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Unbiasedness and risk premiums in the Indian currency futures market

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ABSTRACT

This paper explores the relationship between currency futures and realised spot rates for the Indian rupee US dollar exchange rate. Using futures contracts with maturities of one, two and three months, we examine the unbiasedness of futures quotes as a predictor of the future spot exchange rate as well as the nature of time-varying risk premiums in this emerging market. Empirical estimates, obtained using monthly data, suggest the biasedness of futures quotes as a predictor of the future spot rate for contracts with maturities of two and three months. We also find significant time-varying risk premiums in the considered futures market, while the premium is of greater magnitude and more significant with increasing maturity of the contracts. We then examine the relationship between realised risk premiums and explanatory variables such as spot currency returns, the futures basis and realised volatility, skewness and kurtosis of spot currency returns. Our results show that spot currency returns and the futures basis can be considered as significant determinants of realised risk premiums in the considered futures market.

1. Introduction

The relationship between currency forward or futures rates and realised spot rates has been one of the central issues in the literature of international financial markets. As pointed out by Pippenger (2011), it is one of the most important puzzles in the area of international finance. The uncovered

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interest rate parity (UIP) and the forward rate unbiasedness hypothesis (UH) are the most commonly used theories to establish the relationship between current forward rates and future spot rates. UIP theory suggests that the expected future change in the spot rate is determined by the interest rate differential (or forward premium under the assumption of no arbitrage) between two countries (Bai and Mollick, 2010) such that high yield currencies are expected to depreciate against currencies with lower interest rates (Bekaert et al., 2007). The UIP theory under the assumption of no-arbitrage leads to the UH which states that the forward rate should be an unbiased predictor of the future spot rate at maturity of the contract (Tai, 2003; Nikolaou and Sarno, 2006). Hereby, unbiasedness means that the currency futures price should not be significantly different from the corresponding future spot prices. In other words, a regression of the spot rate at maturity on the current forward rate should yield a slope coefficient of one under the assumption of risk neutrality and rational expectations. Alternatively, a slope coefficient of one should also be obtained in the regression of percentage change in spot rates between now and maturity on the current forward-spot basis (forward premium) divided by the current spot rate. For an extensive review of the empirical literature on foreign exchange rate expectations, we refer, for example, to Engel (1996), Sarno (2005) and Jongen et al. (2008).

The unbiasedness of the forward rate has been overwhelmingly rejected in a number of studies (Kodres, 1993; Cavaglia et al., 1994; Baillie and Kilic, 2006; Nikolaou and Sarno, 2006) and the slope coefficient has been found to be significantly different from one, often even negative in a number of cases. The puzzle of the biasedness of the forward rate has been coined as the forward premium puzzle by Fama (1984) who states that the reason for the failure of UIP is a time-varying risk premium. Baillie and Bollerslev (2000) suggest the forward premium anomaly as a widespread empirical result in the literature and find that returns on most of the nominal exchange spot rates are negatively correlated to the forward premium. This finding implies that the forward rate is not an unbiased predictor of future spot rates. Tai (2003) states that the speculative return from holding a forward contract results from a risk premium that has to be paid to risk averse speculators who takes the risk of future changes in the exchange rates. The presence of a time-varying risk premium in currency forward markets is also confirmed by other studies, e.g. Wolff (1987), Theobald (1991), Panigirtzoglou (2004), just to mention a few.

Ehsani and Shahrokhi (2003) have tried to explain this puzzling relationship and put forward that the main reason for a negative relationship between the future currency spot rate and the forward rate can be attributed to surrogate variables[1] used in place of expectations conditional on all the available information. Frankel and Poonawala (2010) study a sample of 14 emerging market currencies and state that the bias in the forward rate for emerging market currencies is lower than that of advanced market currencies. According to Baillie (2011), the forward premium anomaly remains a paradox in international financial markets which is important and worthwhile to be better understood. Chang (2011) has tried to solve the forward premium puzzle using covered interest parity, but suggests that this is not feasible. Due to the complex nature of the forward premium puzzle, Müller (2011) states that we should stop trying to work out this anomaly and should start looking for fundamentally better models for the determination of exchange rates.

Note that the majority of these studies focus on the relationship between the forward and spot rates, and not on the relationship between futures quotes and the spot rate. For futures there is no natural equivalent to the forward rate unbiasedness hypothesis available. Also futures contracts differ in several ways from forward contracts such that forward and futures prices for delivery of a currency on the same maturity date may deviate. However, a variety of studies, including for example, Cornell and Reinganum (1981), Hodrick and Srivastava (1987), argue that often forward rates and futures prices have been found to be approximately equal. As a consequence, the relationship between futures contracts and the spot rate could be analysed in a way very similar to the relationship between the forward and currency spot rate, since there is generally very little difference between the two speculative prices (Baum and Barkoulas, 1996). Also de Roon et al. (1998) point out that they ignore the difference between forward and futures markets when analysing risk premiums for currency and commodity futures contracts. Therefore, with futures quotes of foreign exchange rates being very

[1] A variable that can be easily measured and used in place of one that cannot be measured or is difficult to measure.