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Comment on "Evaluating Euro Exchange Rate Predictions from a Battery of Multivariate Models"

Harald Grech
Oesterreichische Nationalbank

Forecasting exchange rates – in particular – in the short run is a controversial issue, far from being settled. Various empirical exchange rate models which are dealt with in a huge number of empirical papers are not found to consistently outperform the random walk. So, although researchers occasionally claim that their model can beat the random walk, the scientific consensus today is that the results of the classical paper of Meese and Rogoff (1983) still stand. Another noteworthy conclusion from the empirical literature is that since the breakdown of Bretton Woods, exchange rates in general have become a lot more volatile. There is however no evidence that the fundamentals which are – according to the theoretical models – deemed to determine the value of the exchange rates have become more volatile during the same period. This is clearly the opposite to the predictions of the various models, indicating that exchange rate variability can only increase if the underlying fundamental volatility has also increased. Obviously, exchange rate volatility is – at least to a great extent – separated from the variability of the fundamentals, see for instance de Grauwe (2000). Obstfeld and Rogoff (2000) refer to this perception as one of the six major puzzles in international finance.

The economic theory behind the exchange rate forecasting exercise of the Institute for Advanced Studies, Vienna, is the monetary model of exchange rate determination (MM-model). The empirical methods are various forms of vector-auto-regressions (VARs). The theoretical framework and the empirical methods are extensively described in two papers, namely "Forecasting the Euro Exchange Rate Using Vector Error Correction Models" by van Arle et al. (2000) and "Forecasting Exchange Rates in Transition Economies: A comparison of multivariate time series models" by Cuaresma and Hlouskova (2004).Van Arle et al. (2000) estimate a sticky-price monetary exchange rate model in the form of a Vector Error Correction Model (VEC) of the Euro (EUR) against the U.S. dollar (USD), the British pound (GBP), the Japanese yen (JPY) and the Swiss franc (CHF). The variables used in the empirical analyses are nominal money balances, real output, nominal short-term interest rates and nominal long-term interest rates, serving as a proxy for inflation expectations. The authors furthermore produce out-of-sample exchange rate forecasts, investigating periods from January 1994 to February 1999, with the forecasting horizons from one to twelve months. The performance of the various forecasts is measured by the ratio of the Root Mean Squared Error (RMSE) and the Mean Absolute Error (MAE) of the best model against alternative models, including as the "true" benchmark, the random walk (RW). The forecasting model is –to some extent – able to beat the random walk for the EUR/USD and the EUR/GBP exchange rate. For the EUR/JPY and the EUR/CHF spot rate, the best forecasting models do not outperform the RW-model.

Cuaresma and Hlouskova (2004) compare the accuracy of five different VAR-models in forecasting five Central and Eastern European currencies (Czech koruna, Hungarian forint, Polish zloty, Slovak koruna, and Slovenian tolar) against the EUR and the USD. The forecasting horizons range from one to twelve months. The Slovenian tolar/euro rate is the only rate, being able to outperform the random walk model.

Summing up the forecasting results of the two papers: The sticky-price monetary exchange rate model has some out-of-sample forecasting power (in the short run), though not in a consistent way. The results differ from country to country and from forecasting period to forecasting period.

These rather disappointing results may have various reasons. The first may be the time horizon. Forecasting exchange rates for a period of one to twelve months may be too short to obtain (reliably) significant results, given that the MM-model is a long-run exchange rate model. In general, most of the empirical exchange rate studies, investigating the monetary models of exchange rate determination over the floating exchange rate period have found no support for these theoretical models. Opposing to what the long-run MM-models ask for, no evidence for a co-integrating relationship between the exchange rate and various monetary fundamentals could be established. Moreover, even in the minor cases, where co-integration has been found, little support is detected found for the predictions of the MM-model. Coefficients had wrong signs or were simply insignificant. This is not too surprising, since the long-run purchasing power parity, one of the major building blocks performs poorly on a country-by-country basis, in particular at shorter horizons. Furthermore, another important building block, the uncovered interest rate parity (UIP) is typically rejected by empirical evidence, mainly as the forward rate is generally not conceived to be an unbiased predictor of future spot rates.

