

PART I

Purchasing Power Parities and 2005 ICP Results

INTRODUCTION: THE INTERNATIONAL COMPARISON PROGRAM AND PURCHASING POWER PARITIES

The International Comparison Program

The International Comparison Program (commonly known as the “ICP”) is a worldwide statistical initiative to collect comparative price data and estimate purchasing power parities (PPPs) of the world’s economies. Using PPPs instead of market exchange rates to convert currencies makes it possible to compare the output of economies and the welfare of their inhabitants in real terms (that is, controlling for differences in price levels).

The *System of National Accounts, 1993 (SNA93)* provides a common international framework for the measurement of economic activity. Gross domestic product (GDP) is the measure most often used to quantify economies’ economic activity, and GDP and consumption per capita are basic indicators of economic productivity and well-being. But the conversion of output or expenditures, measured in the local currency of one economy, to a common unit of account for comparison or aggregation with that of other economies is not a trivial problem. The standard method has been to use market exchange rates. However, market exchange rates are determined by the demand for, and supply of, currencies used in international transactions. They do not necessarily reflect differences in price levels and may therefore under- or overstate the real value of an economy’s

output and the standard of living of its residents. In fact, the prices of many goods and services within economies are determined in partial or complete isolation from the rest of the world. Therefore, *SNA93* recommends that the real value of economic activity be determined using purchasing power parities. The need for a more meaningful tool for comparing the real domestic product between economies led to the creation of the International Comparison Program (ICP) in 1968 and the publication of PPP estimates in 1970. The increasing use of PPPs by researchers, businesses, and international institutions has made the ICP a truly global program now covering more than 140 economies.

This report brings together the results of two separate PPP programs. The first is the global ICP program conducted by the ICP global office within the World Bank, which provided overall coordination for the collection of data and calculation of PPPs in more than 100 (mostly developing) economies. The program was organized into five geographic areas: Africa, Asia-Pacific, Commonwealth of Independent States, South America, and Western Asia. Regional agencies took the lead in coordinating the work in the five regions.

In parallel, the Statistical Office of the European Communities (Eurostat) and the Organisation for Economic Co-operation and Development (OECD) conducted their 2005 PPP program, which comprised 46 economies.

Eurostat covered 37 economies: the 25 European Union (EU) member states; the European Free Trade Association (EFTA) economies (Iceland, Norway, and Switzerland); and Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, Serbia, and Turkey. The OECD part of the program included 9 other economies: Australia, Canada, Israel, Japan, the Republic of Korea, Mexico, New Zealand, the Russian Federation, and the United States.

The main reasons for conducting the ICP on a regional basis are that the products to be priced are more homogeneous within regions, the expenditure patterns are likely to be more similar, and language differences are reduced. Moreover, dividing the ICP organization among a number of regional offices in relatively close proximity to the economies they are coordinating provides operational benefits.

The ICP global office has combined the results from each of the five regions with those from the Eurostat-OECD PPP program into an overall global comparison, so that results for all participating economies can be compared directly. The ring comparison (described on page 159, was developed specifically to link the regional PPPs without changing the relative results within a region (see page 163, “Fixity”). In other words, the starting point was the final results computed by each region. The ring comparison provided regional scalars by which economies’ data at each level of aggregation were converted to a global level (that is, the relative comparisons between economies within a region remained the same in the global comparison). For that reason, the global PPP results were not reviewed by national statistical authorities before publication.

(Appendix A provides a more detailed overview of the history of the ICP and its relationship to the Eurostat-OECD program. Appendix B describes the governance and the management of the ICP and how that related to the Eurostat-OECD program. Appendix C shows the Eurostat-OECD classification of expenditures on the GDP used by both programs as a starting point to select products to be priced and also as the basis for the first level at which PPPs are estimated.)

Purchasing Power Parity

A purchasing power parity between two countries, A and B, is the ratio of the number of units of country A’s currency needed to purchase in country A the same quantity of a specific good or service as one unit of country B’s cur-

rency will purchase in country B. PPPs can be expressed in the currency of either of the countries. In practice, they are usually computed among large numbers of countries and expressed in terms of a single currency, with the U.S. dollar (US\$) most commonly used as the base or “numeraire” currency.

