International Comparison Program 2021

Methodology

Overview

The ICP is a complex international statistical exercise, and its methodology has evolved over several decades. The 2021 cycle maintained the same core methods and procedures applied in the 2011 and 2017 cycles, further strengthened data quality assurance approaches using the latest technology and maintained proper documentation and a transparent process for producing results. The box below summarizes the new developments incorporated into the ICP 2021 methodology.

Overall, the ICP methodology has three major components. The first is the System of National Accounts (SNA) definition of final expenditures on GDP. The second is the basket of goods and services from which items are selected for pricing: these items should be comparable across economies and should represent an important part of each economy's final purchases. Prices for these items should reflect the definition and classification of the respective category in the national accounts expenditures. The third component is the methodology used to compute purchasing power parities (PPPs) - first within regions for the regional comparisons and then across regions for the global comparison.

Each ICP comparison has a reference year, such as 2011, 2017, and 2021. Each participating economy provides the following required data for the reference year: a set of average prices for a selection of items chosen from a common basket of precisely defined goods and services; a detailed breakdown of the national accounts expenditures in local currency units, according to a common classification; the economy's market exchange rates; and its resident population. The prices and expenditures are used to calculate PPPs and PPP-based expenditures (or volumes); the market exchange rates and PPPs are used to calculate price level indexes; and the population totals and PPP-based expenditures are used to calculate PPP-based expenditures per capita. Prices and expenditures are reported by participating economies in their local currencies. Both cover the whole range of final goods and services constituting GDP.

Box: New developments in the ICP methodology introduced in the 2021 cycle.

While the core methodology remains the same as the ICP 2017 cycle, three main developments were adopted for the estimation of the 2021 benchmark PPPs. These further harmonize the computation process across all participating regions and economies by overcoming exceptions to the core methodology.

1. The Commonwealth of Independent States (CIS) region is now treated as the sixth core region in the global linking procedure. In previous ICP cycles the CIS region was linked via the Russian Federation's dual participation in both the CIS and Eurostat-OECD ICP regional programs. In the ICP 2021 cycle the CIS region was linked through the same global core list approach used for all other ICP regions. For ICP 2017 the Russian Federation's results were based on the OECD comparison, and for ICP 2021 they were based on the CIS comparison.
2. Regional housing PPPs for economies in the Asia and the Pacific region were estimated using a hybrid approach, following the standard ICP methods for estimating housing PPPs based on rental and volume data. This approach was used for the revised ICP 2017 results and ICP 2021 results, both at the regional and global levels, and replaced the previously utilized non-standard reference volume approach.
3. For economies that did not participate in the ICP 2021 cycle and, therefore, did not submit any data, PPPs were imputed based on a regression model using other official data sources. In addition to the imputation of PPPs at the level of GDP and household consumption, PPPs for actual individual consumption were imputed for the first time in the ICP 2021 cycle.

These developments ensure the increasing standardization of the ICP methodology by incrementally overcoming exceptions in the treatment of economies and regions.

Conceptual framework

The conceptual framework for an ICP comparison is determined by the definition of GDP. The ICP 2021 cycle utilized the internationally agreed-on definition of GDP provided by SNA 2008 (UNSC 2009) as its framework for the common ICP expenditure classification. The SNA defines GDP from the expenditure side as the sum of expenditures on final consumption, gross capital formation, and net exports. Final consumption is the total expenditure on the goods and services consumed by individual households or the community to satisfy their individual or collective needs. Gross capital formation is the total expenditure on gross fixed capital formation, changes in inventories, and acquisitions less disposals of valuables. Net exports are the difference between the value of goods and services exported and the value of goods and services imported. ICP comparisons are based largely on PPPs calculated using prices collected for the expenditure components of final consumption and gross fixed capital formation. Prices are not collected for changes in inventories, the acquisition and disposal of valuables, or net exports, and are thus deflated using reference PPPs.

Expenditure data

The data on national expenditures in local currency provided by the participating economies are essential to the ICP comparison. First, they are used as weights to aggregate PPPs through the various levels of aggregation up to GDP. Second, they are ultimately deflated by the PPPs and expressed as PPP-based expenditures.

