Journal of Banking & Finance 59 (2015) 14–26

Contents lists available at ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

Can implied volatility predict returns on the currency carry trade? ☆

Tom Egbers, Laurens Swinkels *

Erasmus School of Economics, The Netherlands

ARTICLE INFO

Article history:
Received 8 July 2013
Accepted 10 April 2015
Available online 17 June 2015

JEL classification:
F21
F31
G11
G15

Keywords:
Currency carry trade
Exchange rates
Implied volatility
Market timing
VIX
VXY

ABSTRACT

Currency carry strategies have long positions in currencies with a high interest rate and short positions in currencies with a low interest rate. Currency carry strategies have generated about 5.4% return per annum (Sharpe ratio: 0.57) over the period December 1996 to May 2014. However, during the recent financial crisis, the carry strategy suffered losses of up to 20% on invested capital. We investigate whether investors could have used the implied option volatility index on the US equity market (the VIX) or the option implied volatility index from G7 currencies (the VXY) to time the currency carry trade. We examine a large set of timing strategies and find that for some specific settings excess returns can be as large as 2.5% per annum. However, when we take into account that we investigated many trading strategies, these excess returns turn out not to be statistically significant. Hence, our findings cast doubt on implied volatility as a stand-alone timing indicator for currency carry trading in real-life portfolio decisions.

1. Introduction

The term currency carry trade is used for currency investment strategies that involve long positions in currencies with a high interest rate and short positions in currencies with a low interest rate. Many empirical studies find that these investment strategies yield Sharpe ratios that are at least as high as those on the equity market. This is to a certain extent surprising, as according to the uncovered interest rate parity hypothesis the expected return of such a strategy equals zero. When investors are risk-neutral and rational, currencies with low interest rates are expected to appreciate against currencies with high interest rates to such extent that interest rate differentials are exactly compensated. Investors in the carry trade typically expect that the currency appreciation of the currency with the low interest rate is less than predicted by uncovered interest rate parity and this has been the case, at least historically. Whether this excess return can be fully explained as a compensation for risk is still a topic of debate in the academic literature.[1] As currency carry investors suffered large losses during the recent financial crisis, the question has come up whether investors can reliably predict periods with negative returns on currency carry trades.

The contribution of our paper is to examine the use of implied equity volatility and implied currency volatility as a timing signal for the currency carry trade when applied in real-life investment portfolios. Brière and Drut (2009), and Ilmanen (2011, Chapter 13) have suggested that higher implied volatility predicts negative

☆ We would like to thank Arash Aloosh, Marie Brière, Wilma de Groot, Winfried Hallerbach, Dennis Karstanje, Tapio Pekkala, Andreas Schrimpf, Fredrik Willumsen, Remco Zwinkels, and participants from the Quant Finance Summer Research Workshop at Singapore Management University (July 2013), Norges Bank Investment Management seminar (September 2013), and Robeco Quantitative Strategies seminar (November 2013) for valuable comments. Swinkels would like to disclose that he is also affiliated with Norges Bank. The views expressed in the paper are solely those of the authors and not necessarily the organization they are affiliated with.

* Corresponding author.
E-mail address: lswinkels@ese.eur.nl (L. Swinkels).

[1] Recent attempts to explain the returns of the currency carry trade are Aloosh (2013), Brunnermeier et al. (2008), Burnside (2012), Burnside et al. (2011), Christiansen et al. (2011), Della Corte et al. (2013), Dobrynskaya (2014), Doukas and Zhang (2013), Hutchison and Sushko (2013), Jordà and Taylor (2012), Jurek (2014), Lustig et al. (2011), Menkhoff et al. (2012), and Rafferty (2012).

http://dx.doi.org/10.1016/j.jbankfin.2015.04.026
0378-4266/

returns on the currency carry trade.[2] Brière and Drut (2009) use the VIX as an indicator to switch between a carry strategy and a purchasing power parity based currency strategy. Their crash indicator is based on an ex-post determined standard deviation increase of the VIX, which is not known to investors in real-time. Ilmanen (2011, Chapter 13) suggests that when currency implied volatility has increased sharply over the past month, next week's carry trade returns tend to be negative, while using sharp changes in equity market volatility leads to zero future carry returns. In our paper, we focus on the predictive value of aggregate equity market volatility and currency market volatility that has been suggested to predict carry trade returns. The existence or absence of such predictability is important, as it may shed light on the existence of liquidity spirals in foreign exchange markets, such as described in Brunnermeier et al. (2008).