Take the familiar “Big Mac Index” as an example. If a Big Mac hamburger costs 4.00 U.S. dollars in the United States and 4.80 euros in France, then the PPP for a Big Mac from the French viewpoint is 0.83 U.S. dollars to the euro. From the American viewpoint, it is 1.20 euros to the U.S. dollar. This means that for every euro spent on Big Macs in France, it would be necessary to spend 0.83 U.S. dollars in the United States to obtain the same quantity and quality of Big Macs. Conversely, for every U.S. dollar spent on Big Macs in the United States, it would be necessary to spend 1.20 euros in France to obtain the same quantity and quality of Big Macs.

The Big Mac is a single, standard product. The aim of the ICP is to produce PPPs that take into account the relative prices among many countries for a broad range of goods and services, including not only consumer products but also capital and government expenditures, which together make up GDP.

Price Level Indexes

Comparing PPPs at the level of GDP with market exchange rates provides a measure of the average cost of goods and services in one economy when purchased using currencies converted at prevailing exchange rates. The ratio of a PPP to a corresponding market exchange rate is called a price level index (PLI). A PLI of 100 indicates that price levels are the same as those in the base country or the world average. The PLI with the United States = 100 is simply the PPP divided by the exchange rate to the United States. The PLI with the world = 100 is the PLI to the United States multiplied by the ratio of the world total PPP expenditures to world total exchange rate expenditures for each level of aggregation. The detailed data tables show the PLI for the world = 100 to remove the effect of the exchange rate of the U.S. dollar.

Returning to the Big Mac example, if the market exchange rate is 1.00 U.S. dollar to 0.67 euros, then the PLI for a Big Mac with the United States as the base is 179 ($1.20/0.67 \times 100$). This indicates that given the relative

purchasing power of the U.S. dollar and the euro, a Big Mac costs 79 percent more in France than in the United States. Travelers exchanging their dollars to euros would notice this immediately.

PPPs between any pair of countries change slowly, whereas market exchange rates can change quickly. Sudden changes in PLIs result mainly from changes in market exchange rates. When market exchange rates change rapidly, a PLI for a country could change too in a short time, indicating that a country that was relatively cheap has now become relatively expensive compared with the base country.

The Use of PPPs and Market Exchange Rates for International Comparisons

PPPs are the preferred means of converting the value of the GDP and its components to a common currency. They enable cross-country comparisons of the sizes of economies, average consumption levels, poverty rates, productivity, and the use of resources. However, PPPs should not be used for all international comparisons; for example, market exchange rates should be used to measure international trade, capital flows, or the values of foreign debt.

PPPs adjust for differences in price levels between economies, which may not be reflected in market exchange rates, at least in the short run. Market exchange rates are the prices at which currencies trade in international markets. Because developing economies tend to have relatively lower wages leading to lower prices for nontraded goods and services, a unit of local currency has greater purchasing power within a developing economy than it does in the global market. Consequently, the GDP of a developing economy and the consumption of its residents will typically be underestimated if market exchange rates are used to compare their value with those of high-income economies. Although differences in price levels are generally less pronounced among economies at similar levels of development, large and rapid movements of exchange rates can alter the apparent size of economies or the perceived welfare of their residents. For example, the Euro exchange rate has changed from US\$ 0.853 in October 2000 to US\$ 1.562 in March 2008, but that does not mean that the welfare of Euro area countries has changed accordingly in relation to the United States in that time.

There is no need to convert from national currencies to a common currency (whether by market exchange rates or

PPPs) when calculating growth rates for a single economy. However, in computing regional (or world) growth rates, the sizes of the economies matter: national GDPs and aggregates are first converted to a common currency and then summed to regional (or world) totals, from which growth rates are computed. The appropriate conversion factor is provided by PPPs. Developing economies have often had (at least in the past decade) higher rates of economic growth than developed economies. As a result, the global growth rates computed with PPP-based activity levels tend to be higher than those computed using market exchange rates. The reason is that the developing economies have a higher weight in the PPP-based regional totals (both levels and growth rates) than those based on market exchange rates.

