CrossMark

Forecasting exchange rates under parameter and model uncertainty ☆

Joscha Beckmann [a,b,c,1], Rainer Schüssler [d,e,*]

[a] *University of Duisburg-Essen, Germany*
[b] *Department of International Economic Policy, University of Freiburg, Platz der Alten Synagoge 1, 79085 Freiburg*
[c] *Kiel Institute for the World Economy, Kiellinie 66, 24105 Kiel*
[d] *Chair of Applied Stochastics and Risk Management, Helmut Schmidt University Hamburg, Holstenhofweg 85, 22043 Hamburg, Germany*
[e] *Center of Quantitative Economics, Münster, Germany*

ARTICLE INFO

ABSTRACT

We introduce a forecasting method that closely matches the econometric properties required by exchange rate theory. Our approach formally models (i) when (and if) predictor variables enter or leave a regression model, (ii) the degree of parameter instability, (iii) the (potentially) rapidly changing relevance of regressors, and (iv) the appropriate shrinkage intensity over time. We consider (short-term) forecasting of six major US dollar exchange rates using a standard set of macro fundamentals. Our results indicate the importance of shrinkage and flexible model selection/averaging criteria to avoid poor forecasting results.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

Exchange rate forecasting is one of the most important topics in international economics. Although economic fundamentals are considered to contain information about future exchange rate movements, the forecasting performance of exchange rate models has turned out to be frequently inferior to a naive random walk benchmark, a finding that dates back to the seminal study by Meese and Rogoff (1983). Given the lack of success in predicting exchange rates by macro fundamentals, exchange rates are considered as largely disconnected from economic fundamentals. This phenomenon constitutes the "exchange rate disconnect" puzzle (Engel et al., 2008).[1] The prevailing view is that Meese and Rogoff's finding has not yet been convincingly overturned. Providing a comprehensive survey study, Rossi (2013) finds that forecasting ability crucially depends on the choice of predictors, the forecast horizon, the sample period, the type of forecasting models, and forecast evaluation method. Despite some encouraging result for certain predictors, such as Taylor-rule based forecasts (Molodtsova and Papell, 2009), no predictor or model seems to provide systematically superior forecasts compared to a random walk. Rossi (2013) concludes that predictability only appears occasionally for some countries and short periods of time.

Sarno and Valente (2009) consider forecasting exchange rates using a predictive procedure that allows the relationship between exchange rates and fundamentals to evolve in a very flexible fashion. They conclude that the poor out-of-sample forecasting ability of exchange rate models may be caused by poor in-sample model selection criteria rather than by the lack of information embedded in the fundamentals, and that the difficulty in selecting the best predictive model is largely due to frequent shifts in the fundamentals. This finding fuels the search for a model selection procedure that is able to keep up with frequent model changes.

In general, forecasting problems in economics and finance are in many cases complicated because potential predictive power of the considered regressors appears to be undermined by overfitting and instabilities, resulting in poor out-of-sample forecasting performance.[2] The forecasting literature has addressed those issues by focusing on parsimonious models that limit the effect of parameter estimation error through various shrinkage or regularization techniques. Forecast combinations have turned out to be useful for stabilizing forecasts, since they are robust to structural breaks and model misspecification; see, e.g., Rapach et al. (2010).

Recently advanced theories give rise to both parameter instability and model uncertainty with respect to exchange rate forecasts. Rational expectations models ascribe the instability between exchange rates and macro fundamentals to imperfect knowledge. Facing incomplete and heterogeneous information, investors in the foreign exchange market attach excessive weight to an observed fundamental – the "scapegoat" variable – during some period (Bacchetta and Van Wincoop, 2004, 2006, 2013).[3] Markiewicz (2012) proposes a learning theory in which forecasts based on the selected macro variable feed back into the actual exchange rate dynamics. The theoretical argument behind these rational expectation models is that investors focus excessively on a time-varying subset of fundamentals that changes over time.

This line of reasoning requires an econometric forecasting technique that can handle rapid shifts in parameters and allows the relevant subset of economic fundamentals to change over time. That is, an appropriate econometric model should be able to accommodate both parameter instability and model uncertainty. Furthermore, the specified model universe ought to be general enough to comprise all possible models of exchange rate behavior considered plausible by the researcher as well as to allow for the possibility that none of the regressors is indeed useful for forecasting; in this case, the model should collapse to a simple random walk specification. Our approach allows a researcher to include a multitude of different model specifications, while (s)he may rely on the

---

[1] The "exchange rate disconnect" puzzle particularly refers to short-term forecasting with horizons of up to one year.
[2] See Rossi et al. (2012) for a recent study on forecasting a very broad set of financial and economic variables under model instability.
[3] They rationalize exchange rate movements by a shift in an unobserved fundamental (e.g., liquidity trades). Searching for an explanation for the exchange rate change, investors in the foreign exchange rate market may attribute such a movement to an observed macro fundamental. The concerned macro fundamental becomes the "scapegoat" and feeds back to investors' trading strategies, resulting in time-varying weights for the fundamentals. For survey evidence that agents in the foreign exchange rate market frequently change the weight they ascribe to fundamentals, see Cheung and Chinn (2001) and Fratzscher et al. (2012).