The Methodological Innovations, Main Results and Findings of the 2011 Round of the International Comparison Program

Nada Hamadeh (World Bank)

Michel Mouyelo-Katoula (World Bank)

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The Methodological Innovations, Main Results and Findings from the 2011 Round of the International Comparison Program*

Nada Hamadeh[1] and Michel Mouyelo-Katoula[2]
[1]Senior Statistician and International Comparison Program Team Leader, World Bank, Washington DC, USA
nhamadeh@worldbank.org
[2] 2011 International Comparison Program Global Manager, Luxembourg
mmk2302@gmail.com

Abstract: The International Comparison Program (ICP) is a worldwide statistical initiative designed to estimate purchasing power parities (PPPs) that can be used as currency converters to compare the performance of economies around the world. The ICP conducts surveys every six years to collect price and expenditure data for all goods and services that make up the gross domestic product (GPD) in economies worldwide in order to calculate the PPPs. PPPs enable levels of economic activity in different countries to be compared thereby providing in-depth views of the distribution of resources worldwide. The 2011 round of the ICP was leveraged on the successful outcome of the 2005 round that included 146 economies. The 2011 round introduced various methodological improvements, mainly in linking the regions and aggregating results. The summary report and results from the 2011 round were released in April 2014, followed by more detailed results in June 2014. A comprehensive report will be published in September 2014. The April release provided PPPs, price level indices, and real expenditures for the GDP and major aggregates for 199 economies. The final report in September will provide a more in-depth analysis of volume and per capita indices. The purpose of this paper is to provide an overview of the major methodological innovations that were implemented in ICP 2011, and the main results and findings of the round.

Key Words: International Comparison Program, PPPs, Prices, National Accounts

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1. Introduction

Measuring and comparing the performance of economies around the world is made feasible with purchasing power parities (PPPs). PPPs are produced by the International Comparison Program (ICP), which is based on a sound body of statistical and economic theory and a diverse array of studies and successful projects; it is now the largest worldwide statistical operation. To calculate PPPs for its comparisons, the ICP conducts surveys every six years to collect price and expenditure data for all goods and services that make up the gross domestic product (GPD) including consumer goods and services, government services, and capital goods. The ICP was implemented as a true global initiative for the second time, with the reference year 2011, building on the successful implementation of the 2005 round.

The detailed results for ICP 2011 were released in June 2014 in electronic form, after the *Purchasing Power Parities and Real Expenditures of World Economies: Summary of Results and Findings of the 2011 International Comparison Program (World Bank, 2014)* was published in April 2014. A comprehensive report providing more in-depth analysis is due in September 2014. These results provide data on PPPs of currencies, expenditure shares of GDP, total and per capita expenditures in United States dollars (USD) both in exchange rate terms and PPP terms, and price level indices. This dataset covers 26 expenditures categories for goods and services for 199 participating economies from Africa, Asia and the Pacific, the Caribbean, the Commonwealth of Independent States, Latin America, Eurostat-OECD, Western Asia, singleton economies, and the Pacific Islands.

The results of ICP 2011 show that the world has become more equal because consumption and GDP values in most poor countries are larger relative to the United States than previously believed. The shares of the world GDP of large economies such as China and India have more than doubled relative to the United States between 2005 and 2011. Provided that the results are used by various institutions and academia for poverty analysis, building PPP time series, quota calculation, among other uses, the ICP aims to be transparent and provides as much information as possible for a better understanding of the complex program and its results.

The purpose of this paper is to provide an overview of the major methodological innovations that were implemented in ICP 2011, and the main results and findings of the round.

2. General implementation features of the 2011 ICP round

2.1 Participation, governance and framework

For the first time ever, the ICP 2011 covered 199 economies, representing over 90 percent of the world economies and accounting for approximately 97 percent of the world's population as well as nearly 99 percent of the world nominal GDP (in U.S. dollars using exchange rates). Final participation included 50 economies in Africa; 23 in the Asia and Pacific region; 9 in the Commonwealth of Independent States; 17 in Latin America; 22 in the Caribbean; 12 in Western Asia; 21 in the Pacific Islands; 2 singleton countries (Iran and Georgia); and 47 in the Eurostat-OECD PPP Program. Four countries participated in two regions: Arab Republic of Egypt, Sudan, Russian Federation, and Fiji.

