Agenda

Advancing economics in business

Not a powerful comparison: purchasing power parity in OECD telecoms reviews

Purchasing power parity indices are intended to make measures of GDP and per-capita income comparable between countries. However, sometimes such indices are used to compare prices of individual items or specific sectors—for example, in reviews of telecoms services by the OECD. Dr Adriaan ten Kate, independent economist based in Mexico, explains why this approach is spurious

The concept of purchasing power parity (PPP) emerged in the theory of international trade as an indicator of the point at which exchange rates would be in equilibrium. The hypothesis of PPP was that an exchange rate is in equilibrium when the two currencies involved, converted to each other at that rate, have the same purchasing power in their respective home countries. To give an example, if the exchange rate of the Mexican peso to the US dollar is 10 to 1, there is PPP if 10 pesos buys the same in Mexico as 1 dollar in the USA.

This is not normally the case. With the amount of pesos you can get for 1 dollar at the current exchange rate, you can buy more in Mexico than what one dollar buys in the USA. That is to say, Mexico is a 'cheap' country in comparison with the USA. In general, no single exchange rate in the world is in equilibrium in the sense of the PPP hypothesis, and it is unlikely that any of them ever will be.

Ever since economists have recognised this state of affairs, PPP has gradually left behind its role as an indicator of exchange-rate equilibrium and has taken up another role: that of making the size of economies and per-capita incomes comparable across countries. Thus, if the GDP of Mexico amounts to US$1 trillion and that of the USA to US$15 trillion, this does not imply that the US economy is 15 times larger than its Mexican counterpart. As a result of price differences between the two countries, US citizens cannot buy with their US$15 trillion 15 times what Mexicans can buy with their US$1 trillion. Therefore, it is customary to express Mexico's GDP in US dollar PPP (USD PPP), which makes it, say, US$1.5 trillion. In this case, the US economy is no longer 15 times that of Mexico, but only ten times.

To correct GDP and per-capita income comparisons across countries for differences in purchasing power, one needs a basket of goods and services that is representative of the total expenditure in both countries. Unfortunately, expenditure patterns vary widely across countries, and this is precisely one of the main obstacles to constructing proper and reciprocal PPP indices. However, for simplicity, for the purpose of this exposition I assume that there is such a basket. See the box below.

PPP as 'shadow' exchange rate or scalar

The basket holds N products i (i = 1, … , N), and the composition of the basket is given by quantities Q_i. In Equation 1 the value of this basket at Mexican prices is compared with its value at US prices:

$$PPP^{MEX-US} = (P_1^{MEX}Q_1 + … + P_N^{MEX}Q_N) / (P_1^{US}Q_1 + … + P_N^{US}Q_N) \qquad \text{Equation 1}$$

If Mexican prices are expressed in pesos and US prices in dollars, PPP^{MEX-US} is a 'shadow' exchange rate—ie, an exchange rate corrected for differences in purchasing power. If, on the other hand, Mexican prices are expressed in current US dollars, converted at the prevailing exchange rate, PPP^{MEX-US} is a scalar factor to correct the current exchange rate for purchasing power differences. For example, if PPP^{MEX-US} is 2/3 (Mexican prices are on average two-thirds of US prices), it is this factor that converts the Mexican GDP of US$1 trillion into USD PPP1.5 trillion, as described above. In the following, I interpret the PPP index in the second sense—ie, as a scalar factor rather than as a shadow exchange rate.

Use of PPP indices

As noted above, the purpose of PPP indices is to make GDP and per-capita income comparable between countries. The indices achieve this by converting a comparison of the *value* of a basket of goods and services between two situations into a comparison of the *quantity* or *volume* of that basket between those situations, just as a normal price index does. In such cases, it is not only the prices but also the quantities that differ from one situation to the other, and the aim is to arrive at a comparison of the size.

In spite of the difficulties involved in a proper measurement of PPP indices—worst among which is the definition of a representative basket of goods and services—there is a general consensus that the PPP methodology is the most appropriate way to make GDP, per-capita income, and broad categories of final demand expenditure comparable across countries. However, the way in which the OECD sometimes employs PPP indices to convert price comparisons of telecoms services from nominal US dollars to USD PPP is an entirely different story.

