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The asymmetry in carry trade and the U.S. dollar[☆]

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ABSTRACT

This study aims to investigate the potential asymmetric dependence between the carry trade and U.S. dollar returns. Empirical results demonstrate that the U.S. dollar becomes a safe haven and provides protection for carry trade investors to avoid the crash risk during the 2007–2008 global financial crisis and the 2010–2011 Eurozone sovereign debt crisis. The asymmetric dependence is not only statistically significant, but this information also helps investors to generate extra 14–2166 annualized basis points from the perspective of an asset-allocation decision. Our findings provide important financial implications for currency investors in asset allocation and risk management.

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1. Introduction

The carry trade, which is designed to exploit the failure of uncovered interest parity (UIP), is a currency trading strategy that borrows in low interest rate (i.e., funding) currencies and invests in high interest rate (i.e., investment) currencies. According to UIP, if one assumes rational risk-neutral investors, the interest rate differentials should be offset by a commensurate depreciation of the investment currency and the expected return of carry trade should be equal to zero. However, in reality, the UIP is commonly violated, and investment currencies tend to appreciate rather than depreciate.¹ The carry trade has also been shown

to deliver sizeable excess returns and a Sharpe ratio more than twice that of the U.S. stock market over the last 35 years (Burnside, Eichenbaum, Kleshchelski, & Rebelo, 2011). Therefore, the carry trade has become a popular investment strategy among global institutional and individual investors as a result of its substantial profitability.²

Although carry trade strategy generally provides positive returns on average, there has been dramatic variation in the returns of this strategy during several well-known financial crisis periods.³ In particular, during the global financial crisis of 2007–2008, a high risk-averse attitude amplified the unwinding of carry trade activities and resulted in huge losses for carry trades. Hence, how to

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¹ Many empirical papers document the violation of the UIP that originated with the seminal papers of Bilson (1981), Fama (1984), Hansen and Hodrick (1980), and Hodrick and Srivastava (1986). Recently, several studies attempt to explain the returns of the currency carry trade (Brunnermeier and Pedersen, 2009; Burnside, 2012; Burnside et al., 2011; Christiansen et al., 2011; Doukas and Zhang, 2013;

Farhi and Gabaix, 2013; Farhi, Fraiberger, Gabaix, Ranciere, & Verdelhan, 2015; Jurek, 2014; Lothian and Wu, 2011; Lustig, Roussanov, & Verdelhan, 2011; Mancini, Ranaldo, & Wrampelmeyer, 2013; Menkhoff et al., 2012).

² In the past few years, some tradable exchange traded funds (ETFs) have been created, which facilitate the participation of individual investors in the currency carry trade. A relatively popular ETF is the PowerShares DB G10 Currency Harvest Fund (DBV) which began trading in September 2006 on NYSE Arca to track the Deutsche Bank G10 Currency Future Harvest Index.

³ In previous crisis events, only a few recessions affect the carry trade returns, such as the 1997–1998 Russian bond default, the collapse of Long-Term Capital Management, and the Asian crisis (Cai, Cheung, Lee, & Melvin, 2001).

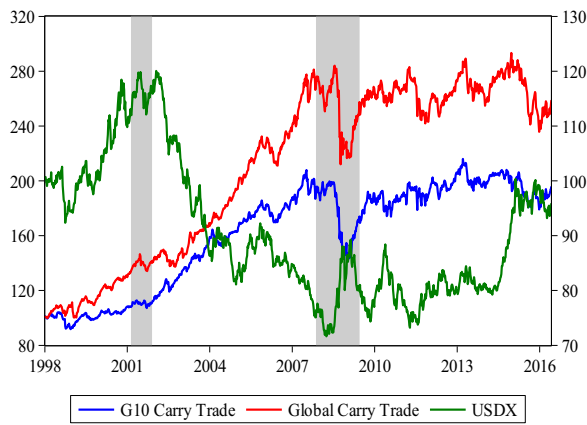


Fig. 1. Cumulative carry trade returns and USDX futures prices during the period from January 1998 to June 2016. Notes: The left axis scale represents the cumulative returns of carry trades, and the right axis scale represents the price of USDX futures. Gray shaded areas are the NBER recession periods.

diversify the downside risk of carry trades is a crucial issue for currency investors.

Moreover, since the U.S. dollar is the primary international medium of exchange, oscillations in the value of the dollar and changes in the U.S. monetary policy can directly affect other international countries. There is also extensive empirical evidence that the U.S. dollar can be regarded as a safe haven due to its property of retaining or appreciating in value in times of market turmoil.⁴ Cumby (1988) and Froot and Thaler (1990) find that the strong appreciation of the U.S. dollar in the early 1980s partially resulted from safe-haven purchases of international investors. Doroodian and Caporale (2000) show that the U.S. dollar is positively associated with uncertainty on the foreign exchange markets during the period 1973–1996. Likewise, Kaul and Sapp (2006) find a significant appreciation of the U.S. dollar due to safe-haven purchases around the Y2K conversion.