As an improvement from the successful outcome of ICP 2005, the governance structure of ICP 2011 was constructed to ensure the delivery of accurate, reliable, and timely estimates of the PPPs of currencies

and real GDP and its components. The program was conducted under the charter of the United Nations Statistical Commission, and led by the Executive Board, which consisted of internationally renowned chief statisticians. The overall coordination and implementation of the work program of ICP 2011 was handled by the Global Office, hosted by the World Bank. Conceptual, methodological, and technical issues were entrusted to the Technical Advisory Group. Additionally, three task forces were created: the Validation Expert Group, PPP Computation Task Force, and Results Review Group to oversee the validation of the data provided for the global comparison, calculate the global results independently and ensure their convergence, and review the global results in terms of their plausibility and adherence to the agreed methodologies and procedures, respectively. Regional coordinators were responsible for the activities such as data collection, compilation, processing and dissemination within the regions.

The System of National Accounts 1993 (SNA93) guided the framework of these activities and the resulting statistical estimates. Price data for a selection of goods and services were collected throughout 2011 and combined into national annual averages for each economy participating in ICP 2011. Particular care was taken to ensure adequate coverage of rural and urban outlets when collecting the prices of individual household consumption items. Specific guidelines were prepared for ICP purposes to ensure that geographical coverage, outlet selection, item selection, number of items, price quotations, and frequency of collections were adequately handled. The main price survey for household consumption goods and services built on the consumer price index (CPI) infrastructure while special surveys were devised to collect price data for housing, education, government, machinery and equipment, and construction. The approaches adopted were similar overall, yet allowed for focused details pertaining to each survey. As an improvement from ICP 2005, the global core list, a worldwide list of products designed to provide links between regions, was implemented in ICP 2011. Additionally, regions priced goods and services from their regional product lists. The selection of products to be priced was made by basic heading and economies based their selection on the availability of the product in the economic territory and the importance of the product relative to other products in the basic heading.

2.2 Data requirements

Each economy participating in ICP 2011 provided prices and importance indicators for the goods and services selected for the precisely defined product list, national expenditures broken down to a common classification, exchange rates, and the population of the economy for 2011.

Maintaining the structure of SNA93, national accounts expenditures for each economy in ICP 2011 are broken down from their GDP estimate into different levels of aggregation. Basic headings are the lowest level of aggregation, and there are 155 basic headings for final goods and services in ICP 2011.

Price data are the essential input for PPPs and therefore must be accurate, reliable, and representative for each economy. Prices are collected for the selection of goods and services forming the final consumption expenditure (by households and government) and gross fixed capital formation. In accordance with SNA93, economies collected prices paid to obtain a good or service, factoring in any discounts, taxes, and the like. Prices are national annual averages that are deemed to be consistent with prices embedded in GDP estimates. They account for seasonal variations and spatial differences across the entire economic territory of each economy. This requires product specifications to be thoroughly defined to enable the ICP comparisons of each product and basic heading.

The concept of importance was utilized in ICP 2011 as items from each economy's product lists were either classified as important or less important. Each economy was required to price at least one important item per basic heading and collect prices for important items on their regional product lists as well as the important items of other economies to ensure sufficient overlap for comparisons. These importance indicators were then taken into account during price validation, calculation of PPPs, and in estimating linking factors.

2.3 Quality assurance and Transparency

A comprehensive ICP quality assurance framework was developed to ensure that the above data requirements and other major ICP principles were being met at the country, regional, and global levels. The aim of the framework was to introduce rigor, structure, and common criteria for assessment of the quality of the input data and the results produced. The quality assurance framework entailed a body of principles for the ICP, a three-level checklist to evaluate the quality of ICP work, and documentation of all critical processes as well as an inventory of best practices and guidelines for ICP data validation.