Expenditure data compilation

Economies are expected to estimate their GDP for the reference year in line with SNA 2008 and to disaggregate this GDP estimate into the relevant expenditure components identified in the ICP expenditure classification.

At the lowest level of the classification, the expenditure components are termed basic headings. The classification breaks down the expenditure on final goods and services into 155 basic headings that comply with the functional and product classifications of SNA 2008 and are the building blocks of the ICP comparison. They are the level at which expenditures are defined and estimated, items are selected for pricing, and prices are collected. Basic headings are the level at which PPPs are first calculated.

In principle, a basic heading consists of a group of similar well-defined goods or services. In practice, a basic heading is defined by the lowest level of final expenditure for which the participating economies can estimate explicit expenditures.

Expenditure data validation

Validation procedures are an iterative process carried out at the national, regional, and global levels to ensure data quality and comparability across all participating economies.

National accounts data validation requires three stages: first, intracountry validation carried out by the individual participating economies; second, intercountry validation carried out at the regional level; and third, interregional validation carried out at the global level.

Before the national accounts expenditure data are sent to the regional offices, basic edits are carried out by the national implementing agencies. These include:

- Ensuring SNA compliance, including data completeness, applicability of positive and negative values, and additivity

- Ensuring the correct estimation of financial intermediation services indirectly measured (FISIM), net purchases abroad, and nonprofit institutions serving households (NPISHs).

Furthermore, an economic plausibility assessment, such as verifying per capita basic-heading expenditures and basic-heading shares of GDP, should also be conducted.

The validation edits carried out at the national level are 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 regional implementing agency identifies clusters of economies based on their economic similarities. GDP per capita estimates from previous years serve as a key indicator of the cluster to which an economy should be allocated.

The global comparison of PPP-based expenditures (and their per capita equivalents) is achieved by linking regional results to form a global set of results. At the global level, the same intracountry validation processes as previously defined are followed. The intercountry validation process is also followed across economies and within and between regions.

Price data

Economies participating in the ICP collect prices for a selection of the goods and services that make up final consumption expenditure and gross capital formation. There are four main surveys:

- Household consumption
- Government consumption
- Machinery and equipment
- Construction and civil engineering.

The household consumption survey covers the largest expenditure share, accounting for around 55 percent of GDP on average. It includes a wide assortment of goods and services purchased by households for individual consumption. This survey also includes two additional surveys that are treated separately due to different data requirements; these are the private education and housing surveys.

The government consumption survey compiles administrative or survey data on the compensation of public employees in a variety of public health services, public education services and collective services. This selection of government occupations represents the various education and skill levels that are commonly found among employees working in these three government sectors.

The machinery and equipment survey is based on a list of industrial, transportation, and electronic items commonly used in a variety of industries for the production of goods and services. The items on this list are often paired as *brand specific* and *not brand specific*—that is, generic—items with the same characteristics. The construction and civil engineering survey is based on a list of common resources for construction work, including materials, equipment hire rates, and labor costs. In addition, respondents are required to provide information on resource mixes, that is, material, equipment hire rate, and labor cost shares.

For each of these surveys there is both a global core list (GCL) of items, prepared by the Global Office in consultation with regional, and national implementing agencies, and a list of region-specific items representative of the consumption patterns in each region. In each ICP cycle, items on either the global core list and regional lists are carefully reviewed and updated where necessary, for example technology-related items, while maintaining broad consistency with previous ICP cycles. Regional PPPs are first computed on the basis of both the global and regional lists. The global core list items, in turn, are used to link regional PPPs across regions.

All prices reported are national annual average prices, in local currency, for the reference year—that is, they should be the average of the prices collected at regular intervals throughout the year. When price surveys are conducted outside the reference year, prices are retropolated or extrapolated based on consumer price index (CPI) data or other price indices, such as national accounts deflators.

