prices are collected and no PPP is calculated. It is based on prices collected for other basic headings and serves as a proxy for the missing PPP.

**reference quantity.** The quantity to which the prices collected for a product must be rebased to ensure that they refer to the same quantity when being compared.

**reference year.** The calendar year to which the results of the comparison refer.

**resident population.** The average number of people present in the economic territory of an economy during the reference year.

**seasonal product.** A product for which both prices and quantities sold vary significantly throughout the year. Typically, the pattern of variation is repeated from one year to the next. Seasonal products vary from economy to economy.

**services.** Outputs produced to order and that 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 the 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 as either goods or services, depending on the medium by which these outputs are supplied.

**social transfers in kind.** Individual goods and services provided as transfers in kind to individual households by government units (including social security funds) and nonprofit institutions serving households (NPISHs). The goods and services can be purchased on the market or produced as nonmarket output by government units or NPISHs.

**structured product description (SPD).**

A tool designed to standardize 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. Standardizing product specifications helps to improve their precision, making it easier for price collectors to determine whether a 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 economies can present their proposals for new products.

**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 (i.e., subsidies payable per unit of good or service produced), as well as subsidies that resident enterprises may receive as a consequence of engaging in production (e.g., subsidies to reduce pollution or to increase employment). The former are called subsidies on products; the latter are called other subsidies on production.

**symmetric index.** An index that treats the two economies being compared symmetrically by giving equal importance to the price and expenditure data of both economies. The price and expenditure data for both economies 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 (i.e., taxes payable per unit of good or service produced such as excise duties and a nondeductible value added tax) as well as taxes that resident enterprises may pay as a consequence of engaging in production (e.g., payroll taxes and taxes on motor vehicles). The former are called taxes on products; the latter are called other taxes on production.

**transitivity.** The property whereby the direct PPP between any two economies yields the same result as an indirect comparison via any other economy. For example, for economies 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 so that  $PPP_{A/C} = PPP_{A/B} / PPP_{C/B}$ .

**user cost method.** The method of estimating the value of imputed rentals for owner-occupiers 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).

**value added tax (VAT).** A tax on products collected in stages by enterprises. This wide-ranging tax is usually designed to cover most or all goods and services. Producers are obliged to pay the government only the difference between the VAT on their sales and the VAT on their purchases for intermediate consumption or capital formation. The VAT is not usually levied on exports.

**verification.** The second step of validation which entails investigating the possible errors detected during the editing of survey prices to establish whether they are actual errors and, if they are actual errors, correcting or suppressing them. In many cases, verification will require revisiting the outlets where the prices were collected to determine whether what was priced matches the product description and whether the correct price and quantity were recorded. Price observations 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 economies. The quantities have to be homogeneous, and 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 economies.

**volume measure.** Volume measures are the real expenditures, the real expenditures per capita, and the volume indexes to which they give rise.

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