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Volatility risk premia and exchange rate predictability☆

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ABSTRACT

We discover a new currency strategy with highly desirable return and diversification properties, which uses the predictive ability of currency volatility risk premia for currency returns. The volatility risk premium—the difference between expected realized volatility and model-free implied volatility—reflects the costs of insuring against currency volatility fluctuations. The strategy sells high insurance-cost currencies and buys low insurance-cost currencies. A distinctive feature of the strategy's returns is that they are mainly generated by movements in spot exchange rates instead of interest rate differentials. We explore explanations for the profitability of the strategy, which cannot be understood using traditional risk factors.

1. Introduction

For decades, finance practitioners and academics have struggled to understand currency fluctuations. The difficulty of explaining and forecasting nominal exchange rates was systematically reported by Meese and Rogoff (1983), and it has continued to be difficult to find variables able to beat a random walk forecasting model for currencies (e.g., see Engel, Mark, and West, 2008). More recently, the literature on exchange rates has focused on a closely related issue, which is high returns to currency investment

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strategies such as carry and momentum.[1] Analogous to the difficulty of finding definitive answers about the source of currency fluctuations, limited success has been attained in explaining the often high returns to these currency investment strategies in terms of compensation for systematic risk.

In this paper, we discover a new currency strategy with high risk-adjusted returns, excellent diversification benefits relative to the set of previously discovered currency strategies, and unusual properties that provide clues to the underlying drivers of exchange rate movements. The key to this new strategy, which we dub *VRP*, is the significant predictive power of the currency volatility risk premium for changes in spot exchange rates.[2]

The desirability of the *VRP* strategy does not derive only from its profitability. The strategy is a useful complement to other widely studied currency strategies, as it has a low correlation with them. This unusually low correlation partly arises from the excellent performance of *VRP* during crises and primarily from the fact that the excess returns of *VRP* are almost completely obtained through prediction of changes in exchange rates, not from interest rate differentials. This stands in sharp contrast with the performance of the carry strategy, which has primarily been driven by interest differentials instead of spot currency returns.[3]

The currency volatility risk premium is the difference between expected future realized currency volatility and a model-free measure of implied volatility derived from currency options. A growing literature studies the variance or the volatility risk premium in different asset classes, including equity, bond, and foreign exchange (FX) markets.[4] In general, this literature has shown that the volatility risk premium is on average negative: Expected volatility is higher than historical realized volatility and, because volatility is persistent, expected volatility is also generally higher than future realized volatility.

Understood intuitively, the volatility risk premium represents compensation for providing volatility insurance; that is, the currency volatility risk premium can be interpreted as the cost of insurance against volatility fluctuations in the underlying currency. When it is high (realized volatility is higher than the option-implied volatility) insurance is relatively cheap, and vice versa.

We use the currency volatility risk premium to sort currencies into quintile portfolios at the end of each month. The *VRP* strategy buys currencies with relatively cheap volatility insurance, i.e., the highest volatility risk premium quintile, and sells short currencies with relatively expensive volatility insurance, i.e., the lowest volatility risk premium quintile. We track returns on this trading strategy over the subsequent period, meaning that these returns are purely out-of-sample, conditioning only on information available at the time of portfolio construction. We find that the performance of the strategy is remarkable, delivering performance per unit of volatility that is better than or comparable to the highest of the set of widely studied currency investment strategies that we consider.

Unusually for currency investment strategies, the performance of *VRP* stems virtually entirely from the predictability of spot exchange rates, not from interest rate differentials. That is, currencies with relatively cheap volatility insurance tend to appreciate and those with relatively more expensive volatility insurance tend to depreciate over the subsequent month. The observed predictability of spot exchange rates associated with *VRP* is far stronger than that arising from carry (which is perhaps unsurprising given the well-documented fact that interest differentials are the proximate component of carry returns) and, perhaps more importantly, stronger than that associated with currency momentum or any of the other well-known currency trading strategies that we consider. This is part of the reason for the diversification benefits that the *VRP* strategy offers in a currency portfolio.

The contribution of our paper is purely empirical, and we do not have a formal theoretical model that links the volatility risk premium or its determinants to spot returns. However, we do provide empirical evidence on possible interpretations of our results. First, we consider the possibility that returns from the *VRP* strategy reflect compensation for risk, and we test the pricing power of conventional risk factors for its returns using standard linear asset pricing models. We find no evidence that *VRP* returns can be explained by various sets of factors that have been used to explain time series and cross-sectional variation in the returns to trading strategies more generally and currency strategies more specifically.

We then extend our search for risk compensation to check whether *VRP* returns capture fluctuations in aversion to global volatility risk. We check the relation between *VRP* returns and global volatility risk in two ways: first, by using cross-sectional asset pricing tests of volatility risk premium portfolios on a global FX volatility risk factor and, second, by estimating time-varying loadings of currency returns on various proxies for global volatility risk and building portfolios sorted on these estimated loadings. Neither of these tests produces evidence consistent with the proposed explanation. The long-short strategy generated from estimated loadings on the global volatility risk factor produces substantially lower average returns than *VRP*. Moreover, these returns are virtually uncorrelated with *VRP* returns. In sum, the data appear to reject an explanation based on fluctuations in aversion to global volatility risk

[1] See, for example, Lustig and Verdelhan (2007), Ang and Chen (2010), Burnside, Eichenbaum, Kleshchelski, and Rebelo (2011), Lustig, Roussanov, and Verdelhan (2011), Menkhoff, Sarno, Schmeling, and Schrimpf (2012a, 2012b) and Barroso and Santa-Clara (2015), who all build currency portfolios to study return predictability, currency risk exposure, or both.

[2] To be clear from the outset, our strategy does not trade volatility products. We simply use the currency volatility risk premium as conditioning information to sort currencies, build currency portfolios, and uncover predictability in currency excess returns and changes in spot exchange rates.

[3] We use interchangeably the terms “spot currency returns” and “exchange rate returns” to define the change in nominal exchange rates over time. Similarly, we use interchangeably the terms “excess returns” and “portfolio returns” to refer to the returns from implementing a long-short currency trading strategy that buys and sells currencies on the basis of some characteristic.

[4] See, for example, Carr and Wu (2009), Eraker (2012), Bollerslev, Tauchen, and Zhou (2009), Todorov (2010), Drechsler and Yaron (2011), Han and Zhou (2011), Mueller, Vedolin, and Yen (2012), Londono and Zhou (2012), and Buraschi, Trojani, and Vedolin (2014).