2011 INTERNATIONAL COMPARISON PROGRAM

What is Purchasing Power Parity?

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A Purchasing Power Parity (PPP) measures the differences in price levels of identical goods in different locations much as the Consumer Price Index measures price changes over time. As such, PPPs allow for comparisons of buying power in different countries. Consider the prices of *Big Mac* hamburgers in the U.S. and Australia. A *Big Mac* in Australia costs $4.56 Australian dollars while the same burger costs $US 4.07 dollars in the U.S. By taking the ratio of the two prices in their home currencies (4.56/4.07 = 1.12), we can see a U.S. dollar can buy 12 percent more burger than one Australian dollar. Thus, Americans have (12%) more buying power in every dollar they have than Australians do – at least when it comes to buying hamburgers.

The Economist magazine has popularized comparing the prices of *Big Macs* in many countries. Column 2 in Table 1 below shows the price of a Big Mac as reported in the Economist web site for five countries for June 2011   Column 3 provides the PPPs for the other countries to the US(including the example described above)..

Of course, people and businesses don't just spend their money on *Big Macs.* So to complete the picture of the spending power, one needs to estimate PPPs for a host of goods and services and then combine them to get one aggregate PPP capturing the relative purchasing power between two countries. The System of National Accounts provides the standardized categories of spending by consumers, governments, exports (what the foreign sector is buying) and business investment. Adding up these spending categories under the SNA equals the income the country is earning. Thus, this aggregate PPP becomes a relative measure of the spending power of a dollar of income earned in each country.

This note will use the well-known Big Mac Index prepared by the Economist magazine 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.

These PPPs by themselves need to be put into the context in which they are used in order to understand their full meaning. Column 4 shows the exchange rate of each country's currency to the US. In Brazil, for example, in June 2011 it took 1.54 Real to purchase a US dollar. The cost of a Big Mac in Brazil divided by the exchange rate shows how many US dollars are needed to purchase a Big Mac in Brazil (9.5/1.54 =$6.17). This simply shows that Big Macs are more expensive in Brazil than they are in the US. The same column shows they are much cheaper in China and South Africa than they are in the US.

These price level differences are measured by the 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 number of US dollars to purchase a Big Mac in China to the cost in the US or 2.28/4.07 = .56.

So far, we know that Big Macs are more expensive in Australia and Brazil and cheaper in China and South Africa than in the US. One can also use the PPPs and exchange rates to examine the degree to which currencies may be under or over-valued.

Table 1. Big Mac prices and per capita expenditures in national currency, PPPs and exchange rates for the US = 1.00

Country	Currency	Big Mac in national currency June 25, 2011	PPP * to the US $	Exchange rate June 25, 2011 to US $	US $ to purchase Big Mac	Price Level Index
	1	2	3	4	5	6
Australia	Aus $	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
S. Africa	Rand	19.45	4.78	6.77	2.87	.71
U. S.	$	4.07	1.00	1.00	4.07	1.00

A major interest of analysts and researchers is to compare the well-being as measured by per capita expenditures in a common currency; a good example is the dollar a day poverty measure. 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 an assumed per capita consumption or the average number of Big Macs consumed per person per year. This example shows that the per capita consumption in Australia and the US is 50 Big Macs per year while it is 40, 30, and 25 respectively in Brazil, China, and South Africa. These quantities times the average price of a Big Mac from table 1 column 2 provides the per capita expenditures in national currency shown in table 2, column 2. For comparison purposes, these need to be converted to a common currency. Column 3, 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 US. The PPP conversion shows a smaller per capita consumption than exchange rate conversions for countries that are more expensive than the US and larger per capita measures for the less expensive countries. The per capita expenditures 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 lies in columns 5-7, table 2 which 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 US 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 over estimated for Australia and Brazil because of their high prices while the quantities for China and South Africa are under estimated

because of their low prices. The use of the PPPs to convert national expenditures to a common currency removes the effect of price level differences.

Column 6 shows the implied quantities based in exchange rates for June 2011 while column 7 shows the same using exchange rates for November 2011. The numbers 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 Mac consumed; per capita expenditures in national, PPP, and exchange rate units; and implied number consumed in PPP and exchange rate conversions

Country	Per capita # Big Macs	Per capita Exp in national currency	Per Capita Exp in PPP US $	Per capita Exp 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
S. Africa	25	486	102	72	25	18	14
U. S.	50	204	204	204	50	50	50

This brief example provides a worked example showing how a PPP based on a single product is estimated and used. While 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 Book contains a rich and detailed explanation how the product PPPs are averaged to aggregates and the 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.