Household consumption

Household consumption survey

This main survey collects prices for a wide range of goods and services for household consumption, such as food, beverages, tobacco, clothing, footwear, utilities, furniture, household appliances, pharmaceuticals, private health care services, motor vehicles, transportation services, electronic equipment, communication services, catering services, accommodation services, recreational activities, personal hygiene, and other goods and services. For this survey, each economy classifies the items priced as important or less important for the consumption patterns of its inhabitants. The items marked as important have a higher weight in the estimation of basic-heading PPPs for that economy.

Private education survey

This survey collects annual tuition prices for private education institutions at the primary, secondary, and tertiary levels as well as other education services, such as foreign language and private tutoring. The private education survey is not conducted by the Eurostat–Organisation for Economic Co-operation and Development (OECD) PPP Programme, as the Programme follows an output approach for total education.

Housing survey and related data

This survey collects annual rental prices and dwelling stock data. Four basic headings within the ICP expenditure classification require data on rentals:

- Actual rentals for housing
- Imputed rentals for housing
- Housing under individual consumption expenditures by NPISHs
- Housing under individual consumption expenditures by government

Since these last two basic headings use reference PPPs derived from the first two basic headings listed, it is sufficient to focus on how to compute PPPs for actual and imputed rentals. Actual rents are the rents that tenants pay to the owner of the dwelling they are leasing. Imputed rents are estimates of the rents that owner-occupiers would have to pay for their dwelling were they renting rather than owning the dwelling. The SNA requires that households' housing expenditures include both the actual expenditure on rents and an estimate of the rent that the owners would have to pay if they were obliged to rent (imputed rents).

The PPPs for housing services can be calculated either directly, using the rental (price) approach, or indirectly, using the dwelling stock (volume) approach, or through a combination of both approaches (mixed rental and volume approach). The survey was designed to collect data for all three approaches, in the form of rental prices for different types of dwelling and dwelling stocks (volumes).

Government consumption

This survey collects prices for the compensation of government employees, which comprises the basic salary or wage, allowances, and cash payments over and above the basic salary or wage, income in kind, and the employer's actual and imputed social security contribution. The sources of the data reported are

the administrative government pay scales for each of the selected occupations or dedicated surveys on the compensation of government employees. The GCL defines these occupations using job descriptions taken from the International Labour Organization's International Standard Classification of Occupations 2008.

Gross fixed capital formation

Machinery and equipment

This survey collects prices for machinery and equipment typically used in a variety of industries. The GCL includes one item identified by brand and model and another generic item with the exact same characteristics, but not identified by brand and model. For consistency with national accounts, prices for equipment goods that are consistent with the valuation of those goods as fixed capital assets in the national accounts are required. Thus, the prices must include the import duties and other 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 that it will be ready for use in production. Deducted from the price are the discounts generally available to most purchasers.

Construction and civil engineering

This survey collects prices for inputs to construction work, including materials, equipment hire, and labor. The prices provided are those paid by construction contractors to their suppliers. For materials, 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 a value added tax (VAT). For equipment, prices are the rental charges paid to hire companies or internal hire rates. For labor, these reflect the cost to the contractor of employing workers. In addition, resource weights for each input component (materials, equipment hire, labor) for typical residential, nonresidential, and civil engineering projects are collected.

Price data validation

Similar to the process for national accounts, the validation process for price data comprises three distinct stages. The first is the intracountry or national validation stage, during which the prices collected by a single economy are edited and verified. The second is the intercountry or regional validation stage, during which the prices collected by all economies participating in a regional comparison are edited and verified. The third is the interregional, or global, validation stage, during which the prices that have been collected for global core items from the GCL and have already been edited and verified withi regions during the intercountry validation are edited and verified across all economies and all regions.

This process is repeated over several rounds, since changes and revisions to price data from one economy impact the PPPs calculated for all other economies. Once errors are found and corrected, overall results need to be recalculated, and a new validation round begins. The new results, once cleared of major errors, may reveal mistakes that were not previously detected. This process repeats itself until the final price data are deemed reliable.

