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Taylor rule deviations and out-of-sample exchange rate predictability

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ABSTRACT

The Taylor rule has become the dominant model for academic evaluation of out-of-sample exchange rate predictability. Two versions of the Taylor rule model are the Taylor rule fundamentals model, where the variables that enter the Taylor rule are used to forecast exchange rate changes, and the Taylor rule differentials model, where a Taylor rule with postulated coefficients is used in the forecasting regression. We use data from 1973 to 2014 to evaluate short-run out-of-sample predictability for eight exchange rates vis-à-vis the U.S. dollar, and find strong evidence in favor of the Taylor rule fundamentals model alternative against the random walk null. The evidence of predictability is weaker with the Taylor rule differentials model, and still weaker with the traditional interest rate differential, purchasing power parity, and monetary models. The evidence of predictability for the fundamentals model is not related to deviations from the original Taylor rule for the U.S., but is related to deviations from a modified Taylor rule for the U.S. with a higher coefficient on the output gap. The evidence of predictability is also unrelated to deviations from Taylor rules for the foreign countries and adherence to the Taylor principle for the U.S.

1. Introduction

The Taylor rule has become the dominant model for academic evaluation of out-of-sample exchange rate predictability. Papers by Engel et al. (2008, 2015), Molodtsova and Papell (2009, 2013),

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Molodtsova et al. (2008, 2011), and Ince (2014) report superior out-of-sample exchange rate predictability with Taylor rule models than with the random walk model. Rossi (2013) surveys the literature and concludes that Taylor rule models perform better than a number of alternatives.

Out-of-sample exchange rate forecasting became a prominent academic topic following Meese and Rogoff (1983), who argued that empirical exchange rate models which appeared to fit well in-sample did not forecast better than a random walk out-of-sample. Their metric was the root mean squared forecast error (RMSE), where the forecast error is the difference between the realized and forecasted exchange rate for the models and, since a random walk forecast is simply a naïve no change forecast, the realized exchange rate change for the random walk. Because the random walk forecast could be performed by anyone who read a newspaper, this received considerable attention.

The first "modern" analysis of out-of-sample exchange rate forecasting was by Mark (1995), who used error correction methods to evaluate Purchasing Power Parity (PPP), Interest Rate Parity (IRP), and monetary models vis-à-vis the random walk model with DMW statistic developed by Diebold and Mariano (1995) and West (1996). Mark found that, while some evidence of predictability could be found at long horizons of up to four years, no systematic evidence of predictability could be found at short horizons of one quarter. While the long-horizon results have been both criticized and confirmed, the short-horizon results have held up over time. In a comprehensive paper, Cheung et al. (2005) found that none of the standard models could systematically forecast better than the random walk at short time horizons.

Out-of-sample exchange rate predictability with Taylor rule fundamentals was initiated by Molodtsova and Papell (2009). The idea is to subtract a Taylor rule for the foreign country from a Taylor rule for the domestic country, in this case the United States. The resultant equation has the interest rate differential on the left-hand-side and the variables that comprise the Taylor rule, domestic and foreign inflation, output gaps, and (depending on the specification) lagged interest rates and/or the real exchange rate, on the right-hand-side. If uncovered interest rate parity (UIRP) held in the short run, you would simply replace the interest rate differential with the expected rate of depreciation to derive a forecasting equation. However, there is overwhelming evidence, both theoretical and empirical, that UIRP not only does not hold in the short run, but that the short-run effects are opposite of the UIRP predictions. The resultant forecasting equation, therefore, reverses the signs of the coefficients of the right-hand-side variables from what would be predicted by UIRP. Using the CW statistic developed by Clark and West (2006), Molodtsova and Papell (2009) report statistically significant evidence of exchange rate predictability at the 5 percent level for 11 of the 12 currencies studied at the one-month-ahead horizon.

An alternative model of out-of-sample exchange rate predictability with Taylor rules was developed by Engel et al. (2008). They subtract the Taylor rule for the base country from the Taylor rule for the foreign country, but use posited rather than estimated coefficients and include the real exchange rate in the forecasting equation. We call this the Taylor rule differentials model. They use both single-equation and panel methods at one quarter and 16 quarter-ahead horizons, and report some evidence of out-of-sample predictability using the CW statistic. They find stronger evidence at the 16-quarter than at the one-quarter horizon and stronger evidence when the random walk with drift is used for the null hypothesis instead of the random walk without drift. Ince (2014) uses their methods with real-time data and reports somewhat stronger results.

The financial crisis, Great Recession, and slow recovery for the U.S. raise questions about whether Taylor rule exchange rate forecasting is still relevant in an environment where the federal funds rate has been at the zero lower bound from the end of 2008 through the end of 2014. As early as December 2008, Chinn (2008) posed this question, concluding that, with policy rates near zero for Japan and the U.S. and predicted to be near-zero for the United Kingdom and the Euro Area, prospects for continued Taylor rule exchange rate forecasting were bleak. A second theme, however, was that returning to the monetary model, even in a time of quantitative easing, did not seem promising. Molodtsova and Papell (2013) used LIBOR-OIS spreads, TED spreads, Bloomberg financial conditions indexes, and OECD financial conditions indexes for the U.S. and the Euro Area to augment Taylor rule exchange rate forecasting for the dollar/euro exchange rate from 2007:Q1 to 2012:Q1. The Taylor rule fundamentals and differentials models with financial variables provided more evidence of out-of-sample exchange rate predictability than the models without financial variables.

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