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Comment

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It is a pleasure to have an opportunity to discuss the stimulating paper "Can Parameter Instability Explain the Meese-Rogoff Puzzle?" by Philippe Bacchetta, Eric van Wincoop, and Toni Beutler. This paper represents a part of an innovative research agenda investigating the reasons why structural macroeconomic models that economists use to explain exchange rates have so much difficulty in outpredicting a random walk, even when using contemporaneous information on the "fundamentals."

In discussing this paper, I will first review what other researchers have tried, recap quickly what is undertaken in this paper, and discuss why we should expect time variation in the parameter values. Then I will provide some insight into why one might expect different types of time variation, not considered by the authors, to be relevant.

I. Previous Attempts to Overturn the Meese-Rogoff Results

As Bacchetta et al. note, the Meese-Rogoff papers sparked an enormous literature. Various authors attempted to overturn the finding that in out-of-sample forecasting exercises using actually realized (as opposed to forecasted) values of the right-hand-side variables, structural models failed to outperform a random walk, with little success. This set of models included the monetary model, portfolio balance models incorporating cumulated current account balances. In addition, the forward rate and simple time-series models were included. In essentially no case did these alternative models outperform a random walk along the mean squared error or mean absolute error dimensions. Cheung, Chinn, and Pascual (2005) represents one of the most recent updates to the Meese-Rogoff papers.

In discussing this result, it is important to recall that the failure to outpredict a random walk is not a necessary implication of the efficient markets

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hypothesis (EMH). The EMH asserts that no model using only time t information can add additional information above and beyond the time t asset price. In contrast, these ex post historical simulations use time $t + k$ information on the fundamentals to predict the time $t + k$ asset price. In this sense, these exercises were more akin to testing for predictability after guarding against data mining than true tests of forecasting performance.

One can break down the approaches to overturn the Meese-Rogoff results into the following categories:

- Allowing for different functional form (nonlinearity, thresholds)
- Allowing for regime switching
- Using panel regressions
- Including additional variables

In terms of functional form, early papers include allowing for functional nonlinearity as in Diebold and Nason (1990), Chinn (1991), and Meese and Rose (1991). More recent papers allowed for nonlinearities in terms of thresholds; Taylor, Peel, and Sarno (2001) falls into this camp.

A different sort of nonlinearity can be investigated by use of regime switching. Engel and Hamilton (1990) were early expositors of this approach, allowing for upswing and downswing regimes in the dollar. Engel (1994), however, failed to obtain evidence that such an approach could outperform a random walk. Frömmel, MacDonald, and Menkhoff (2005) used a Markov switching model applied to monetary model parameters to obtain a better in-sample, but not out-of-sample, fit.

Another approach involves incorporating cross-currency information by using panels of exchange rates. Notable among this approach are the papers by Mark and Sul (2001) and Groen (2005). Authors using these panel approaches have found that a random walk can be outperformed in these out-of-sample exercises.

By far the most popular approach is to incorporate additional variables: relative price of nontradables (Clements and Frenkel 1980), wealth (Frankel 1982), and productivity (Chinn 1997) are a few of the examples. More recently, we have seen the use of Taylor rule fundamentals (Engel and West 2006) and linearized external budget constraints (Gourinchas and Rey 2007).

II. This Paper's Approach

The paper by Bacchetta et al. adopts a very different approach. Essentially, the authors show what is *not* the source of the Meese-Rogoff finding. While related to the broader research agenda of showing how a scapegoat model can result in apparently unstable exchange rate parameters, it focuses on the potential role for parameter instability.

After documenting the continued persistence of the Meese-Rogoff finding in the latest data set, Bacchetta et al. show by way of a variety of simulations that parameter instability, wherein the true parameters follow AR(1) processes, cannot explain the Meese-Rogoff results.

