What Is a Purchasing Power Parity?

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A purchasing power parity (PPP) is a price index very similar in content and estimation to the consumer price index, or CPI. Whereas the CPI shows price changes over time, a PPP provides a measure of price level differences across countries. A PPP could also be thought of as an alternative currency exchange rate, but based on actual prices. The CPI is, though, easier to understand because it is based on the national currency, which remains the same over time.

The dilemma facing analysts and policy makers who need to make comparisons across countries is that each has its own currency. The situation is further complicated because each country's economic structure and stage of development may lead to price level differences as well. The *System of National Accounts* provides the framework for every country and economy to provide consistent measures of economic performance through the estimation of its gross domestic product (GDP) or gross national income (GNI) and their aggregates. International comparisons are possible only if the GDP and its aggregates are converted to a common currency using either PPPs or exchange rates.

This paper uses the well-known Big Mac index prepared by the *Economist* to describe a basic PPP, illustrate how it differs from exchange rates, and demonstrate why PPPs should be used to convert expenditures in national currencies to a common currency.

Column (2) in table 1 shows the price of a Big Mac[1] as reported on the *Economist* website for five countries for June 2011. The PPP between Australia and the United States for a Big Mac is the price paid in Australia in its national currency divided by the price paid in the United States (4.56/4.07 = 1.12), which means a consumer pays $A 1.12 to make a purchase in Australia that would cost $1.00 in the United States. Column (3) provides the PPPs for the other countries to the United States.

To understand their full meaning, these PPPs have to be put into the context in which they are used. Column (4) shows the exchange rate of each country's currency to the U.S. dollar. In Brazil, for example, in June 2011 a U.S. dollar could be purchased for 1.54 real. When the cost of

[1] A type of hamburger sold by McDonald's restaurants worldwide.

a Big Mac in Brazil is divided by the exchange rate, the result is how many U.S. dollars are needed to purchase a Big Mac in Brazil (9.5/1.54 = $6.17). Big Macs, then, are more expensive in Brazil than they are in the United States ($4.07). The same column shows they are much cheaper in China ($2.28) and South Africa ($2.87) than they are in the United States.

These price level differences are measured by a price level index, which can be computed two ways. One is simply the ratio of the PPP to the exchange rate, which for China is 3.61/6.45 = .56. The other is the ratio of the cost in U.S. dollars of purchasing a Big Mac in China to the cost in the United States, or 2.28/4.07 = .56. So far, then, we know that Big Macs are more expensive in Australia and Brazil and cheaper in China and South Africa than in the United States.

Table 1 Big Mac Prices and Per Capita Expenditures in National Currency, PPPs and Exchange Rates for US = 1.00

Country	Currency	Big Mac in national currency June 25, 2011	PPP* to US$	Exchange rate, June 25, 2011, to US$	US$ cost of Big Mac	Price level index
	(1)	(2)	(3)	(4)	(5)	(6)
Australia	Aus. dollar	4.56	1.12	.92	4.96	1.22
Brazil	real	9.50	2.33	1.54	6.17	1.52
China	yuan	14.70	3.61	6.45	2.28	.56
South Africa	rand	19.45	4.78	6.77	2.87	.71
United States	dollar	4.07	1.00	1.00	4.07	1.00

Source: The Economist, http://www.economist.com/blogs/dailychart/2011/07/big-mac-index

Table 2 provides an example, again using Big Mac prices, to further define a PPP and illustrate why PPPs should be used instead of exchange rates to convert expenditures in national currency to a common currency.

Column (1) in table 2 shows assumed per capita consumption or the average number of Big Macs consumed per person per year. According to this example, per capita consumption in Australia and the United States is 50 Big Macs per year, whereas it is 40 in Brazil, 30 in China, and 25 in South Africa. These quantities times the average price of a Big Mac from column (2) in table 1 provides the per capita expenditures in national currency shown in column (2) of table 2. For comparison purposes, these expenditures need to be converted to a common currency. Column

(3) of table 2 shows the per capita expenditures using the PPP conversion (per capita expenditures in national currency divided by the PPP), and column (4) shows per capita expenditures using exchange rates to the United States. The PPP conversion shows a smaller per capita consumption than exchange rate conversions for countries that are more expensive than the United States and larger per capita measures for the less expensive countries. The per capita expenditure in China is $122 at PPP, but only $68 using the exchange rate. So, which is the appropriate measure for comparisons over countries?

The answer, which lies in columns (5)–(7) of table 2, is simply the implied quantity or number of Big Macs consumed, obtained by dividing the PPP and exchange rate measures of per capita expenditures by the cost of a Big Mac in the United States, or $4.07. Note that the quantities in PPP terms are the same as the quantities actually consumed. The derived quantities based on exchange rates are overestimated for Australia and Brazil because of their high prices, while the quantities for China and South Africa are underestimated because of their low prices. Use of the PPPs to convert national expenditures to a common currency removes the effect of price level differences.

Column (6) of table 2 shows the implied quantities based on the exchange rates for June 2011, and column (7) shows the same using the exchange rates for November 2011. The number of Big Macs actually consumed in each country did not change; however, the estimated number changed significantly just because of a difference in exchange rates.

Table 2 Per Capita Number of Big Macs Consumed, Per Capita Expenditures in National, PPP, and Exchange Rate (XR) Units, and Implied Number Consumed in PPP and Exchange Rate Conversions

Country	Per capita no. of Big Macs consumed	Per capita expenditure in national currency	Per capita expenditure in PPP, US$	Per capita expenditure at XR to US$, June 2011	Quantity in PPP $	Quantity in XR $, June 2011	Quantity in XR $, Nov. 2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Australia	50	228	204	248	50	61	54
Brazil	40	380	163	246	40	61	52
China	30	441	122	68	30	17	17
South Africa	25	486	102	72	25	18	14
United States	50	204	204	204	50	50	50

Source: The author's computations.

This brief worked example demonstrates how a PPP based on a single product is estimated and used. Although the Big Mac is just one product, it is a combination of many other products such as meat and bread, plus inputs such as labor and rent. In reality, many different products need to be priced because of the variability in product prices across countries. The ICP volume *Measuring the Real Size of the World Economy* contains a rich and detailed explanation of how the product PPPs are averaged to aggregates and total GDP. The concept at each level remains the same, which is that the estimated PPPs using actual prices remove the effect of price level differences and variations in exchange rates.