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Can cross-country portfolio rebalancing give rise to forward bias in FX markets?

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A B S T R A C T

This paper develops a model of exchange rate dynamics that takes into account positions in foreign and domestic equities in addition to "standard" short-term riskless securities. The modeling of cross-country stock holdings is motivated by evidence that a large and ever-increasing proportion of currency flows has been directed toward national stock markets. To the extent that there is not perfect risk sharing, investors tend to hold currency risk and international equity risk as a bundle. This paper examines the impact of such cross-country covariance risk on the relationship between exchange rate returns and interest rate differentials. In particular, we show that the sign and magnitude of the coefficient on the lagged interest differential is governed by a type of time-varying beta risk that reflects the conditional covariance between exchange rate returns and the return differential between foreign and domestic equities. As this cross-country beta is predominantly negative, our results have direct implications on the empirical failure of the uncovered interest parity (UIP) hypothesis, suggesting that the traditional UIP regression equation is confounded (in a non-standard, nonlinear way) by the presence of cross-country equity flows. Simulation experiments show that accounting for such portfolio-rebalancing activities may, in part, help to explain the anomalous slope coefficient associated with the forward premium.

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1. Introduction

The empirical breakdown of standard workhorse models that rely on macroeconomic fundamentals such as money supplies, real incomes, and inflation rates in explaining short-term exchange rate movements, as well as the limited success of numerous refinements to capture peso problems, time-varying risk premia, and pricing kernels is so well known and long standing that Sager and Taylor (2006, p. 81) call it an "occupational hazard for the international financial economist." Particularly puzzling over the past several decades has been the empirical failure of the uncovered interest parity (UIP) condition. Contrary to theory, forward premiums appear to have a negative relationship with future exchange rate movements, implying that forward rates are biased predictors of future spot rates and that excess returns in currency markets are predictable.

Following the seminal work of Fama (1984), such excess returns are viewed as compensation for time-varying risk and a persistent challenge has been to develop theoretical models of premia for such risk that hold up empirically. Noteworthy papers in this area include Backus et al. (1993), Bansal et al. (1995), and Bekaert (1994, 1996), which extend the two-country Lucas (1982) type models of money and consumption in general equilibrium to incorporate refinements such as separability and habit persistence. Despite such advancements, this approach has had limited success in matching key features of the forward premium puzzle, such as the variability of excess returns.

A second generation of models applies two-country versions of the term structure model of Cox et al. (1985) to derive stochastic discount factors that explore how forward risk premia and expected changes in exchange rates depend on interest rates across countries. This approach is exemplified by Bansal (1997), Backus et al. (2001), Ahn (2004), and Brennan and Xia (2006). This line of research has shed light on the dynamics of currency risk premia and the causes of the forward premium anomaly but also have difficulty in fully explaining the puzzle.

Examining the problem at much finer frequencies, the microstructure approach pioneered by Lyons (1995, 2001), with its emphasis on order flow and information and agent heterogeneity, appears to explain intraday exchange rate movements strikingly well (Evans and Lyons, 2002). Microstructure models have also been applied to exchange rate puzzles at higher frequencies with reasonable success (Lyons and Rose, 1995).

Applying the tenets of microstructure to macro horizons, Osler (1995, 1998) and Carlson and Osler (2000) develop a model with two agent types: commercial traders, who trade foreign currency on noise and liquidity concerns, and financial traders, who are rational, fully informed, and maximize the expected utility of profits from trading. Consistent with the importance of order flow, exchange rate dynamics are determined in *flow* rather than *stock* equilibrium, the latter being standard in macroeconomic models. Carlson et al. (2008) find that such an approach can explain key features of the forward premium puzzle. While their results are largely driven by trade flows and the behavior of commercial agents, this paper examines the behavior of financial traders and capital flows related to their international portfolio-rebalancing activities.

With respect to capital flows, Hau and Rey (2006) observe that cross-border transactions in bonds and equities have grown at a staggering pace over the last 30 years, and that a large and ever-increasing portion of these flows goes toward investment in equities versus bank loans or government bonds.[1] Accounting for this fact, the authors develop a model where home and foreign stock investors interact with currency speculators and derive the joint dynamics of stock prices and currency. A key insight in their model is incomplete forex risk sharing, implying that the typical investor holds currency and foreign equity risk as a bundle. The concept of order flow also features prominently in their model.

[1] According to Hau and Rey (p. 273): "While gross cross-border transactions in bond and equity for the United States were equivalent to 4% of GDP in 1973, this share increased to 100% in the early 1990s and has grown to 245% by 2000…[Moreover], during the period 1975–1984, bank loans accounted on average for 39.5% of total outflows from major industrialized countries (60.3% of inflows), while equities accounted for only 9.5% of outflows (6.1% of inflows). During the 1985–1994 period, these proportions were reversed. Bank loans accounted for only 8.3% of outflows (16.3% of inflows), while equities jumped to 35.9% of outflows (31.6% of inflows)".