The particular setup they examine is summarized by this group of equations:

$$\Delta s_t = \sum_{n=1}^{N} \beta_{nt} f_{nt} + u_t, \tag{1}$$

$$f_{nt} = \rho_n f_{n,t-1} + \varepsilon_{nt}^{f}, \tag{2}$$

$$u_t = \rho_u u_{t-1} + \varepsilon_t^{u}, \tag{3}$$

$$\beta_{nt} - \beta_n = \rho_\beta (\beta_{n,t-1} - \beta_n) + \varepsilon_{nt}^{\beta}, \tag{4}$$

where s is the exchange rate, f is the fundamentals, the ρ's are AR(1) coefficients, and the ϵ's are error terms. This experiment design allows for an AR(1) error in the exchange rate equation, an AR(1) in fundamentals, and an AR(1) in β's.

The authors find that parameter variation cannot explain the Meese-Rogoff finding. Hence, by process of elimination, low explanatory power of the fundamentals must be the explanation.

III. But What about Other Types of Parameter Variation?

This conclusion makes perfect sense within the confines of the experiment Bacchetta et al. have set up. However, I think that there are other types of parameter variation that could explain the Meese-Rogoff results. Indeed, like nonlinearities, there are a myriad of different types of parameter variation. In order to see this, consider a simple rational expectations model, circa 1975.

Assume stable money demand equations that can be inverted to solve for price levels:

$$m_t - p_t = \varphi y_t - \lambda i_t,$$

$$p_t = m_t - \varphi y_t + \lambda i_t.$$

Purchasing power parity is given as

$$s_t = p_t - p_t^*.$$

Then by rearranging and imposing uncovered interest parity

$$E_t s_{t+1} - s_t = i_t - i_t^*,$$

one obtains

$$s_t = \tilde{M}_t + \lambda(E_t s_{t,t+1} - s_t),$$

where

$$\tilde{M}_t = (\hat{m}_t - \varphi \hat{y}_t).$$

Recursively solving forward leads to

$$s_t = \left(\frac{1}{1+\lambda}\right) \sum_{\tau=0}^{\infty} \left(\frac{\lambda}{1+\lambda}\right)^{\tau} E_t \tilde{M}_{t+\tau}$$

if one assumes away bubbles. Finally, if one assumes a stable driving process for the fundamentals,

$$\tilde{M}_t = \rho_n \tilde{M}_{t-1} + u_t,$$

then one obtains the current exchange rate as a function of the current fundamentals:

$$s_t = \left(\frac{1}{1+\lambda-\lambda\rho_n}\right)\tilde{M}_t.$$

Notice that if some structural parameter, like λ, varies slowly over time, the reduced-form coefficient between the left- and right-hand-side variables will evolve as an AR(1). However, if the AR(1) coefficient in the driving process were to change, then this would manifest itself in a discrete break in the reduced-form expression. Indeed, one of the reasons forwarded for the failure of the old-style rational expectations approach of estimating systems imposing cross-equations constraints is the instability in the driving processes.

The foregoing demonstrates that the case of smoothly evolving parameters, as investigated in the paper, is not the only plausible form of parameter variation. Discrete breaks could also show up. And if these changes in the driving processes were sufficiently short, they might not be picked up in the other type of parameter variation investigated by the authors, namely, Markov switching between two regimes for the β parameters, where the probability of being in each regime is about the same.

There is one interesting aspect of this particular type of time variation. Stationary time-varying parameter specifications such as this are observationally equivalent to specifications incorporating stable coefficients, heteroskedasticity, and a time-varying constant. This might be the reason why typically the time-varying parameter models do not impose a formal process for the coefficients (i.e., the use of rolling regressions) or assume random walk coefficients (e.g., Wolff 1987). The authors' $\rho_\beta = 0.98$ specification does come close to matching this random walk specification.

IV. Closing Observations

I think that the results in this paper are important, insofar as they demonstrate under certain assumptions regarding the type of parameter instability that the Meese-Rogoff results are not driven by parameter variation. However, I think their conclusion that the reason is that the fundamentals have little explanatory power is premature. The key reason is that they have investigated only a small set of possible types of parameter instability that one can think of. (Admittedly, it would be hard to investigate some of the other equally plausible types of parameter variation I have laid out.)

Perhaps more significantly, it is notable that the authors work in the first differences; yet we do find lots of evidence, in sample, of cointegration between exchange rates and posited fundamentals. Why the disjuncture? This is a question that is not addressed directly in this framework, and it suggests to me that the book is still open for parameter variation to be an explanation for the Meese-Rogoff results.

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