In its biennial Communications Outlook, and in specific country and sector reviews, the OECD compares the prices of baskets of telecoms services between member countries by expressing those prices first in USD PPP—multiplying them by the corresponding PPP index.[1] In those reviews, it is no longer about the conversion of a value index to a quantity index, but about expressing the prices themselves in a purportedly common currency called USD PPP. Moreover, it is no longer about the revaluation of a basket using a price index for only that basket; it is about a revaluation of the price of a limited basket (or good) with a price index for a much broader basket. Below, I explain the problems with this approach.

Why PPP price comparisons for individual items or sectors are inappropriate

First, expressing prices of individual items in USD PPP rather than in current dollars implicitly suggests that USD PPP is a kind of 'super currency', better suited than the actual currency to make prices comparable across countries. However, there is no such currency as USD PPP—at least, not a common currency. A USD PPP for, say, the Netherlands is quite a different measure from a USD PPP for Mexico. This is because, for the Netherlands, it involves the general price level in the Netherlands, whereas for Mexico it involves the general price level in Mexico.

Effectively, if a particular item is more expensive in Mexico than it is in the Netherlands when measured in USD PPP, it may well be that the item is not more expensive at all, but that the general price level in the Netherlands is so much higher than the general price level in Mexico that the item itself is more expensive in appearance only. In particular, for 'cheap' countries, such as Mexico, comparisons in PPP are more informative about differences in general price levels than about price differences for the individual items. In general, stating that a specific item is more expensive in one country than it is in another in USD PPP is like stating that one man is taller when measured in feet than another measured in metres. See the box on p. 3.

To see the logic described in this box in simple terms, consider a basket containing a telephone call of average duration (say, three minutes), a car, petrol and domestic services. If, in Mexico, the telephone call is expensive relative to the other items in the basket while, in the Netherlands, it is relatively cheap, the USD PPP comparison would indicate that telephone calls are more expensive in Mexico. Yet it may well be that telephone calls are not more expensive at all when compared using the actual exchange rate between the Mexican peso and the euro. It is only because cars are twice as expensive in the Netherlands as in Mexico, petrol three times as expensive, and domestic services at least four times as expensive, that telephone calls are made to look expensive. The fact that cars, fuel and domestic services are cheap in Mexico is caused entirely by a range of unrelated, external factors.

Absolute versus comparative advantages

The distinction between comparisons in current dollars and comparisons in USD PPP is equivalent to the distinction made in the theory of international trade between absolute and comparative advantages. By using such comparisons in USD PPP, the OECD measures comparative advantages or disadvantages, but in its country and sector studies it interprets such (dis)advantages as if they were absolute.

From a theoretical perspective, international price comparisons in USD PPP might still be a useful instrument in a comparative analysis of consumption and expenditure patterns across countries. Why do Mexicans buy more domestic services or fuel-intensive cars? The answer to such questions depends less on absolute than on comparative price relations. However, if the analysis is about comparing the efficiency and the performance of a single sector, one should not work with comparative but with absolute price differences.

Apples and pears

To explain what the OECD actually does when it compares prices of individual items in USD PPP, I assume that the price in current dollars of the item to be compared (item k) in Mexico is P_k^{MEX}. Expressing the price of the item in USD PPP delivers the following result:

$$P_k^{MEX*} = P_k^{MEX} \, PPP^{US-MEX} = P_k^{MEX} \, (P_1^{US}Q_1 + \ldots + P_N^{US}Q_N) / (P_1^{MEX}Q_1 + \ldots + P_N^{MEX}Q_N) \qquad \text{Equation 2}$$

where P_k^{MEX*} is the price in USD PPP.

Likewise, the price of the same item in the Netherlands expressed in USD PPP is:

$$P_k^{NL*} = P_k^{NL} \, PPP^{US-NL} = P_k^{NL} \, (P_1^{US}Q_1 + \ldots + P_N^{US}Q_N) / (P_1^{NL}Q_1 + \ldots + P_N^{NL}Q_N) \qquad \text{Equation 3}$$

where P_k^{NL} is the price in current dollars in the Netherlands and P_k^{NL*} the price in USD PPP. Note that Mexican and Dutch prices in USD PPP are not expressed in a common measure. The Mexican price has the general price level in Mexico in the denominator; the Dutch price has the general price level in the Netherlands.

