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Asymmetric loss and rationality of Chinese renminbi forecasts: An implication for the trade between China and the US

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ABSTRACT

This study examines the asymmetry of the loss function in Chinese renminbi exchange rate forecasts and tests the rationality of the forecasts, assuming a possibly asymmetric loss function. The results indicate that the majority of forecasters have asymmetric loss adverse to US dollar appreciation and the direction of asymmetry is associated with institutional bases, in particular, those in the US. It is consistent with the facts that RMB is often said to be undervalued and there are political conflicts between China and its largest trade partner, the US. This study also finds evidence of rationality under an asymmetric loss function. It implies that those forecasters efficiently use the information in key exchange rate indicators.

1. Introduction

The new exchange rate regime of the renminbi (RMB) has been a controversial issue since the People's Bank of China announced in July 2005 that the RMB would switch to a managed float regime "with reference to a basket of currencies." Because RMB exchange rate policies have crucial impacts on the international trade system, many studies examine the new RMB exchange rate regime, that is, how Chinese authorities operate the managed floating exchange rate regime in practice (e.g., Frankel, 2009; Sun, 2010; Tian and Chen, 2013).

However, there are few studies that examine the RMB exchange rate forecasts; on the other hand, considerable studies investigate how market participants form exchange rate expectations for various exchange rates, including advanced and emerging economies. Theoretical models of foreign exchange markets often rely on the assumption that a representative agent forms rational expectations. The rational expectation hypothesis is of great importance, and thus, there is substantial research on survey data of exchange rate forecasts. However, those empirical studies broadly suggest significant failures of rational exchange rate expectations for many different currencies and sample periods (e.g., Chen et al., 2014; Frankel and Froot, 1987). Therefore, this study attempts to fill the gap in the literature about whether the RMB exchange rate is rationally

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expected because the Chinese authorities exert substantial control on the foreign exchange market, which could have significant impacts on forecast rationality.

Forecast rationality has been examined based on the assumption that forecasters have a symmetric and quadratic loss function. Although some studies point out that loss functions would not be generally symmetric (e.g., Zellner, 1986), empirical studies that assume asymmetric loss functions have recently gained attention. An increasing number of those studies show that there are often cases of asymmetric loss for macroeconomic forecasts (e.g., Capistrán, 2008; Christodoulakis and Mamatzakis, 2009; Döpke et al., 2010; Elliott et al., 2005; Krol, 2013; Krüger and Hoss, 2012; Pierdzioch et al., 2012a; Tsuchiya, 2012; Wang and Lee, 2014); once allowing for an asymmetric loss, forecast rationality is satisfied.

Not many of those empirical studies are on foreign exchange rate forecasts. Christodoulakis and Mamatzakis (2013) investigate the exchange rates of the G7 countries using forward exchange rates. Recent studies of Pierdzioch et al. (2012b) and Fritsche et al. (2014), using survey data, focus on yen–dollar and dollar–euro exchange rate forecasts. In particular, studies on exchange rate forecasts for emerging economies are even rarer. The only studies in line with this topic are Baghestani and Marchon (2012) and Fritsche et al. (2015). The former examine asymmetric loss function in a Brazilian real consensus forecast and the latter examine asymmetric loss function in individual Brazilian real and Mexican peso forecasts. Therefore, this study examines asymmetric loss functions in RMB forecasts based on the pioneering work of Elliott et al. (2005). Furthermore, knowledge about forecasts for the Chinese economy is very limited[1] although many such forecasts have been produced. Therefore, this study could also contribute to filling this gap in the forecast evaluation literature.

This study further investigates whether the degree and direction of asymmetry in the loss functions of forecasts differ by forecasters' characteristics and forecast horizons. It considers not only short-term forecast horizons (one-month) but also long-term (three-month and one-year) forecast horizons because forecasters could form expectations differently depending on their characteristics, including affiliation (nonfinance or finance institutions, including commercial or investment banks) regional bases, and forecast horizons, a fact that has been examined rarely in the literature. Elliott et al. (2008) suggest that agents are adverse to bad outcomes, and as they build these aversions into their forecasts, there might be differences in forecast errors, such as lower-than-expected RMB appreciation for forecasters in Asia, Europe, and the US, possibly reflecting their trade patterns with China and their impacts. China plays a critical role in global manufacturing supply chain networks and has great impacts on advanced economies. To address a controversial issue on trade conflicts with China and short- to long-term horizons, this study uses a new set of variables as instruments that have not been used in the literature, even though they are key variables in international finance: nominal and real effective exchange rates, exchange rate volatility, and purchasing power parity (PPP).

The empirical results show consistent evidence with the literature. The majority of forecasters have asymmetric loss function adverse to US dollar appreciation. That is, they are likely to underpredict RMB exchange rate forecasts (overdepreciation of the US dollar), while some have symmetric loss, and few have asymmetric loss adverse to US dollar depreciation. The degree and direction of asymmetry in the US-based forecasters are clearer toward underprediction but are not so clear for those in Asia–Pacific, Europe, and affiliations. These results are consistent with reality, given that the RMB is often said to be undervalued (e.g., Goldstein and Lardy, 2006), triggering political conflict between China and its largest trade partners, in particular, the US. In addition, I find evidence of rationality under an asymmetric loss function. These results are robust to the recent financial crisis and the reform by the People's Bank of China, and provide an implication for the peso problem.

The rest of the paper is organized as follows. Section 2 describes the data and Section 3 introduces the statistical method. Section 4 examines asymmetric loss functions and provides implications for international trade patterns. Section 5 concludes the paper.

2. Data

2.1. Forecast description

Every month, Consensus Economics, the world's leading international economic survey organization, surveys more than 700 private financial and economic forecasters for their estimates of key macroeconomic variables, including real GDP growth, consumer price indexes, and exchange rates. The organization's *Foreign Exchange Consensus Forecasts* publications include exchange rate forecasts of the Chinese RMB against the US dollar by various private forecasters for the end of the following month (F1), three months ahead (F2), and the following year (F3). This study uses forecasts published irregularly in the period between July 2005 and December 2012, which amounts to 15 surveys available. Although there are several surveys available before July 2005, they are excluded from analysis because the Chinese currency was effectively pegged to the US dollar until July 2005, when the People's Bank of China proclaimed a switch to a managed float regime "with reference to a basket of currencies." Note that the consensus[2] forecast is not examined in this study.

[1] Stekler and Zhang (2013) is one of a few exceptions.

[2] To examine the consensus as an individual forecast series, it would need to be assumed that individual forecasters have an identical loss function, although the assumption is not likely to be met.

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