Moreover, MM-models might suffer from omitted variables. One of these omitted variables could be home and foreign country wealth variables, such as the government debt to GDP ratio or net foreign asset ratios. Such variables typically enter into another kind of exchange models, the "behavioural equilibrium exchange rate" (BEER) approach. Models like the BEER and related models, like the NATREX, have gained considerable importance in the context of policy issues for intermediate horizons. The BEER approach, for instance, is frequently used to determine the long-run value of the euro. Clostermann and Schnatz (2000) for instance, identify four fundamental factors, driving the real exchange rate of the EUR/USD exchange rate, which are the international real interest rate differential, relative prices in the traded and non-traded goods sectors, the real oil price and the relative fiscal position. They also perform forecasts from one to eight quarters, showing that their single equation error correction model is able to outperform the benchmark random walk model.

Other reasons, why the monetary exchange rate models have performed rather poorly in the empirical literature are:

Simultaneity problems. It is questionable, whether all variables on the right hand side of the forecasting equations are exogenous. A change in money supply for instance, is assumed to influence the exchange rate. However, if the central bank intervenes to influence the spot rate without sterilization, the money supply changes. Similarly, real income may also be affected by the exchange rate.

Lack of taking into account nonlinearities. In case, exchange rates are influenced or determined by economic fundamentals and in doing so, in a nonlinear form, the formulation of a linear model would clearly lead to a misspecification of the empirical model.

Parameter instability. Most of the empirical studies cover a long period of investigation and only very few test for structural breaks.

Turning to the econometric method applied, VARs have the distinct advantage that they are not only able to cover the long-run properties of the MM-model but are also able to capture short run exchange rate dynamics. In general it is well known that VARs do a good job in data description and forecasting, see for instance Stock and Watson (2001). Two other tasks, VARs are used for structural inference and policy analysis are much more difficult to fulfil, since they require to solve the identification problem. Solving the identification problem, the researcher is enabled to differentiate between correlation and causation and thereby enabled to interpret correlation causally. What is also well known is that in order to produce good forecasting results, VAR forecasting systems should on the one hand contain at least three or four variables and on the other hand allow for time varying parameters to capture important drifts in the coefficients. An increase in the variables, however, makes it a lot more difficult to obtain reliable estimates of all coefficients without further restrictions. One way to tackle this problem is to impose a common structure on the coefficients by using for example Bayesian methods which, however, is covered by the empirical models, applied by the Institute for Advanced Studies, at least in the paper on the exchange rates of the five transition countries.

One alternative empirical route that could be followed, when forecasting for instance the EUR/USD exchange rate especially for shorter horizons, is to take account of possible nonlinearities between exchange rates and fundamentals and examine the MM-model in a context of time-varying coefficients using a Markov switching approach.

Finally, two further suggestions for forecasting for instance the EUR/USD or EUR/JPY exchange rates could possibly be improved are:

The first suggestion concerns the data, being used in the forecasting exercises: Most of the exchange rate forecasting experiments in the empirical literature are based on revised macroeconomic data. Nevertheless, it is well known that data revisions can have large effects on the fundamentals, for instance on GDP figures. Recently, in particular in the fields of monetary economics, a new growing strand has emerged in literature. It suggests that analysis working with real-time data frequently results in substantially different conclusions than work based on revised data. Indeed, it is conceivable that we would possibly get a much different picture of exchange rate movements, if information or data are used which were actually available to agents at a particular point in time in the past. Faust et al. (2003), for instance, examine the real-time forecasting power of standard exchange rate models of several currencies (JPY, DEM, CAD and CHF) against the USD. The authors conclude that the predictive power of the exchange rate models used is uniformly better using real time data than using ex-post revised data.

The second and last suggestion refers to the estimation technique: As empirical exchange rate models performed rather poorly in forecasting spot rates on a country-by-country basis, why not turn to panel tests that pool data across countries? In this context, I would like to refer for instance to a paper by Rapach and Wohar (2002). The authors show that in contrast to country-by-country analysis, there is substantial support for the monetary model using panel tests. Moreover, comparing forecasts undertaken on a country-by-country basis versus panel forecasts, they show that panel estimates generate superior out-of-sample exchange rate forecasts. This suggests that panel estimates of the monetary model are more reliable than country-by-country analysis.

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