In ICP 2011, validation was conducted in three distinct stages. The first was the intra-country or national validation stage during which the prices collected by a single economy were edited and verified. The second was the inter-country or regional validation stage during which the prices collected by all economies participating in a regional comparison were edited and verified. And the third was the inter-regional or global validation stage during which the prices collected for global core products—prices that had already been edited and verified within regions during the inter-country validation—were edited and verified across all economies and all regions. Validation was an iterative process requiring a number of rounds of editing and verification. In general, the three validation stages were conducted for prices, national accounts expenditures, and PPPs. However, the specific steps within each stage of the validation were specifically tailored to the respective context of prices, national accounts expenditures, and PPPs to increase the quality and reliability of the data.

Furthermore, at the global level parallel and independent processes were established for the validation of input data by the Validation Expert Group, computation of PPPs by the PPP Computation Task Force, and review of the final results by the Results Review Group.

To ensure the transparency of the methodology and processes, all major knowledge items related to the most recent ICP rounds were consolidated in a book entitled *Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP)* (World Bank 2013). Additionally, an ICP 2011 Operation Guide entitled *Operational Guidelines and Procedures for Measuring the Real Size of the World Economy* was prepared to provide DETAILED information on all the operational aspects of the ICP 2011. These materials are available on the ICP website (http://icp.worldbank.org), which was revamped to better serve as a repository of ICP knowledge resources and data. Furthermore, the limitations of the data and methods were identified, and they are explicitly described in the *Summary of Results and Findings of the 2011 International Comparison Program (World Bank, 2014)*.

Additionally, the 2011 ICP Data Access and Archiving Policy was established to improve access to more detailed data while respecting confidentiality constraints and data quality limitations.

3. Major methodological improvements

As part of its quality objective, ICP 2011 introduced various methodological improvements, leveraging on the strong foundation provided by ICP 2005. The main areas of methodological improvements include global linking, calculation of basic heading PPPs, dwellings, government and construction.

3.1 Global linking and aggregation

The linking procedures used in ICP 2011 differ from those used in 2005 in two main areas: at the basic heading level, and at the aggregate levels above the basic heading. In 2005, 18 representative economies were used to link all of the 146 economies by means of a common price list of products, called the Ring list. In 2011, the global core list of products enabled interregional linking of almost all of the participating economies. The new procedure was constructed after the analysis of the 2005 results indicated sensitivity to pricing problems in the Ring economies due to the linking factors. The methodology used in ICP 2011 is a noteworthy improvement at the basic heading level and aggregate level over the 2005 linking method.

3.2 Calculating basic heading PPPs

In 2005, the country dummy product (CPD) method was used to calculate basic heading PPPs at the product level without assigning any weight. In 2011, the weighted country product dummy (CPD-W) method was used. The weights of 3:1 came from the classification of products as important or less important, which were used in computing basic heading PPPs at the intra-region level and in estimating linking factors.

3.3 Dwellings

Several approached were used for dwellings in 2005. The dwelling stock approach was used for Africa and the CIS, the rental approach for Latin America, the reference volume approach for Asia and the Pacific, and a combination of rental and dwelling stock data for Eurostat-OECD and Western Asia. In 2011, rental data collected of dwelling types for the global list was used for Africa, Latin America, the Caribbean, and Western Asia. The reference volume approach was used for Asia and the Pacific, dwelling stock data for the CIS, and a combination of rental and dwelling stock data for Eurostat-OECD. Linking was carried out in stages. The same rental data that was used for the estimation of the intra-region PPPs for Africa, Latin America, Caribbean, and Western Asia regions were used for linking. Dwelling stock data were used to link Asia and the Pacific, the CIS, and Eurostat-OECD, to each other and then to the rest of the world.

3.4 Government

For ICP 2005, government salaries were adjusted for productivity in the Africa, Asia and the Pacific, and Western Asia regions, however, between-region linking factors were not adjusted for productivity. For ICP 2011, productivity adjustments were used for the Africa, Asia and the Pacific, Latin America, and Caribbean regions when computing their regional results, however, no productivity adjustments were applied within the Eurostat-OECD, CIS, and Western Asia regions. For the ICP 2011 global results, the linking factors for all regions were computed with productivity adjustments.