It should be stressed that validation procedures are complementary to good survey practices. Data quality depends to a large extent on the design and management of each price survey. Price collections

must be planned carefully, carried out efficiently, and supervised properly. Item specifications must be sufficiently detailed to enable price collectors to identify items unambiguously in the outlets they visit. Any difficulties arising with each price survey should be documented and reflected in the design and conduct of future surveys.

PPP calculation and estimation

In general, price relatives are first computed at the individual item level within each basic heading for each pair of economies being compared. Suppose three economies—A, B, and C—price two kinds of rice under the rice basic heading. For each kind of rice, there are three price relatives: P_B/P_A; P_C/P_A; and P_C/P_B. The basic-heading PPP for each pair of economies can be computed directly by taking the geometric mean of the price relatives between them for the two kinds of rice. This is a bilateral comparison. The PPP between economies B and A can be computed indirectly: $PPP_{C/A} \times PPP_{B/C} = PPP_{B/A}$. The use of both direct and indirect PPPs is a multilateral comparison. This means that the PPPs between any two economies are affected by their respective PPPs with other economies in the comparison. As a result, a change in the mix of economies included in the comparison will also change the PPPs between any two economies.

Different methods can be used to compute multilateral PPPs. The choice of method is based on two basic properties: transitivity and base country invariance. PPPs are transitive when the PPP between any two economies is the same whether it is computed directly or indirectly through a third economy. PPPs are base country invariant if the PPP between any two economies is the same regardless of the choice of base economy. These properties apply for every computational step: computing basic heading PPPs between economies, aggregating basic-heading PPPs to the within-region GDP PPPs, linking PPPs across regions, and finally computing global PPPs.

Another property underlying the computational steps to obtain PPPs is that economies are treated equally regardless of the size of their GDP. Weights based on basic-heading expenditures are used in the methodology to weight a group of basic headings to an aggregate level. Therefore, PPPs are first weighted using economy A's weights (Laspeyres index) and then weighted again using economy B's weights (Paasche index). Each index provides a weighted average of the PPP between economy A and economy B. To maintain symmetry, the geometric mean is taken of the two aggregated PPPs for every pair of economies in the comparison. The result is the Fisher index. For each pair of economies, the multilateral PPP is the geometric mean of the direct and indirect Fisher indexes.

This method, however, does not satisfy the additivity requirement. Additivity occurs when the sum of the PPP-based expenditures of the basic headings constituting an aggregate equals the PPP-based expenditures based on the PPPs for the aggregate. Additive methods have the disadvantage of giving more weight to the relative prices of the larger, more developed economies. As a result, the PPP-based expenditures of smaller, less developed economies become artificially larger and move closer to the PPP-based expenditures of rich economies. This is known as the Gerschenkron effect. For the uses of ICP PPPs, such as for poverty analysis, nonadditive methods that avoid the Gerschenkron effect are preferred.

Fixity is yet another concept that determines the methods used. The fixity concept means that the relative volume—the ratio of PPP-based expenditures—between any pair of economies in a region remains the same after the regional results have been combined into a set of global results, including all economies.

PPP estimation at the basic-heading level

The PPP estimation process begins with the participating economies collecting prices for items chosen from a common list of precisely defined items. These common lists include both regional items, priced in a specific region, as well as global core items as set out in the GCL, priced in all ICP regions. These two sets of prices cover the whole range of final goods and services included in GDP: household consumption expenditures, government consumption expenditures, and gross capital formation expenditures. In the current ICP methodology, basic-heading PPPs are first estimated at the regional level by the regional implementing agencies, and subsequently linked at the global level through the global linking procedure outlined in the following sub-section.

Two basic methods are used in the ICP to calculate basic-heading PPPs. The first approach is based on the Jevons index made transitive by the Gini-Éltető-Köves-Szulc (GEKS) method, which transforms bilateral PPPs into multilateral PPPs. The other method uses a regression model known as the country product dummy (CPD) method, which directly estimates PPPs that are transitive and base-country invariant in one step. The results obtained by both methods are the same if every economy prices every item, and no item level weighting is applied.

