

# Research Brief

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## How (not) to calculate currency misalignment

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**What is the appropriate exchange rate at which neither domestic nor foreign firms gain an unfair competitive advantage? A new study examines whether the estimation methods currently being used are conducive to answering this question. It turns out that this is often not the case.**

A situation all too familiar to travellers: they go to a neighbouring country and find that, on the other side of the border, everyday items – converted into euro – are often significantly cheaper or more expensive than comparable products back home. If the general price level in a country exceeds that of its partners, this can become a problem for its economy: foreign holidaymakers might choose another, less pricey destination. Domestic consumers, for their part, may prefer to hop across the border to make large-scale purchases or opt for comparatively inexpensive imported products. The high prices of domestic exporters' products could erode their competitiveness in global markets.

Particularly with regard to these competitiveness issues, governments, central banks and international organisations are examining very closely how domestic price levels, converted into foreign currency, develop relative to price levels abroad. This relative price level is also referred to as the real exchange rate. In the short term, the easiest way a country can improve a low international competitiveness of its domestic economy caused by a high relative price level is by taking measures to depreciate its own currency (in nominal terms). It could, for example, intervene in the foreign exchange market, i.e. use local currency to buy foreign currency. The resul-

ting depreciation of the domestic currency lowers the price of domestic goods in export markets. Conversely, the relative price level of the rest of the world increases; its price competitiveness deteriorates. Interventions aimed at devaluing the domestic currency therefore involve the risk of that country being accused of unfair currency manipulation. Indeed, the US Department of the Treasury, for instance, publishes a semi-annual report which looks at the foreign exchange policies of major trading partners from precisely this angle (see e.g. US Department of the Treasury, 2020).

### **Statistical procedures to identify misalignments**

Yet what is the appropriate exchange rate at which neither domestic nor foreign firms gain an unfair competitive advantage? Neither academia, nor central banks, nor international organisations use a standardised methodology for its calculation. In my latest research paper, I compare the statistical methods used in this process (Fischer, 2019). First, the study investigates whether the different statistical methods lead to marked differences in the fair value estimates for the exchange rates. Second, it examines whether one of the methods is fundamentally superior to the others.

One key challenge when calculating such “equilibrium” exchange rates is that, in addition to the real exchange rate, other factors often have to be taken into account. If a country has a high relative price level, this does not readily imply a low price competitiveness of its firms. For example, there is ample empirical evidence that highly productive economies tend to have a high price level without necessarily being less competitive. One reason for this may be especially high prices for services not exposed to international competition. These include, for example, rents, haircuts or concert tickets.

That is why misalignment analyses usually adjust the relative price level for the impact of factors such as differences in productivity between countries. This is done by estimating the typical effect of a variation in these variables, such as the relative productivity level, on the real exchange rate for a group (more specifically, a panel) of countries. In this estimation, a variety of panel estimation methods are used. In my study, I examine how the application of alternative methods affects the calculated equilibrium exchange rates.

The most commonly used panel estimation method is the regression using fixed country effects. It focuses entirely on the impact of a variation in relative productivity over time on the movements of the real exchange rate. At the same time, however, it assumes that differences between various countries in terms of their average productivity levels, each averaged over time, do not systematically influence the real exchange rate. Other methods, such as the least squares method, assume that the impact on the real exchange rate is independent of whether we are looking at a variation in the relative productivity level over time or a variation in the average productivity level across countries. My calculations show that, in the cases I have examined, neither assumption holds.

#### **Suitability of conventional estimation methods dubious**

I therefore propose eschewing conventional panel estimation methods and instead using a particular, more general panel estimation approach to identify equilibrium exchange rates. This approach, known as the “correlated random effects” (CRE) estimator, was already developed in the late 1970s and is well-known in the literature. However, it has seen very little use in economic applications and, for the question we are looking at here, none whatsoever. I show that conventional panel estimation methods deliver exchange rate estimates that result as special cases from the CRE model if certain assumptions, such as those mentioned in the previous paragraph, are also made. Since these assumptions are invalid in

the datasets I have examined, a discrepancy between the conventional exchange rate estimate and the estimate obtained using the CRE model ensues. As the CRE approach does not assume the validity of the incorrect assumptions, in such a case its estimation result is preferable to that of the conventional method.

Are the differences in exchange rate valuation resulting from the different procedures significant in terms of magnitude? I have examined this question using, among other things, a dataset similar to that used by the International Monetary Fund (IMF) for its equilibrium exchange rate calculations. It comprises annual data for 40 countries over the 1995-2015 period. The IMF publishes an annual External Sector Report covering the world’s largest economies (most recently IMF, 2019). This report also contains economic policy recommendations to address any external sector imbalances. It identifies these imbalances, such as currency misalignments, by, inter alia, using the traditional panel estimation methods mentioned above.

In my study, I show that different panel estimation methods applied in an IMF-type framework generally lead to very different assessments of currency misalignments. To illustrate this, let us assume that the CRE estimation, which requires less restrictive assumptions, yields the result that a given currency is appropriately valued. Let us assume now that, instead of the CRE model, we choose the currently most commonly used estimation method – a fixed country effects regression. Owing to non-fulfilment of the necessary assumptions, the fixed country effects regression will – on average across time and space - erroneously assess this currency to be considerably misaligned by more than 12% (it should be added, however, that the IMF does, for its part, also use another panel estimation method under which deviations from the CRE model are, on average, considerably smaller; see Mano et al., 2019). Because of the incorrect restrictions, some countries’ currencies are calculated as being undervalued instead of overvalued and vice versa. For example, a general CRE estimate for the United States in 2015 shows an undervaluation of 1%, whereas the fixed country effects regression applied on the same dataset incorrectly results in an overvaluation of 11½%.

## Conclusion

Estimates of equilibrium exchange rates play an important role in research-based policy advice, for example in discussions on current account imbalances. My study shows that the conventional panel estimation methods used to calculate such equilibrium exchange rates are often not well suited for this purpose; a CRE model based on less restrictive assumptions would be preferable.

## References

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## News from the Research Centre

“Does the Lack of Financial Stability Impair the Transmission of Monetary Policy?” by Viral Acharya (New York University School of Business), Björn Imbierowicz (Deutsche Bundesbank) Sascha Steffen (Frankfurt School of Finance and Management) and Daniel Teichmann (Goethe Universität Frankfurt) will be published in the *Journal of Financial Economics*.

“Negative Monetary Policy Rates and Systemic Banks’ Risk-Taking: Evidence from the Euro Area Securities Register” by Johannes Bubeck (Bundesbank), Angela Maddaloni (EZB) and José-Luis Peydró (Universitat Pompeu Fabra) will be published in the *Journal of Money, Credit and Banking*.

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