3.5 Construction

A completely new method was used to estimate construction in ICP 2011, which is not comparable to the method used in 2005. A hybrid approach that combined prices for some construction outputs with those for some inputs was used in ICP 2005. The approach was difficult to implement and thus, ICP 2011 adopted a simplified input method based on the prices of basic materials, labor rates, and machinery hire.

4. The new structure of the world economy

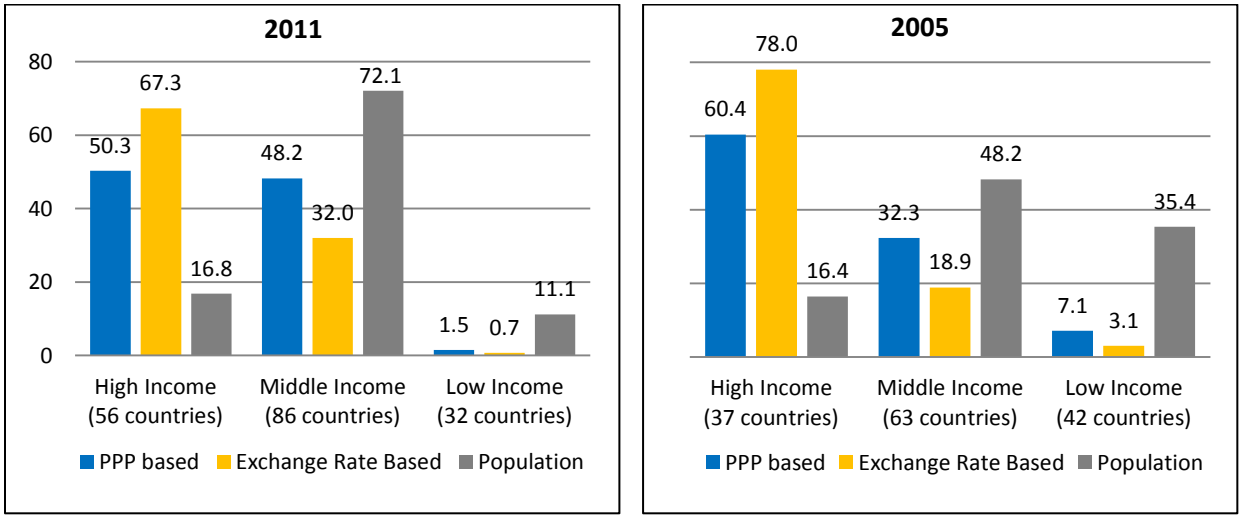
4.1 Volume structure at world level

The purpose of introducing methodological improvements in the abovementioned areas was to fine tune the measurement of the size of the world economy and better estimate its structure.

Results from ICP 2011 measure the size of the world economy as $90,647 billion in PPP terms, as measured by world GDP in 2011. The size was $70,295 billion when measured by exchange rates. Results from ICP 2005 reported world GDP as $54,976 billion in PPP terms and $44,309 billion in exchange rate terms.

Based on 2011 data, the distribution of world GDP in PPP terms accruing to the high-income countries was 50.3 percent (67.3 percent in exchange rate terms); middle-income countries, 48.2 percent (32.0 percent); and low-income countries, 1.5 percent (0.7 percent), as depicted in Figure 1. Accordingly, 49.7 percent of world real GDP went to the poorest 83.2 percent of the population. ICP 2005 results showed that only 39.4 percent of world GDP in real terms went to the poorest 83.6 percent of the global population. The regional shares of world GDP were 53.2 percent, Eurostat-OECD; 30 percent, Asia and the Pacific; 5.5 percent, Latin America; 4.8 percent, CIS; 4.5 percent, Africa and Western Asia; and 0.1 percent, the Caribbean.