Both methods can be modified to include weighting at the item level. As there are no expenditure weights below the basic-heading level, participating economies are asked to use their expert judgment to determine which items would have the larger expenditure shares within each basic heading. For instance, if basmati rice is deemed to be important within the rice basic heading, then basmati rice will have a higher weight in the PPP calculation for that economy. This weighting at the item level is only applied in the household consumption survey. The modified methods are simply known as GEKS* and weighted CPD (CPD-W). However, the results provided by the two methods differ. This is because these methods provide different results in their unweighted form, and in addition the GEKS* method assigns a weight of 1 to the most important items and a weight of zero to the least important items, while the current CPD-W method assigns weights of 3 and 1, respectively.

Reference PPPs

For some basic headings, expenditure data exist, but price collection is considered too expensive or time-consuming or the price data are unreliable. For these basic headings, reference PPPs are used, and they can be categorized as follows:

- Price-based reference PPPs, specific or neutral
- Market exchange rate reference PPPs.

Price-based reference PPPs form the majority of all reference PPPs used. They are based on the PPPs of other basic headings for which prices were collected. These PPPs are referred to as specific reference PPPs. They may refer to the PPP for a single basic heading or an average of the PPPs for several basic headings. In the latter case, they will be GEKS averages of the selected PPPs weighted by expenditure shares. In other cases, reference PPPs are the PPPs of a large group of basic headings, such as all the

basic headings under gross capital formation for which prices have been collected. In this case, the purpose is to ensure that the use of a reference PPP will not change the PPP for that larger group. These are referred to as neutral reference PPPs because the intention is for them to have no impact on the PPPs of the larger group of basic headings.

Market exchange rate reference PPPs are used for the following four basic headings: net purchases abroad, acquisitions less disposals of valuables, exports of goods and services, and imports of goods and services. For the calculation of PPPs for exports and imports, it would be prohibitively expensive to collect prices in the same manner as for other items of final expenditure, and the use of market exchange rates can be justified on practical grounds.

PPP aggregation above the basic headings

Once PPPs are computed for each basic heading for all participating economies within a region, they are used as inputs for the higher levels of aggregation using the GEKS method. This method consists of two steps:

- *Step 1*. Aggregate the basic-heading PPPs using the national accounts expenditure structures to obtain the bilateral PPPs for each pair of economies. Usually Fisher-type PPPs will be used, which require calculating both 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.
- *Step 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.

As previously discussed, the GEKS method is not additive. While additivity may be desirable for some uses, this property has the disadvantage of rendering the PPP-based expenditure of low-income economies artificially larger. In applications of PPPs such as global poverty estimates, this might lead to unwanted biases, and therefore a non-additive method is preferred. The resulting linked global PPPs maintain the fixity of the regional results.

Calculation of global PPPs

Standard linking approach

At the global level, regional PPPs are linked to form a global set of PPPs and measures of price and volume relatives. In order to link the regional basic-heading PPPs for each participating economy, the so-called interregional linking factors are calculated based on the prices of global items from the GCL collected in all ICP regions.

The GEKS aggregation method, with further redistribution of regional volumes in accordance with an economy's regional volume shares (known as the country aggregation with redistribution [CAR] procedure), is used to obtain PPP-based expenditures (hereafter referred to as volumes) and aggregated PPPs with regional fixity. All economies in the standard ICP regions participated simultaneously and equally in the global aggregation using the GEKS method.

Linking at the basic-heading level involves the following four steps:

- *Step A1.* Calculate the regional basic-heading PPPs based on both the regional and GCL items. The regional basic-heading PPPs must follow the ICP expenditure classification.
- *Step A2.* Convert all GCL item prices in local currency to a common regional currency by using the regional basic-heading PPPs from step A1.
- *Step A3.* Calculate the interregional linking factors by applying the weighted Region-Product-Dummy regression method (a modified version of the CPD-W) to the GCL item prices from step A2.[1]
- *Step A4*. Multiply each economy's regional basic-heading PPP from step 1 by the interregional linking factor resulting from step A3. The PPPs derived from this step are the global basic-heading PPPs with regional fixity.