By dividing Equation 2 by Equation 3, one arrives at the following comparison of the Mexican price with the Dutch price in USD PPP:

$$P_k^{MEX*}/P_k^{NL*} = \{P_k^{MEX}/(P_1^{MEX}Q_1 + \ldots + P_N^{MEX}Q_N)\}/\{P_k^{NL}/(P_1^{NL}Q_1 + \ldots + P_N^{NL}Q_N)\} \qquad \text{Equation 4}$$

As observed in this equation, there is no direct comparison between the Mexican and the Dutch price, but rather a comparison between the relation of the Mexican price with the general price level in Mexico, and the same relation in the Netherlands.

For example, declaring Mexican telecoms services excessively expensive, as the OECD does in its recent sector study (referred to above), is like expecting Mexican operators to charge the same tariffs in their *own* USD PPP (feet) as operators of other member countries charge in *their* USD PPP (metres). It is like demanding them to take their rightful place in the international pricing order of the full basket, including cars, petrol and domestic services.

There may still be arguments in favour of such a point of view for industries that are intensive in production factors that abound in the country in question (say, petroleum products, which one would expect to be relatively cheap in Mexico). However, it is not reasonable to ask it of an industry such as telecoms, which is not intensive in unskilled labour but intensive in advanced technology. After all, advanced technology is typically acquired at international prices in dollars (or some other international currency), not in USD PPP. Mexican telephony operators can hardly require Ericsson, for example, to sell them its equipment at USD PPP just because they are in Mexico.

Final remarks

PPP indices are estimated from current price comparisons in order to convert value comparisons into quantity comparisons in real terms, particularly to compare GDP and income per capita across countries. The purpose of PPP indices is not to improve on the current price comparisons that served as an input to build the indices, and yet this is what the OECD does. I can only guess that the OECD does so in the belief

that, where it is preferable to compare GDP and per-capita income in PPP, it must also be preferable to compare prices of specific products in terms of PPP. This may sound logical, and add a scientific flavour, but it has no theoretical justification and produces misleading results.

The OECD has been using such PPP comparisons for telecoms services for at least 15 years and it has explicitly declared its preference for PPP price comparisons over current comparisons ever since. In the aforementioned study on telecoms policy and regulation in Mexico, it states that:

> PPP prices are more relevant to assess relative price levels across countries as they take into account the purchasing power of Mexican consumers and businesses. Moreover, the application of the PPP methodology to telecommunication price baskets is an example of good use of the methodology. (note 7, p. 38)

The OECD does not give any justification for this point of view. Why account should be taken of the purchasing power of consumers and businesses when carrying out such price comparisons remains unexplained.

Beliefs—particularly wrong beliefs that nonetheless sound logical—risk turning into conventional wisdom when they are repeated time after time without challenge. That is how they take root and become difficult to eradicate. In my view, the assumption that

PPP comparisons are preferable to current price comparisons is one such belief. Comparing prices for individual items in USD PPP is like using a gun to kill a fly. Guns are not made for that purpose, just like PPP indices are not made to improve on price comparisons of individual items. A gun is definitely a more sophisticated instrument than a fly-swatter, but you are bound to miss the fly.

Adriaan ten Kate Sr

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[1] A recent instance is OECD (2012), 'Review of Telecommunication Policy and Regulation in Mexico', January. I have commented on this OECD review more extensively in ten Kate Sr, A. (2012), 'Three Best-selling Stories about Telecommunications in Mexico: A Critique of the OECD Review of Telecommunication Policy and Regulation in Mexico', *The Antitrust Chronicle*, Competition Policy International, special edition, June.

If you have any questions regarding the issues raised in this article, please contact the editor, Dr Leonardo Mautino: tel +44 (0) 1865 253 000 or email l_mautino@oxera.com

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