Figure 1. Percentage of PPP-Based and Exchange Rate–Based GDP and Population by Income Group, ICP 2011 and ICP 2005



Source: ICP 2011

4.2 Ranking of economies

Substantial changes in the rankings of economies by share of world GDP were observed from ICP 2011 results, as displayed in Table 1. The top ranking remained as the United States with 17.1 percent of world GDP, China was second with 14.9 percent and India third with 6.4 percent. Most noteworthy was China's GDP in 2011 at 86.9 percent of U.S. GDP compared with only 43.1 percent in 2005. India moved up to third in 2011 from fifth in 2005, and Indonesia became one of the top 10 world economies. The top 12 economies in 2011 accounted for two-thirds of world GDP in real terms.

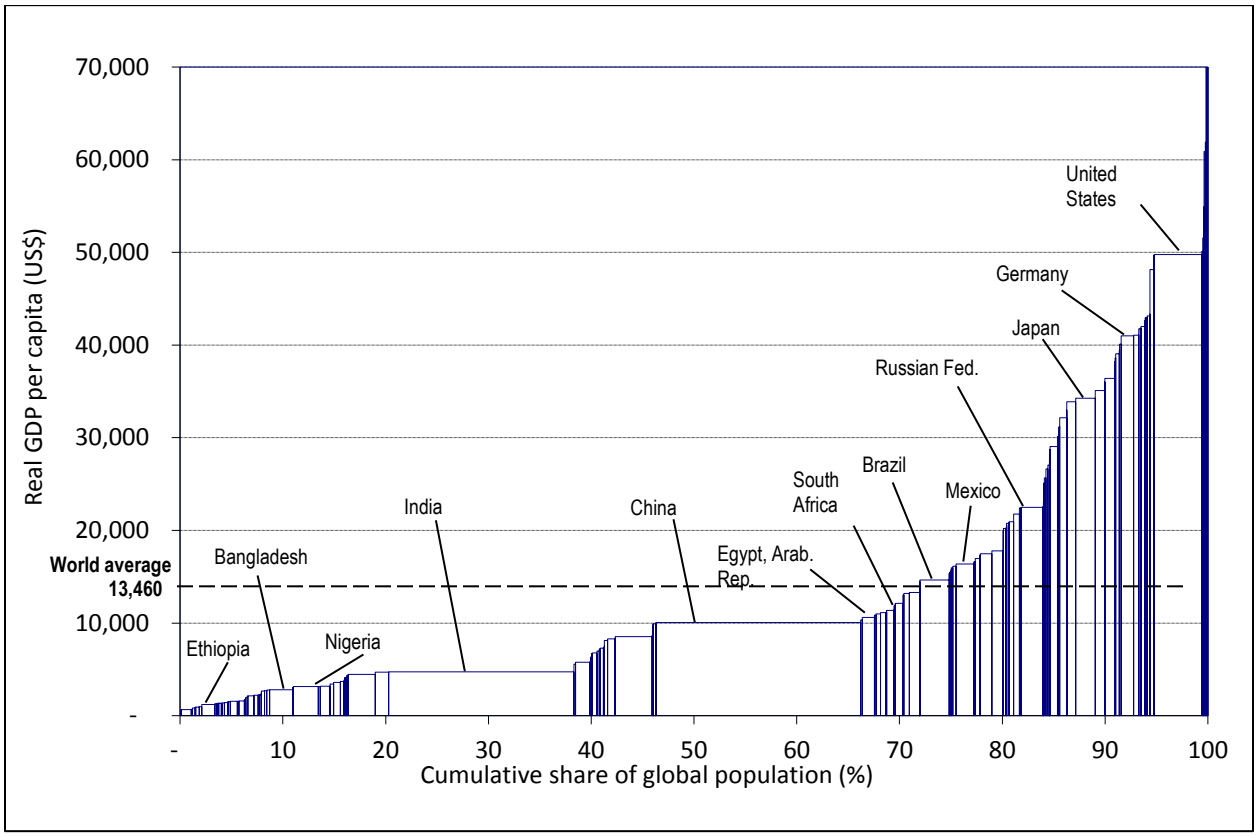
Table 1. Twelve Largest Economies by Share of World GDP, ICP 2011

