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The tail risk premia of the carry trades

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A B S T R A C T

We study the relationship between the excess returns of portfolios invested in carry trade positions and an innovative global tail risk factor. We find that high interest rate currencies are related to innovations in global currency tail risk. They deliver low returns in times of unexpected high tail risk and high returns in times of unexpected low tail risk suggesting a standard Asset Pricing Theory approach to explain the returns to the carry trade. Our tail risk factor can be understood as the interaction of moment-based factors such as volatility, skewness and kurtosis. Our results tend to indicate that the interaction of moments, i.e. tail risk, rather than the moments alone drives investor behavior. This makes sense since the ultimate risk for carry traders is to reach their funding limits which are set, because of the regulations, on the back of tail risk statistics (Value at Risk) and not simply on the back of the volatility, the skewness or the kurtosis alone. The result holds in other cross-sections of currencies and whether the global tail risk indicators are estimated in the currency, the equity or the bond market.

1. Introduction

On average, selling forward currencies that are at a forward premium and buying forward currencies that are at a forward discount is profitable. This is the carry trade strategy. In theory, if investors

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are risk neutral and form expectations rationally, this strategy should fail because, according to the uncovered interest rate parity (UIP), arbitrage should eliminate the gains arising from the differential of interest rates across currencies. But in reality, the theory fails and the strategy generates large profits for practitioners and a puzzle for academics (Fig. C1 and Table B1).

This deviation from the UIP might be rationalized in an asset pricing setting (APT): investors might demand time-varying risk premia associated to a small number of common risk factors. These factors are state variables that convey information about market circumstances and the investment opportunity set. Especially, if investing in currencies that are at a forward discount delivers lower returns during bad times, investors then expect larger average profits to compensate for this risk.

In this paper, we argue that a factor mimicking the tail risks in the currency market might be an interesting candidate to price the return to the carry trade. The intuition for this factor is simple: traders expect larger mean returns in high yielding currencies as a reward against expected losses due to tail events, especially because, in bad times, due to the current regulatory framework, they might face the risk to unwind their leveraged positions and realize losses. Indeed, it is well known that to mitigate insolvency risk, regulators really focus on tail risks. Notably, they impose on financial institutions capital requirement defined on the back of tail risk measures such as the 1-day or 10-day 99% Value at Risk (VaR).[1] Because of the regulations, banks and asset managers in turn rely on VaR-, hence quantile-based thresholds to constrain the funding for trading or investment activities.[2] For instance, when international financial adjustment takes place as described in Della Corte et al. (2013), implying large negative returns on certain currencies, traders may be forced to suddenly unwind their positions and realize losses because quantile-based thresholds are exceeded (e.g. Brunnermeier et al., 2009). Investors in the carry trade strategy may especially be constrained to sell back their positions in currencies that are at a forward discount. In that case, the time-varying expected tail risk acts as a state variable for traders. It defines, somewhat statutorily, the future opportunity set of investment. As a consequence, it seems particularly interesting to look for a premium compensating the risk to reach these quantile-based funding limits. This is precisely what we do in this paper by considering an innovative global tail risk factor.

Our benchmark tail risk factor, called TR, is derived from the estimation of the historical lower quantile of the distribution of the returns of the currencies.[3] First, for every month, using daily observations, we calculate the return associated to the q_{th} lower tail quantile for each currency. Then, we average these observations across the sample to obtain a vector of monthly estimations of global tail risk.[4] In our sample of 22 liquid currencies covering the period December 1984 to May 2012, we find results that are in line with the asset pricing theory: those currencies that have larger loadings on this global tail risk factor offer a larger mean return in compensation. The results are robust in different samples and different quantile cut-offs.

Together, we show that TR can be understood as the interaction of several global risk factors which have been already tested in isolation such as volatility and crash risk (i.e. skewness and kurtosis) but, sometimes, with contradictory results. Indeed, relying on a Taylor series expansion, we show that TR fits with the conditional sample in which it is estimated: when the conditional distribution of returns

[1] For the financing side, see the standards and guidelines of the Basel Committee on Banking Supervision and the Risk-Based Capital Guidelines: Market Risk, jointly issued by the Office of the Comptroller of the Currency (OCC), the Board of Governors of the Federal Reserve System, and the Federal Deposit Insurance Corporation (FDIC). On the investment side, both regulated and unregulated funds are, at least indirectly, concerned by VaR-based constraints, as they may finance their trade through borrowing from financiers who themselves control their VaR. See the guidelines on risk measurement and the calculation of global exposures and counterparty risk for UCITS of the European Securities and Markets Authority and the Securities and Exchange Commission item 305 (see the Securities and Exchange Commission Item 305).

[2] The relationship between the regulations and the trading or investment activities is indirect: the regulators impose capital requirement on banks which, in turn, set the amount of capital available to fund trading and investment activities.

[3] Perignon and Smith (2010) report that 73% of banks disclosing their VaR model to the Basel Committee on Banking Supervision use non parametric historical simulations.

[4] This is in line with Lustig et al. (2011), Menkhoff et al. (2012) and Burnside (2012) who estimate global monthly indicators of volatility and skewness by simply averaging the monthly volatility and skewness of the returns of the currencies in the sample.