analytics
CONSULTING

Decoder Series
ARTICLES

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THE ANALYTICS CURRENCY DECODER

THE EMERGENCE OF PURCHASING POWER PARITY

Purchasing power parity (PPP) is a popular macroeconomic analysis metric used to compare economic productivity and standards of living between countries. PPP involves an economic theory that compares different countries' currencies through a "basket of goods" approach. That is, PPP is the exchange rate at which one nation's currency would be converted into another to purchase the same range and quantity of a large group of products. According to this concept, two currencies are in equilibrium (their currencies are at par) when a basket of goods is priced the same in both countries, taking into account the exchange rates.

To make a meaningful comparison of prices across countries, a wide range of goods and services must be considered. However, the one-to-one comparison is difficult to achieve due to the sheer amount of data that must be collected and the complexity of the comparisons that must be drawn. To help facilitate this comparison, the University of Pennsylvania and the United Nations joined forces to establish the International Comparison Program (ICP) in 1968. For example, in the 2011 round of PPP calculations, each of the 199 participating countries provided national average prices for about 1000 closely specified products. With this program, the PPPs generated by the ICP have a basis in a worldwide price survey that compares the prices of hundreds of various goods and services.

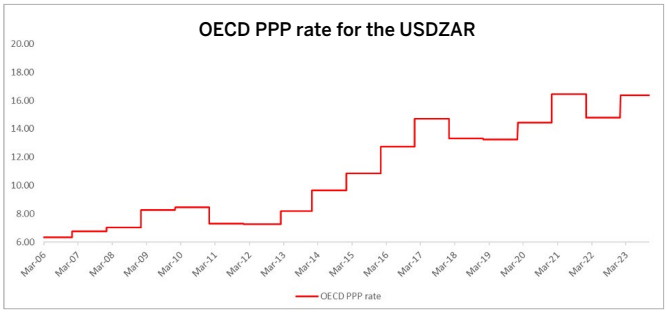
Thus, the ICP program helps international macroeconomists estimate global productivity and growth. Every few years, the World Bank releases a report that compares the productivity and growth of various countries in terms of PPP and U.S. dollars. Both the International Monetary Fund (IMF) and the Organization for Economic Cooperation and Development (OECD) use weights based on PPP metrics to make predictions and recommend economic policy.

The concept behind PPP is simple, it suggests that the exchange rate between two currencies should adjust until the price of an identical basket of goods is equal in both countries. However, in reality, the concept is more complicated than it appears. There are several limitations to relative PPP that economists must consider when utilizing the model. PPP is based on the law of one price, which suggests that identical goods should sell for the same price in different countries. However, several factors can prevent this from happening, such as transportation costs, tariffs, and taxes. For example, the price of a car in the United States may include taxes, while the price of the same car in Japan may exclude taxes, making the prices different. PPP is a long-term model, which means that it may be unreliable in the short-term. In the short-term, exchange rates can be volatile due to changes in market sentiment, political developments, and unexpected events such as natural disasters. These fluctuations can undermine the accuracy of PPP. PPP is only applicable to tradable goods, which are those goods that can be bought and sold across borders. However, many goods are not tradable, such as housing and services. As a result, PPP cannot accurately reflect the differences in prices for non-tradable goods. PPP is based on several assumptions that may not always hold true. For example, the model assumes that there are no transportation costs, no barriers to trade, and that goods are homogeneous. These assumptions may not always be valid in the real world.

So, while PPP is a useful economic model that can help determine exchange rates between countries, it is important to recognize the inherent limitations and complexities of the model.

The monumental task of regularly calculating Purchasing Power Parities is well described in a 448 page document titled "Eurostat-OECD Methodological Manual on Purchasing Power Parities" that was published in 2012. In February 2018, the European Central Bank published a 58 page working paper titled "Exchange rate prediction redux: new models, new data, new currencies". These works, and many others, are all in the interest of improving the way, and accuracy, in which PPP exchange rates are calculated.

We have been able to obtain annual PPP data from the OECD for a number of different economies and in the chart below we show the PPP outcomes for the USDZAR exchange rate from 2006 to the last update in 2023. The OECD PPP calculations are updated annually, and this explains the "stepladder" nature of the chart.



The fundamental principles of Purchasing Power Parity suggest that the chart shows the (annually calculated) equilibrium level of the ZAR relative to the US dollar and that this equilibrium level is a good representation of the inflation differentials between the two economies.