Ranking by GDP (PPP-based)	Economy	Share of world GDP (PPP-based, world = 100)	Share of world GDP (exchange rate–based, world = 100)	Ranking by GDP per capita (PPP-based)
1	United States	17.1	22.1	12
2	China	14.9	10.4	99
3	India	6.4	2.7	127
4	Japan	4.8	8.4	33
5	Germany	3.7	5.2	24
6	Russian Federation	3.5	2.7	55
7	Brazil	3.1	3.5	80
8	France	2.6	4.0	30
9	United Kingdom	2.4	3.5	32
10	Indonesia	2.3	1.2	107
11	Italy	2.3	3.1	34
12	Mexico	2.1	1.7	72

Source: ICP 2011

Ranking economies by real per capita GDP is appropriate for assessing standards of living. The two highest-ranked economies in 2011 were Qatar and Macao, SAR, China with $146,521 and $115,441 in real per capita GDP, respectively. Luxembourg, Kuwait, Brunei Darussalam, Singapore, the United Arab Emirates, Bermuda, and Switzerland followed. The United States ranked 12th while China, Indonesia, and India ranked 99th, 107th, and 127th, respectively. Liberia was the poorest economy, with $535, followed by the Comoros with $610 and the Democratic Republic of Congo with $655. The bottom 10 ranked economies included Burundi, Niger, the Central African Republic, Mozambique, Malawi, Ethiopia, and Guinea. Figure 2 shows the distribution of global GDP for ICP 2011.

Figure 2. Real GDP Per Capita and Shares of Global Population, ICP 2011



Source: ICP 2011

Real per capita actual individual consumption (AIC), which is the sum of individual consumption by households and individual consumption by government, is an informative measure for assessing the welfare of people in various economies. Real per capita AIC provides another perspective for ranking economies.

The top-ranked economies with real per capita AIC in 2011 were Bermuda, the United States, and the Cayman Islands with $37,924, $37,390, and $34,020, respectively. Whereas real per capita GDP ranked Qatar near the top, real per capita AIC ranked it 35th. According to real actual individual consumption in 2011, Indonesia, China and India, ranked 118th, 121st and 134th, respectively while the Democratic Republic of Congo, Liberia, and the Comoros were the lowest-ranked economies, with values as low as $447, $606, and $621 respectively.

4.3 Price level differentials

The price level index (PLI), the ratio of the PPP of a currency in a particular economy and the corresponding exchange rates, is usually expressed relative to the world average price level set at 100. ICP 2011 results show that the economies with the highest PLI for GDP were Switzerland, Norway, Bermuda, Australia, and Denmark, with indexes ranging from 210 to 185. The United States' PLI was ranked 25th in the world. While it is typical that low-income economies have PLIs below 100, twenty-three economies had PLIs of 50 or below. The least expensive economies were found to be Egypt, Pakistan, Myanmar, Ethiopia and the Lao People's Democratic Republic.

