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## Does a “correct” parameter estimate tell a better story about foreign exchange market efficiency?

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This paper demonstrates that the estimated parameters in previous research, with wrong signs and absurd sizes, do not indicate market inefficiency and market behavior as they appear to. In the real world where forecasting errors are substantially large, a “correct” or an “unreasonable” parameter estimate renders almost identical results. Specifically, we demonstrate that an absolutely unbiased predictor is irrelevant empirically, and the unknowingly pursuit of absolute unbiasedness is misleading. What needs to be verified is a sufficiently unbiased predictor, which may appear to be incredibly biased under the circumstances with expected, specified, probabilistic errors.

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### 1. Introduction

Predictability is a perplexing matter in financial markets, and even more so in efficient financial markets. On the one hand, the price of financial securities or financial instruments should be unpredictable in an efficient market. Abnormal returns cannot be made from developing a potential trading rule or procedure that identifies the predictable patterns in the securities’ price. On the other hand, the price of certain financial securities or financial instruments in an efficient market should be as expected or predictable, subject to probabilistic errors. The pertinent theory establishes an operational relationship for such securities’ prices and the associated factors, in a way that no arbitrage opportunities exist. In both unpredictability and predictability cases, the common requirement is that no abnormal or

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excess returns can be made in trading. For the study of market behavior involving both predictability and unpredictability, the foreign exchange rate is an appropriate example to be scrutinized. However, almost all previous empirical studies pay attention to the predictability part of the story only and neglect the unpredictability characteristics of the exchange rate itself. This gives rise to the so called forward premium puzzle that has perplexed researchers so long so much. Put plainly, previous research has overwhelmingly focused on the examination of whether the forward exchange rate is an unbiased predictor of the future spot exchange rate without much reflection on the message conveyed by unbiasedness under real world circumstances. Largely, what most previous empirical studies have attempted to prove or reject is the right hypothesis under the wrong circumstances. In effect, most procedures amount to testing the hypothesis that the forward exchange rate is an unbiased predictor of the future spot exchange rate statistically *and* under certainty. This poses an unsolvable conflict as the prelude to the forward premium puzzle that inevitably emerges consequently. Hence, a different line of research is worthwhile pursuing.

The forward premium puzzle in foreign exchange markets has been a focus in the study of foreign exchange market efficiency since the 1970s, shortly after the adoption of the floating exchange rate regime by major players on the foreign exchange market. It remains unsolved despite tremendous endeavors by researchers who have resorted to various econometric methods, to test the hypothesis that the forward exchange rate is an unbiased predictor of the future spot exchange rate. Early studies include Gwewe and Feige (1979), Hansen and Hodrick (1980), Bilson (1981), Longworth (1981), MacDonald (1983), Fama (1984), Gregory and McCurdy (1984), Hsieh (1984), MacDonald and Torrance (1988) and Copeland (1989). They have all rejected the hypothesis. Examining exchange rates of nine currencies vis-à-vis the US dollar between January 1974 and January 1980, Bilson (1981) reports that the estimated parameters have the wrong sign for seven currencies of the Canadian dollar, the French franc, the German mark, the Italian lira, the Japanese yen, the Dutch guilder, and the Swiss franc. For the other two currencies of the Belgian franc and the British pound, the size of the estimated parameters appears to be absurd. Even more puzzling, Fama (1984) finds that the estimated parameters have the wrong sign for all the nine currencies under scrutiny, using exchange rate data of the same nine currencies against the US dollar as in Bilson (1981) but extending the horizon that starts in August 1973 and ends in October 1982. The search for a sensible resolution stretches into the 1990s, for example, Cavaglia et al. (1994) and Peel and Pope (1995). A decade later, the results obtained by Cavaglia et al. (1994) bear much resemblance to those in Fama (1984). The estimated parameters have the wrong sign for all the nine currency pairs against the US dollar except the Canadian dollar. The primary motivation of the present paper arises from the fact that, whilst the majority of empirical studies decisively reject market efficiency and rational expectations in foreign exchange markets statistically, they have been greeted with much suspicion. The present paper attempts to find the reasons behind the “apparently too large” departure of the parameters from their efficient market values, and to examine whether such large departure is a real phenomenon of the market or a statistical procedure problem. Several recent studies, such as Wang and Jones (2002), Huisman et al. (1998), Schotman et al. (1997) and Taylor (1995), have also made similar effort. These studies all recognize, intentionally or unknowingly, that the (much) less changeable component on the right hand of the regression equation, i.e., the forward premium, is the primary source in creating unreliable parameters. The unconfirmed verdict of these studies is that the large departure of the parameters from their efficient market values is a statistical procedure problem rather than a real phenomenon of the market. Absolute unbiasedness is irrelevant; sufficient unbiasedness? definitely maybe. This is the line of research that the present study pursues.

The present paper demonstrates further that the estimated parameters in previous research, with wrong signs and absurd sizes, do not indicate market behavior through market inefficiency. There are a number of misleading statistical estimation procedure problems that give rise to the wrong impressions that the foreign exchange market is inefficient and irrational to such a great extent that abnormal profits can be easily earned. We show, from several perspectives, that the outcome is empirically the same whether the estimated parameters have the correct or absurd sizes with correct or wrong signs. This is consistent with our knowledge that no profits can be made through applying the results of any of these models. Specifically, we demonstrate that an absolutely unbiased predictor is irrelevant empirically, and that the blind pursuit of absolute unbiasedness is misleading. What needs to

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