The initial rounds of the ICP in the 1970s focused mainly on what are referred to as “volumes” or “real expenditures” of GDP, its major components, and their per capita estimates. PPPs were seen mainly as providing a stepping-stone from national accounts expressed in national currencies to volumes expressed in a common currency. In recent times, economic analysts have shown increasing interest in PPPs in their own right as a measure of relative price levels between economies.

A major use of the PPP results is the estimation of the widely used “dollar-a-day” international poverty threshold. PPP results also enter the estimation of the United Nations Human Development Index and Gender Empowerment Measure, allow the World Health Organization to use health expenditures per capita to assess health inequality across economies, and provide the basis for international organizations to design effective aid programs. The European Commission relies on PPP-based indicators to allocate the Structural and Cohesion Funds across member economies.

Purchasing power measures are also useful for policy makers at the national level. For example, with the internationally comparable data, policy makers can draw on the experience of other economies by comparing the data for the components of the GDP and their relationship to economic growth. Similar analyses can inform policy makers of their economy’s comparative advantage by examining which goods or services are relatively cheap or expensive compared with those of other economies.

Purchasing power parities allow comparisons between economies of expenditure shares or price levels for components such as food, health care, and investments. For example, capital goods tend to be relatively more expensive

than consumer goods in developing economies, while services tend to be cheaper. Comparisons between economies at this level provide another view of what is contributing to differences in growth rates between economies.

The PPP-based measures of the GDP are needed to compare volume measures with other economic variables. Examples include the following:

- Carbon emissions per unit of GDP
- Energy use per unit of GDP
- GDP per employee
- GDP per hour worked

The first two are useful for environmental comparisons, while the latter two provide important comparisons of productivity.

Reliability of PPPs and GDP Volume Measures

Purchasing power parities are statistical estimates. Like all statistics, they are point estimates that fall within some margin of error of the unknown, true values. The error margins surrounding the PPPs depend on the reliability of the expenditure weights and the price data and how well the goods and services that were priced represent the consumption pattern and price levels of each participating economy. As with national accounts data generally, it is not possible to calculate precise error margins for PPPs or the real expenditure data derived from them.

The 2005 ICP included economies ranging from city-states to large and diverse countries such as China, India, and Indonesia, which collectively account for more than 40 percent of the world's population and include many people living in remote, rural locations. These and similar economies had to produce national average prices for goods and services that were comparable with those of other economies in their region. The accuracy of the PPPs for these economies depends upon the extent to which the selected goods and services were representative of their entire economy and on their ability to provide nationally representative average prices. The need to measure prices for internationally comparable goods and services means that they are more likely to reflect consumption patterns of urban areas. It is also true that many household goods and services are available only in towns, so the urban and rural

prices become the same. If the urban-to-rural price differentials are similar across economies, any bias will tend to cancel out in the estimation of PPPs; if not, results for some economies may be biased, up or down, depending on the extent of over- or underrepresentation of urban and rural areas. Additional detail about estimating PPPs for large economies follows in box 1.

To minimize this potential bias, each ICP region prepared its own list of goods and services to be priced so that they would better reflect the characteristics of the economies in its region. The need to deal with the wide diversity of sizes, urbanization, and performance of economies in each region was considered at every step leading to the estimation of PPPs.

Therefore, caution should be used when comparing economies by the size of their GDP or in per capita expenditures. Mindful that there may be errors in the calculation of GDP and population sizes, as well as in the estimation of PPPs, small differences should not be considered significant. It is generally accepted that differences in GDP of less than 5 percent lie within the margin of error of the PPP estimation. Rather than ranking economies, it is preferable to group economies by broad size categories. Caution should also be exercised about making comparisons of price levels or per capita expenditures at low levels of aggregation, where small errors may lead to large discrepancies. Some areas such as housing and health are more difficult to measure, and services in general are more difficult to price than are goods; therefore, comparisons of these components have wider measures of error than those for food products.