The estimation of PPPs above the basic-heading level involves the following six steps:

- *Step B1*. Calculate the regional PPPs by applying the GEKS aggregation to the regional basic-heading PPPs from step A1 and the national accounts basic-heading expenditures in local currency units for each level of aggregation up to GDP.
- *Step B2*. Obtain an economy's volume shares in the regional results for each level of aggregation up to GDP using data from step B1.
- *Step B3*. Calculate an economy's aggregated PPPs in the global comparison by applying the unrestricted GEKS aggregation to the global basic-heading PPPs derived from step A4 and the national accounts basic-heading expenditures in local currency for each level of aggregation up to GDP.
- *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 indirectly by dividing the economies' nominal expenditures by the volumes derived from step B5 for each level of aggregation up to GDP.

Nonstandard linking approaches

While the standard linking approach applies to most household consumption basic headings for all regions, other basic headings require different approaches due to the specific nature of their surveys.

Housing

All economies participating in ICP 2021 were asked to collect annual average rents for a global list of dwelling types, as well as dwelling stock data: for example, number of dwellings, usable surface area in square meters, and information on three quality indicators—availability of electricity, water supply, and

an in-house toilet. National accounts expenditure data on actual and imputed rentals were also collected. 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 decided on the best way to use the collected data for its region.

Rental data were used to link the Africa, Latin America and the Caribbean, and Western Asia regions. The linking factors for these three regions were calculated using the CPD method. The Asia and the Pacific, the Commonwealth of Independent States, and the Eurostat-OECD regions were linked to each other and to the rest of the world using the dwelling stock approach. This involved calculating housing volumes and housing quality indexes to adjust total per capita expenditure on housing and regional housing PPPs in order to render them comparable globally.

Government compensation

The ICP approach for estimating PPPs for government services is based on an input approach in which compensation data for selected government occupations are collected across economies. Given the differences in productivity, adjustment factors are applied to account for differences in capital per worker. These adjustment factors are based on differences in countrywide levels of capital per worker and their estimated contribution to output using the aggregate share of capital income in GDP from the Penn World Tables.[2] Adjustments were made to the PPPs for government in the Africa, Asia and the Pacific, Latin America and the Caribbean, and Western Asia regions. No productivity adjustments were applied to the Eurostat-OECD and Commonwealth of Independent States regions because differences in labor productivity within each of those regions were considered to be relatively low. However, productivity adjustments were made to all regions when the interregional linking factors were estimated to maintain consistency in the global comparison.

Education and health

Eurostat-OECD economies did not report prices nor regional PPPs for private education. As a result, the global linking factors for this basic heading were adjusted on the basis of the global linking factors for the "Production of Education Services" aggregate under Individual Consumption Expenditure by Government.

For all other education and health components, Eurostat-OECD followed an output approach to calculating their PPPs. Thus, it was necessary to link their PPPs to those of other ICP regions that follow the input approach to calculating their PPPs for health and education.

For education, since Eurostat-OECD does not collect expenditure weights at the basic-heading level, a simplified weighting system was used, based on information on education expenditure structures in the OECD–United Nations Educational, Scientific, and Cultural Organization (UNESCO) database. Data on average compensation of employees in education in Eurostat-OECD economies were used to bridge their output-based PPPs to those of other ICP regions that follow the input approach.

For health, since Eurostat-OECD does not collect expenditure weights at the basic-heading level, the System of Health Accounts (SHA) was used, as it offers a breakdown with a significant overlap with basic headings in the ICP. For comparison purposes, it was necessary to combine the basic headings for household, NPISHs, and government consumption for other ICP regions because the SHA does not distinguish between these different types of expenditures.

Construction and civil engineering

Due to differences in the regional approaches for estimating the construction and civil engineering PPPs, the linking of these PPPs at the global level required a special linking approach. Regional item prices in local currency were used to calculate the nine construction sub-heading PPPs using the CPD method for the economies participating in the global linking, which were then aggregated in the respective three construction basic-headings PPPs (residential buildings, nonresidential buildings, and civil engineering works). Linking factors for the three construction basic headings were calculated as geometric means of the aggregated PPPs for the economies in a region.

