

2009-07-02

PRESS RELEASE

Model misspecification, learning and the exchange rate disconnect puzzle

by Vivien Lewis and Agnieszka Markiewicz

NBB Working Paper No 168 - Research Series

Rational expectations models fail to explain the disconnect between the exchange rate and macroeconomic fundamentals. This disconnect is a well-known fact of international macroeconomics. Traditional exchange rate models are known to produce forecasts which are no better than a random walk: the best possible predictor of the exchange rate tomorrow is its value today. At best, such models have been shown to explain the dynamics of only some currencies and over certain time periods.

The exchange rate is usually modelled as an asset price. It is expressed as a weighted average of a set of current fundamentals and its expected future value. Since the weight on expectations is high relative to the weight on the fundamentals, expectations formation is key in determining exchange rate dynamics. Due to the model's self-referential structure with positive feedback, any expectational errors are magnified, so that the exchange rate may drift far away from its fundamental value. We assume two departures from the rational expectations hypothesis: learning and model misspecification.

First, statistical learning implies that agents behave as econometricians; they re-estimate their model each time a new data point is observed. Recent research has argued that learning improves the empirical performance of asset-pricing models. Here, agents learn about the model parameters and the relative performance of different forecasting rules.

Second, we assume model misspecification, whereby agents do not use all available information to make forecasts. Experimental evidence supports this assumption. Surveys among foreign exchange traders have revealed considerable variation in the relative importance attached to different fundamentals both across time and market participants. Here, we allow for heterogeneity in beliefs as well as time variation in the weight on a particular fundamental.

We introduce model misspecification and learning into a standard monetary model where the fundamentals driving the exchange rate are the relative output levels and money supplies of the two countries in question. Together with data on US-UK fundamentals over the post-Bretton Woods period, we generate samples of artificial quarterly exchange rate data. We compute the exchange rate volatility and the correlation between the exchange rate and fundamentals. The model has two free parameters: the learning gain and the speed of switching between forecasting rules. We calibrate the learning gain so as to match the volatility of the exchange rate return with that in the data, for several values of the switching parameter. Then we compare other exchange rate moments in the model to those in the data.

The excess volatility of the exchange rate return can be reproduced with low values of the learning gain. Both assumptions, misspecification and learning, are necessary to generate this result. However, the implied correlations with the fundamentals are higher than in the data. Robustness analysis shows that including more lags tends to tip the balance of our findings slightly towards rational expectations and away from the learning hypothesis.