PPPs should not be used as indicators of the under- or overvaluation of currencies, nor should they be interpreted as equilibrium exchange rates. The PPPs cover all of GDP valued at purchaser's prices, which include both traded and nontraded goods. Exchange rates, unlike PPPs, reflect the demand for currencies as a medium of exchange, speculative investments, or official reserves. Exchange rates should be used to price international transactions and to make comparisons between economies of international debt, the flow of international capital, and the export and import of goods and services.

The PPPs in this report are not comparable with previous PPPs published by the World Bank in the *World Development Indicators (WDI)* or other publications.

The 2005 PPPs are derived from a global program of price surveys carried out using similar methods in 146 economies. The previous benchmark estimates were based on surveys carried out between 1993 and 1996 in a limited number of developing economies and on more recent surveys in OECD and CIS economies conducted in 2002 and 2000, respectively. Many economies were included for the first time in 2005, including China. Previous estimates of China's PPPs came from a research study using data for 1986. India participated for the first time since 1985. Because of the old vintage of Indian data, a regression was used instead for the PPP estimate in the *WDI* (for the methodology, see "Estimation of PPPs for nonbenchmark economies"). Since the last round of price collections, PPPs have been extrapolated forward using ratios of price indexes (either GDP deflators or consumer price indexes). In addition, the new 2005 PPPs are based on a different methodology designed to overcome problems encountered in previous rounds of the ICP. Therefore, users should be cautious about making comparisons with previous estimates of PPP-based GDP and components. What can be said is that the new ICP results substantially revise our view of the world economy. (Additional detail about the comparability with previous estimates is contained in appendix G.)

The overall ICP was designed and conducted to provide comparable results between economies across different regions. However, because of the difficulties of measuring housing and government compensation, different methods were used to compute housing PPPs in Asia-Pacific and Africa and government PPPs in Asia-Pacific, Africa, and Western Asia from those used in the other regions.

(Appendixes F and G provide a detailed overview of the methodological differences that may affect comparability of the new results with those from the past, as well as comparisons between regions.)

PPPs provide a measure of the overall price level of an economy, but they may not reflect the expenditure patterns of the poor. Nor do they capture differences in price levels within an economy. Additional data and analysis will be necessary before international poverty rates can be estimated; direct application of these PPPs to the estimation of poverty levels and rates may yield misleading results.

Box 1

ESTIMATING PPPs FOR LARGE ECONOMIES

Obtaining national prices for a list of comparable products poses special problems for large, diverse economies and especially those with large, rural populations. The sample sizes and number of data collection centers required to collect the data needed to estimate national average prices exceed the capacity even of advanced economies. Eurostat economies, for example, collect prices only in urban areas and use other sources to adjust these to the national level. In the case of China, it was agreed that China would collect prices for 11 municipalities, including their surrounding rural areas, and that the World Bank and the Asian Development Bank (ADB) would extrapolate these to national average prices. The method adopted by the World Bank and ADB matched urban and rural areas of the 11 municipalities to the 31 provinces of China. However, the rural areas included in the surveys may not have been representative of those in the rest of China. See appendix E, which provides a more detailed explanation.

The overrepresentation of urban areas was not unique to China. Brazil, for example, collected prices in only 6 cities. Other economies in the South America region conducted price collection in urban areas only. Because PPPs are based on a multilateral comparison within each region, biases in data collection should largely cancel out if all economies within a region are similarly treated. In the Asia-Pacific region, the extent of urban bias in China's PPP measurements will depend on how different were its data collection procedures—and the resulting computation of national average prices—compared with those of other economies in its region. India, for example, collected both urban and rural prices for food, clothing, footwear, and education. Prices for all other components of the GDP were collected in 31 urban centers. However, because most goods other than food are produced and purchased in the cities, the urban prices of those goods can be considered representative of the national prices. Further sensitivity analysis of the results will be needed to quantify the extent of this bias, if any.