The regional Eurostat-OECD approach to estimating construction and civil engineering PPPs differs from the ICP approach. In order to link construction and civil engineering PPPs between the Eurostat-OECD economies and the rest of the world, eleven economies in the Eurostat-OECD comparison conducted the ICP survey.

Similarly, the regional CIS approach to estimating construction and civil engineering PPPs differs from the ICP approach. A procedure called the Resource-Technology Model (RTM) method was used to compare the construction output of all participating CIS economies. The RTM method consists of defining a standard facility and the notional cost of its construction. It is based on the accounting of prices for resources and corresponds to the information capabilities and the resource-based method of determining the cost of construction used in construction and design organizations in CIS economies. In order to link construction and civil engineering PPPs between the CIS economies and the rest of the world, all economies in the CIS comparison conducted the ICP survey.

Special linking cases

Special linking calculations were conducted in tandem with the calculation of global results. This included the linking of Caribbean economies with Latin American economies, the treatment of dual-participation economies in the Africa and Western Asia regions, and the inclusion of the special participation economies, Georgia and Ukraine.

Linking the Caribbean with Latin America

The method used to link the Caribbean economies with Latin America included three steps. First, PPPs were produced for the full set of Latin American and Caribbean economies. Second, separate subregional PPP aggregations were carried out, one for the Latin American economies and another for the Caribbean economies. As a third and final step, the PPPs in the first step were reindexed in accordance with results from the second step in order to maintain the fixity of both Latin American and Caribbean PPPs.

Linking dual-participation and single economies

The Arab Republic of Egypt, Mauritania, Morocco, Sudan, and Tunisia participated in both the Africa and Western Asia comparisons. Published global PPPs for these economies are geometric means of their respective global PPPs in the Africa and Western Asia comparisons. The single economies Georgia and Ukraine were included as guest participants in the Eurostat-OECD comparison and mainly followed the Eurostat-OECD methodology.

PPPs for nonparticipating economies

In the 2021 cycle, 176 economies participated in the ICP. Other economies did not participate in the comparison for various reasons, including civil unrest, lack of resources, or lack of capacity. Although these nonparticipating economies account for a small share of the world economy and population, it is important to estimate the size of these economies for various purposes.

The method used for imputing PPPs for nonparticipating economies uses three regression models, one based on the price level index (PLI) for GDP, one based on the PLI for individual consumption expenditure by households, including NPISHs and the third, introduced for the first time in the ICP 2021 cycle, based on the PLI for actual individual consumption. The three regressions are estimated jointly using the "seemingly unrelated regression" method. The required explanatory variables are as follows: GDP per capita in US dollars based on market exchange rates; imports as a share of GDP; exports as a share of GDP; and the age dependency ratio. Dummy variables are required for the Sub-Saharan African economies, the Eurostat-OECD PPP Programme participants, island economies, and landlocked economies. Interaction terms of GDP per capita in US dollars based on market exchange rates and the dummy variables are also required.

Interpolated time series PPPs

For the years between reference years 2017 and 2021—namely, 2018, 2019, and 2020—PPPs were calculated based on an approach in which basic-heading PPPs were first interpolated between the reference years and subsequently aggregated using the standard GEKS method. In addition, regional PPPs between the reference years, where available, were incorporated using the country approach with redistribution (CAR) procedure. The resulting annual PPPs uphold the same properties of base-country invariance and fixity as the PPPs from reference year comparisons.

The data required to construct time series PPPs included global PPPs for the two reference years; regional PPPs between the reference years, where available; national accounts deflators and consumer price indexes; national accounts expenditures at current prices in local currency units; market exchange rates; and population. Where participating economies could not provide any of the above information required for time series PPPs estimates, data were complemented with internal estimates by the ICP global implementing agency.

[1] CPD is used for selected basic headings under household consumption (housing and education) and for all nonhousehold consumption expenditure components.

[2] The Penn World Tables are a data set of National Accounts developed and maintained by the University of California, Davis, and the University of Groningen to measure GDP across economies.