More recently, Beck and Rahbari (2011) implement the analysis for central banks and reveal that the U.S. dollar plays the role of safe-haven currency and thus tends to appreciate during global or country specific sudden stops in which investors redirect capital to mature markets. Nevertheless, Habib and Stracca (2012) find that the U.S. dollar does not always act as a safe-haven currency before August 2007, but its safe-haven role is strengthened during the 2007–2008 global financial crisis.

As shown in Fig. 1, the relationship between the carry trade cumulative returns and the U.S. dollar index (USDX)⁵ futures prices appears to be more persistently and negatively related during the 2007–2008 global financial crisis and the 2010–2011 European sovereign debt crisis, but displays an unclear and puzzling relationship before 2008. This very special situation can be understood as a fact that when global risk aversion becomes high, international financial investors tend to redirect capital to relatively stable currencies, and the U.S. dollar then appreciates concurrently. Therefore, a better understanding of the asymmetry and dynamics of the simultaneous dependence between the carry trade and U.S. dollar returns would be beneficial for currency investors due to its critical role in asset-allocation strategies and risk management.

⁴ See, for example, Beck and Rahbari (2011), Cumby (1988), Doroodian and Caporale (2000), Froot and Thaler (1990), Habib and Stracca (2012), and Kaul and Sapp (2006).

⁵ The USDX can be seen as the international value of the U.S. dollar. With the introduction of the Euro, the USDX is calculated by six major foreign exchange rates against the US dollar: GBP (11.9%), CAD (9.1%), EUR (57.6%), JPY (13.6%), SEK (4.2%) and CHF (3.6%).

Furthermore, several studies have shown that the profitability of the carry trade strategy in developed and emerging markets is quite dramatic even though the carry trade portfolio selections are operationally equivalent. For instance, Burnside, Eichenbaum, and Rebelo (2007) demonstrate that including emerging market currencies in portfolio selection can substantially raise the Sharpe ratio associated with the carry trade. As stated by Menkhoff, Sarno, Schmelming, and Schrimpf (2012), the portfolios consisting exclusively of developed country currencies are more profitable in the 1980s and 1990s, but carry trade returns for emerging markets outperform those for developed markets after 2003.

Motivated by the above analyses, this study considers both the G10 and global carry trades, and aims to comprehensively investigate the dependence structure between the carry trade and U.S. dollar returns. We construct an asymmetric multivariate GARCH model with the dynamic skewed-*t* copula to capture the potential asymmetry of volatility and dependence structure. Estimation results of the marginal distributions reveal a positively asymmetric volatility in the carry trade, same as Tse and Zhao (2012), but a strong negative asymmetric volatility in USDX, implying that investors prefer to redirect capital to the U.S. dollar positions as a safe-haven instrument when the global currency markets become volatile, causing the U.S. dollar to appreciate. The asymmetry in marginal distribution for the carry trade indicates the presence of crash risk owing to the unexpected unwinding of carry trades.

In addition, the skewed-*t* copula provides better explanatory ability than the Gaussian and Student-*t* copulas. More importantly, the carry trade and the U.S. dollar become more negatively correlated to each other, especially in the 2007–2008 global financial crisis and the 2010–2011 Eurozone sovereign debt crisis, indicating that the U.S. dollar is a safe-haven currency for carry trades. Moreover, the financial turmoil increases the correlation between the G10 and global carry trades partly due to the globalization of the world economy, financial market integration, and the synchronization of economic activity. Therefore, financial events in recent decades have similar impacts on the global financial markets.

Finally, to examine whether our statistical findings are important for investors, we investigate the implications of asymmetric dependence in the out-of-sample optimum asset-allocation strategy. We also estimate the maximum break-even transaction cost in order to consider the transaction cost in the dynamic trading strategy. The out-of-sample results reveal that the skewed-*t* copula strategies outperform the Gaussian and Student-*t* copula strategies across various levels of risk aversion. Investors can obtain extra 14–2166 basis points in annualized returns by incorporating the asymmetric information into the dynamic asset-allocation strategy. After considering the transaction cost problem, risk-averse investors still prefer to choose dynamic trading strategies.

Several major contributions emerge from this paper. First, we extend the analysis of McCauley and McGuire (2009) by assessing the role of the U.S. dollar as a safe haven with respect to carry trade in the periods of global financial crisis and Eurozone sovereign debt crisis, and demonstrate that the unwinding of carry trade has positive volatility information that raises the volatility of U.S. dollar returns. Second, our empirical results provide further evidence of the asymmetric dependence between the carry trade and U.S. dollar returns, and evaluate the economic significance of asymmetric information. Better knowledge of the asymmetry and dynamics of dependence between the carry trade and U.S. dollar returns can facilitate currency investors to diversify the crash risk or downside risk of carry trade. The economic evaluation results of asymmetry can serve as a guideline for currency investors in asset allocation and portfolio risk management. Moreover, our study contributes to a better understanding that the co-movement between the G10 and global carry trade returns in tumultuous markets reflects the globalization and integration of the world economy.

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