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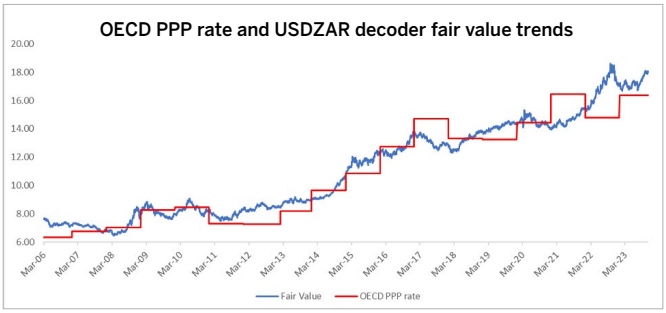
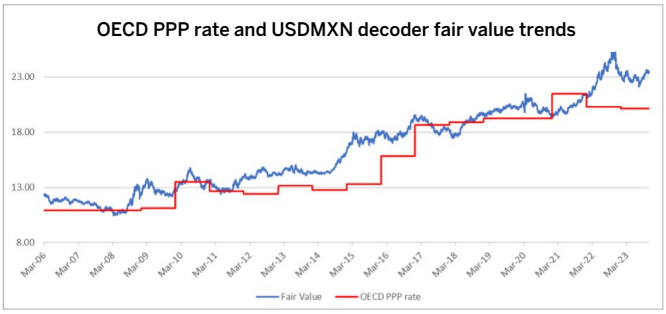
We now extract, over the same time period but on a daily basis, the fair value for the USDZAR exchange rate as provided by the Analytics Currency Decoder. The USDZAR fair value trace is then inserted into the above chart with the result shown below.

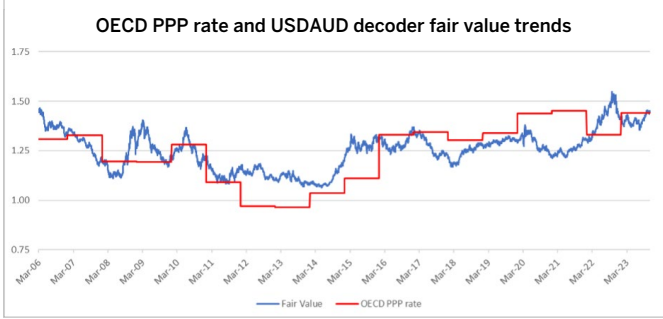


The fair value estimate from the Decoder appears to provide a very accurate but continuous version of the OECD calculated PPP equilibrium rate for the USDZAR. In fact, there is very little difference between the statistical trend lines that can be drawn through each of the two lines in the chart.

What we see here is the emergence of PPP by virtue of running the Analytics Currency Decoder. The word emergence can be used to describe something that is revealed which has previously remained unseen or unrecognised. Fair value can now be recognised as the PPP rate for the currency pair.

Annual PPP rates from the OECD have been obtained for a number of other currency pairs. Where inflation differentials relative to the USA are very small, we have chosen the Australian Dollar and where inflation differentials are much more pronounced, we have chosen the Mexican Peso. The charts are shown below with the fair value trace from the Decoder (in blue) overlaid on the PPP rates from the OECD (in red).





The previous three charts all display the characteristics of mean reversion whereby any deviation between the two lines leads to a convergence at some point in the future. We like to believe that the annual OECD calculations will lead to PPP rates that rise, or fall, to meet the fair value estimate from the Decoder at some point in time.

In addition, the steep slope of the lines in the USDZAR and the USDMXN charts accurately represents the inflation differentials between the USA and South Africa and Mexico while the lack of any noticeable slope in the USDAUD chart lines clearly shows the similarity between the inflation rates of the USA and those of Australia. These characteristics are a consequence of running different exchange rates through the Decoder and are not the result of any pre- or post-programmed interventions in the AI algorithms or its outputs.

The major advantage of this PPP emergence phenomenon of the Analytics Currency Decoder is that the PPP exchange rate for a currency pair does not have to be calculated through the monumental annual globally co-ordinated efforts of large task groups or organisations relying on the co-operation of each participating country's Central Bank and statistical and economic data-gathering entities.

Fair value from the Analytics Currency Decoder can be used as the PPP rate and this rate can be calculated quickly and dynamically in a simple spreadsheet for any currency pair.

We also believe that this emergence of PPP from the Decoder is further evidence that currencies are "all knowing" and are extremely rich in diverse forms of well-hidden information.

Sources: Dr Lance Vogel, Analytics. Bloomberg, Investopedia, Faster Capital