Table 2. Economies with Highest and Lowest Price Level Indexes (PLIs), ICP 2011

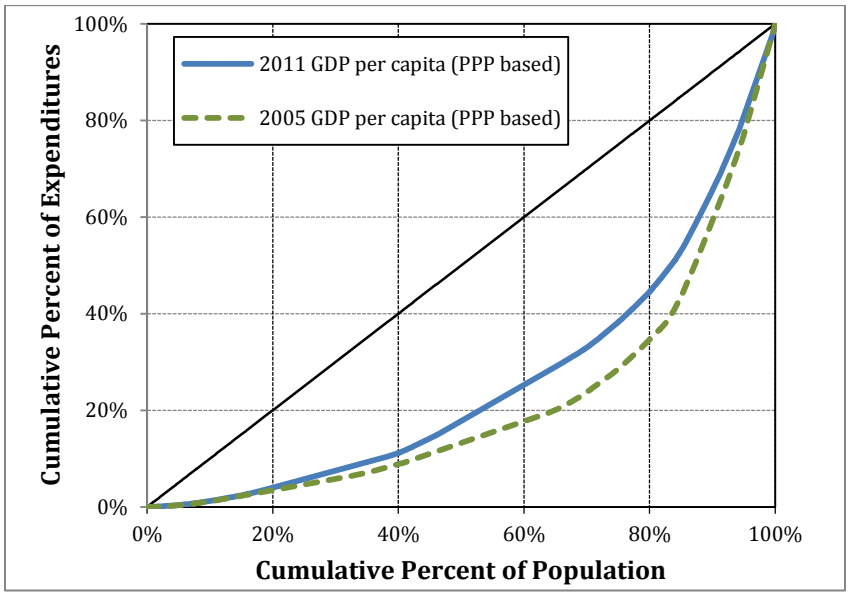
Ranking by GDP PLI	Economy	GDP PLI (world = 100)	GDP PLI (US = 100)	Ranking by GDP (PPP-based, per capita)
1	Switzerland	209.6	162.6	10
2	Norway	206.4	160.0	7
3	Bermuda	201.6	156.4	9
4	Australia	201.0	155.9	20
5	Denmark	185.0	143.5	21
6	Sweden	175.1	135.8	22
7	Japan	173.6	134.6	33
8	Finland	162.6	126.1	28
9	Luxembourg	162.4	126.0	3
10	Canada	161.9	125.6	23
168	Cambodia	42.8	33.2	146
169	Uganda	42.6	33.0	156
170	Vietnam	42.2	32.7	128
171	India	41.7	32.4	127
172	Bangladesh	40.3	31.2	144
173	Lao PDR	39.6	30.7	133
174	Ethiopia	37.5	29.1	169
175	Myanmar	37.0	28.7	139
176	Pakistan	36.4	28.2	129
177	Egypt, Arab Rep.	35.1	27.2	97

Source: ICP 2011

4.4 Comparison with 2005

Comparing ICP 2005 and ICP 2011 results is not completely straightforward. Due to the numerous fluctuations in economic and price structures since 2005 and the significant methodological improvements, users of the data are advised to be cautious when comparing results from different rounds. Nevertheless, measurements of inter-country inequality using real per capita GDP estimates from ICP 2011 are possible. Inter-country inequality in PPP-based per capita GDP measured by the population-weighted Gini coefficient dropped sharply to 0.49 for ICP 2011 from 0.57 for ICP 2005. The Gini measure calculated with exchange rate based per capita GDP also indicated a sharp fall from 0.71 to 0.64 during the same period. Similar trends were observed when the index was calculated with per capita household consumption or per capita actual individual consumption. These strong declining trends in inter-country inequality would have a significant impact on the estimation of poverty in the world.

Figure 3. Lorenz Curve for 2011 and 2005 GDP Per Capita Distribution



Source: ICP

5. Conclusions

Although many useful improvements were introduced to make ICP 2011 the best round yet, there is still considerable room for further advancements. The six-year duration between ICP rounds provides opportunities to adopt new techniques and methods to improve estimation. However, adoption of new techniques makes comparing estimates between successive rounds conceptually impossible. It is also evident that PPP extrapolation faces many challenges. Conceptually, it is impossible to maintain consistency in PPPs simultaneously across time and space. Furthermore, political constraints are compounding, thus delivering a future round with the same approach may be very challenging. ICP rounds pose a large burden on economies as they require extensive price surveys and detailed national accounts expenditures from each economy.

To keep the momentum of the 2011 round, the World Bank is conducting follow-up activities, including building further synergies between the ICP and national statistical programs, improving expenditure-based GDP and price data in countries and improving approaches for building more reliable PPP time series. The World Bank is capitalizing on the established partnerships with various regional and sub-regional agencies to conduct capacity-building activities to address data gaps within the ICP. Looking forward, the United Nations Statistical Commission has commissioned an evaluation of the 2011 ICP round, the findings of which will help shape the future of the ICP and recommend the way forward.

Based on the lessons learned from the 2005 and 2011 rounds, a better approach would be to conduct a 3-year rolling benchmark to minimize the burdens of economies. This approach would entail having fewer expenditure categories, less products, less frequency of collection (once a year), and limited geographic coverage with an urban/rural price ratio. Methodologies would remain constant to improve cross-benchmarks comparability, integration with routine national statistics work would increase, economies would improve GDP expenditures data and harmonize CPIs, and more of the underlying price data and metadata would be released.

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