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Common information in carry trade risk factors

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ABSTRACT

Carry returns have been widely observed in the FX market. This study exploits the common information embedded in several factors previously identified as relevant to carry trade returns. We find that the extracted common factor successfully models the time series and cross-sectional characteristics of carry returns. Empirical evidence is presented that the common factor produces smaller pricing errors than other well known factors, such as innovations of exchange rate volatility and the downside stock market excess return. Our results also suggest that stock market risk is somewhat segmented from FX market risk.

1. Introduction

The carry trade is an investment strategy that involves borrowing in a low interest rate currency and investing in a high interest rate currency. Applying this strategy to many currencies allows for the building of currency portfolios and the diversification of some market risk, as proposed by Lustig and Verdelhan (2007). They focus on cross-sectional interest rate differentials and show that a high interest rate currency portfolio yields a higher average return than a low interest rate currency portfolio. In seeking to extend Lustig and Verdelhan (2007), several risk factors have been proposed in the carry trade literature. These can be generically categorized into currency and non-currency factors. Currency factors exploit readily available foreign exchange market information. For example, Lustig et al. (2011) propose the return difference between high and low interest rate currency portfolios, and Menkhoff et al. (2012a) suggest innovations of global foreign exchange volatility as currency factors. Non-currency factors exploit macro or finance information. For instance, Lustig and Verdelhan (2007) use U.S. durable and nondurable consumption growth, based on the Consumption CAPM. Atanasov and Nitschka (2014), Dobrynskaya (2014), Lettau et al. (2014) investigate downside stock market risk for the FX market. Although most studies explore either currency or non-currency risk factors, these factors may be related to each other, since many institutional investors invest across assets. We propose to test the incremental benefit of combining the information embedded in both currency and non-currency factors previously identified in the literature.

It can be argued that common risk information is important from both a theoretical and an empirical perspective. Lustig et al. (2011) propose a no-arbitrage model which has common and country-specific factors. Heterogeneity across currencies in the exposure to the common factor is substantial, and is relevant for positive carry trade returns. In their model, the

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country specific factors are averaged out in each portfolio, therefore the common factor plays an important role. From an empirical perspective, common risk factors have been identified when modelling excess returns in the bond market (see Ludvigson and Ng, 2009). The common information across exchange rates are explored by Engel et al. (2015). They find that the common factor extracted from exchange rates themselves includes information that is not extracted from macroeconomic fundamentals. Giglio et al. (2016) construct an index to capture the common component in some systemic risk measures. They present empirical evidence that the common index can predict macroeconomic shocks more accurately than a large cross-section of risk measures can do individually. The high minus low interest rate currency portfolios factor (HML_{FX}) proposed by Lustig et al. (2011) prices cross-sectional carry returns. However, this factor uses information from only two portfolios of currencies. If a common factor is important for carry trades, this factor may be enhanced by adding information embedded in the other factors.

Our approach contributes in the following ways. First, we are able to identify common information in currency and non-currency risk factors for carry trades. This allows us to test whether adding non-currency information to currency information help us to better price carry portfolios. This is important since Lettau et al. (2014) find that stock market risk is common between currency carry trades and other assets. Our approach allows us to consider financial and macro risk more generally, since we examine the overlap between currency and non-currency risk, and the latter includes stock market risk. Second, our approach reduces dimensionality in a large cross-section of risk factors. Although the FX portfolio approach averages out the impact of outliers, the number of currency portfolios used in the literature reduces the degrees of freedom, and hence the ability to consider several factors simultaneously. Our approach avoids this difficulty by using a single common factor. Finally, our empirical approach is free from potential multicollinearity problems. One risk factor may be correlated with others, and hence multicollinearity may affect the estimation results. Our approach allows us to extract the common factor even when the number of risk factors increases.

The empirical results show that the extracted common factor can price currency portfolios in both time series and cross-sectional contexts. In the cross-section, relevant tests fail to reject the null hypothesis that there is no pricing error. In addition, the model exhibits a high R^2 and low root mean squared error. We also consider the incremental usefulness of the common factor using an orthogonalization that identifies the factor's marginal information. Evidence is presented that the common factor has additional explanatory power compared with global FX volatility innovations and downside world stock market risk. This common factor is strongly related to the high interest rate currency portfolio. These results are also robust to transaction costs.

The rest of this paper is organized as follows: Section 2 reviews the related carry trade literature, Section 3 describes our methodology and the dataset, Section 4 presents a discussion of our empirical results, Section 5 sets out robustness tests of key results, and Section 6 concludes.

2. Brief literature review

Positive returns of currency carry trades are dependent upon systematic deviations from Uncovered Interest rate Parity (UIP) condition. UIP suggests a high interest rate country's currency depreciates against a low interest rate country's currency. This parity condition has been called into question by empirical evidence (see Fama, 1984; Lewis, 1995; Engel, 1996). Most studies focus on bilateral currency relations, while Lustig and Verdelhan (2007) use a portfolio approach to sort currencies based on cross-sectional interest rate differences. The portfolio approach exploits diversification benefits and generates a higher Sharpe ratio than those of individual currencies or the U.S. stock market (see Burnside et al., 2011). Das et al. (2013) indicate that carry trades have different characteristics from international stocks, U.S. bonds, real estates, and commodities. The carry trade portfolio is used by Das et al. (2013) as the new asset class to enhance the entire portfolio performance.

High profitability of currency carry trades depends upon market states, such as market volatility, and liquidity. The most widely used state variable is FX market volatility. For instance, Christiansen et al. (2011) adopt a smooth transition regression model with factor betas are governed by FX volatility. They show that carry trades have high exposure to the stock market when FX volatility is high. Copeland and Lu (2016) find that most profits of carry trades are attributed to low FX volatility periods. They propose an enhanced trading strategy which adopts carry during low FX volatility periods and real exchange rate deviation during high FX volatility periods. Using the component GARCH model, Ahmed and Valente (2015) decompose Menkhoff et al.'s (2012a) global FX volatility into short-run and long-run components and show that the long-run component has a risk premium. They find this long-run component related to U.S. macro fundamentals. dos Santos et al. (2016) also focus on short-run and long-run components and investigate their risk premium for each emerging currency. They model the residuals of the UIP regression by the component GARCH-M model. They present evidence that the short-run component is related to speculative pressures, whereas the long-run component is associated with macro fundamentals. Market liquidity is also important for carry trades. It is argued by Brunnermeier et al. (2009) that carry trades have crash risk when speculators are subjected to funding constraints. They use the TED spread to measure funding constraints, and show that it predicts future returns of carry trades. Orlov (2016) compares liquidity in the stock market with that in the exchange rate market and shows that the latter is the dominant factor in determining carry returns. Although these studies highlight the pricing relevance to the cross-section of currency portfolios of specific types of information, the common component across these types has not been properly examined.