Exchange rates in PWT8.0

Exchange rates, in national currency relative to the US dollar, play a role in PWT mostly to normalize PPPs. By dividing PPPs by the exchange rate, we get a measure of the relative price prevailing in a country. This measure has important economic significance as richer countries tend to have higher relative price levels, the so-called Penn effect (Samuelson, 1994). Yet foreign exchange markets can be severely affected by political and economic disruptions, such as hyperinflation, the introduction of new currencies, or the transition of formerly Communist countries.

Throughout, we report the currency unit that is now in use in each of the countries and its exchange rate relative to the US dollar. For countries in the euro area, we report the so-called 'euro fixed rates'. This means that the pre-euro exchange rates have been converted to euros at the official conversion rate[1] at the time of introduction in the country. This is illustrated in Table 1, which shows the 1980 exchange rates in Italy and Germany. In 1980, a US dollar was worth 856 Italian lira and 1.82 Deutsche Marks and these can be converted to euro's using the official euro conversion rates of 1936 ITL/EUR and 1.96 DEM/EUR. The 'euro fixed' column shows the results and illustrates that before 1999, the 'Italian' euro exchange rate is quite different from the 'German' euro exchange rate. After 1999 (or later if the euro is introduced at a later date), the euro exchange rates are identical, as shown for 2005 in the final column of Table 1.

Table 1, The euro and exchange rates over time

	Euro conversion rate	1980 XR		2005 XR
		Original	Euro fixed	
Italy	1936.27 ITL/EUR	856	0.44	0.80
Germany	1.95583 DEM/EUR	1.82	0.93	0.80

Note: XR: exchange rate, ITL: Italian lira, EUR: euro, DEM: Deutsche Mark

In dealing with market fluctuations, our aim in constructing PWT is to provide price levels estimates that can be interpreted in the light of income levels and other structural features of the economy rather than short-term market fluctuations. The UN National Accounts Main Aggregates Database publishes two sets of exchange rates that is helpful in this regard.[2] The first set is based on official IMF exchange rates or, if unavailable, estimates of market exchange rates from other sources. However, if there is a wide divergence between trends of exchange rates and of prices and if the economic environment warrants it, an alternative exchange rate is estimated. This estimate is based on inflation in the country relative to the US. In other words, whenever market exchange rates

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[1] See http://www.ecb.int/euro/intro/html/index.en.html for the rates used in each country at the time of conversion. Note that different countries have introduced the euro at different points in time, starting in 1999 with the initial 11 euro area countries.

[2] See http://unstats.un.org/unsd/snaama/methodology.pdf for details.

seem to give an unreliable view on the underlying economic trends, an exchange rate is used that assumes relative PPP holds.[3]

In PWT8.0 we make the following choices in this regard:

1. We use the UN exchange rate series that includes estimated rates, rather than the fully market-based series.
2. We include an indicator variable that identifies observations for which an estimated exchange rate is used, rather than a market rate.
3. We expand the set of estimated observations for a few countries.

We make choice 1 mostly to guard unsuspecting users from drawing conclusions that are hard to give full credence. For example, taking the market-based series at face value implies that Serbia's price level reached 5.8 *million* time the US price level in 1993, before dropping to 48% of the US price level the next year. Using the UN's estimated exchange rate series keeps the Serbian price level approximately constant at 50% of the US price level over the period 1990-1995.

When testing for the presence of the Penn effect, such observations should be excluded, since these contain no independent information on exchange rates relative to PPPs. This exclusion can be done using the indicator variable that identifies whether an estimated rate is used or not (choice 2). However, even if an unsuspecting user would not exclude observations based on estimated exchange rates, the use of estimated rather than market rates ensures that any conclusions are likely to be more in line with the rest of the dataset than if market rates had been used.

An alternative to making a choice to use either market or estimated exchange rates would have been to exclude these observations altogether. However, in cases where estimates rates are used, other variables often show less remarkable trends. For example, while Serbia's GDP per capita declines severely relative to the US between 1990 and 1995 (by about 20 percentage points), other transition countries also experience double digit relative declines, such as the Czech Republic (-12%-point) or Croatia (-14%-point). Furthermore, excluding these observations would have created gaps in the time series of many affected countries. For instance, data for Ghana between 1973 and 1987 would then have to dropped, leaving data for the 1955-1972 and 1988-2010 periods.

Finally, we estimated exchange rates for more observations using the UN methodology, to better reflect the spirit of the estimated exchange rate dataset:

1. *Argentina*: For 1950-1966, price levels of up to 6 times the US level were observed.
2. *Bulgaria*: For 1970-1978, the market rates, lead to implausibly high price levels.
3. *Bolivia*: for 1950-1955, exchange rates from the IMF International Financial Statistics imply relative price levels of up to 11 times the US price level.

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[3] Note that this assumption is applied at the GDP level. Changes in PPPs from year to year in PWT8.0 are based on either interpolation between price comparison benchmarks or inflation trends at a more detailed level and weighted in different way to the National Accounts. As a result, the relative price levels do not precisely stay constant.

4. *Democratic Republic of Congo*: for 1963-1968 and 1972-1994, very high inflation (average annual GDP deflator increases of 49% in the first period and 179% in the second period) and an exchange rate that was frequently out of step with these swings led to price levels of more than 150% of the US level, while the 2005 benchmark level was 57%.
5. *The Gambia*: the period 1972-1985 shows persistent differences between domestic price movements and exchange rate movements, leading to implausibly high price levels.
6. *Israel*: for 1950-1953, exchange rates from the IMF International Financial Statistics imply price levels that are two to four the US level.
7. *Sao Tome and Principe:* for 1970-1976, price levels peak at 180% of the US level during this period and price and exchange rate movements go in opposite directions.
8. *Viet Nam*: for 1970-1979, an implausibly high exchange rate is shown from what the UN indicates is an 'unknown source'.