Our findings can be summarized as follows. First, the (change in) implied volatility of equity and currency markets is a *strong negative contemporaneous* indicator of returns on currency carry investing. This is consistent with the view as expressed by for example Menkhoff et al. (2012), that during periods of increasing risk aversion, carry trades tend to perform poorly. This contemporaneous information gives insight in the portfolio sensitivity to volatility regimes, but cannot be used to enter or exit trading strategies as it requires future information. Second, the (change in) implied volatility on equity or currency markets is a *weak predictive* indicator of returns on currency carry investing. Implied volatility and changes therein can be used as timing indicators to exit and enter the currency carry trade. Our empirical results indicate that the returns from timing can be as large as 2.5% per annum for a few of several alternative trading strategies examined. This may seem economically and statistically significant when viewed in isolation. However, it turns out these results are illusionary. When we adjust for testing many trading strategies simultaneously using reality check *p*-values developed by White (2000), we do not obtain statistical significance anymore. Hence, our findings cast doubt on implied volatility as a stand-alone timing indicator for currency carry trading in real-life portfolio decisions. A battery of robustness analyses confirms these insights. Our findings are at odds with risk-based models that predict sustained negative carry return spirals, at least as far as using implied volatility at the daily frequency is concerned.

The setup of our paper is as follows. In Section 2 we describe in more detail the data that we use for our analysis. In Section 3 we show the results on currency carry timing using daily data on the implied volatility of equity and currency markets. Section 4 contains five sets of robustness analyses to make sure that our results are not depending on the settings chosen in Section 3. Finally, Section 5 concludes.

2. Data description

The currency carry trade can be implemented in different ways. We employ one of the most straightforward methods by sorting the forward discount of G10 currencies: Australian dollar (AUD), Canadian dollar (CAD), Swiss Franc (CHF), euro (EUR/DEM), Great-Britain pound (GBP), Japanese yen (JPY), Norwegian krone (NOK), New Zealand dollar (NZD), Swedish krona (SEK), and the United States dollar (USD). The currency carry strategy takes an equally-weighted long position in the three currencies with the highest forward discount and an equally-weighted short position in the three currencies with the lowest forward discount (and takes no position in the other four currencies).[3] The forward discount is evaluated daily, but since forward discounts are persistent, requires only little trading. We include transaction costs in the same way as Menkhoff et al. (2012) by incurring half the bid-ask spread for the forward contract when traded, as well as half the bid-ask spread on the spot exchange rate of the currency. Since Darvas (2009) and Gilmore and Hayashi (2011) report that rollover costs are typically small for G10 currencies, we follow Menkhoff et al. (2012) by abstracting from rollover transaction costs. Abstracting from rollover costs should not affect the conclusions from our analysis, as our main focus is to examining the possibility to time the currency carry trade, which leads to additional opening and closing signals, and no additional rollover transactions. However, it could reduce the average return for the static currency carry trade with a few basis points.

Our currency forward and spot data is obtained from Thomson Reuters Datastream, with original data source World Markets Reuters, which is the standard data source in this line of literature. We have daily data on bid, mid, and ask prices of one-month currency forward and spot exchange rates vs the USD. Our sample is at the daily frequency and the sample period runs from 31 December 1996 (the start of availability of the World Markets Reuters series) to 31 May 2014. This leaves us with 4545 daily observations. During this sample period, the JPY is most often in the short portfolio, and the AUD is usually in the long portfolio. The forward discounts for other currencies are fairly stable, but several of them are fluctuating enough to be in the long and short portfolio at different points in time. After the Lehman-crisis, G10 interest rates substantially decreased, but there is still a clear spread between the high and low interest rate currencies, albeit somewhat smaller than in the pre-crisis period.

The data on implied volatility comes from two sources. First, we consider the implied equity volatility index, which is a basket of near-maturity index options on the Standard and Poor's 500 US equity index. We download this index from Bloomberg (VIX Index) on a daily frequency starting 2 January 1990.[4] The VIX is high when the implied volatility derived from prices of equity options is high, which is typically in times of financial distress. However, it could be that risks in equity markets are not perfectly related to risks in currency markets. That is why we use as a second risk indicator, which is the implied volatility derived from the currency options market. This is the JP Morgan G7 Volatility Index, and we also download this series from Bloomberg (VXY Index) on a daily frequency starting 1 June 1992. There are several other papers linking implied volatility to currency returns. For example, Brunnermeier et al. (2008), Brière and Drut (2009), Ilmanen (2011, Chapter 13), and Bakshi and Panayotov (2013) are other researchers using the VIX in relation to the currency carry trade. Ilmanen (2011, Chapter 13) and Mancini et al. (2013), and Koch (2014) use the VXY as a proxy for foreign exchange risk.

[2] Dunis and Miao (2007), Bakshi and Panayotov (2013), and Cenedese et al. (2014) instead use historical currency volatility to predict returns on the carry trade. In addition, the literature has also investigated the distribution of carry trade returns in different regimes. Clarida et al. (2009) show that the slope coefficient of the UIP regression is different in low and high volatility regimes. Ichiue and Koyama (2011) estimate a regime-switching model and find that low interest currencies appreciate less often than high interest currencies, but when they do, the magnitude is larger and the speed is faster.

[3] Academic studies using similar strategies are Brunnermeier et al. (2008), Lustig et al. (2011), and Menkhoff et al. (2012), among others. In practice, actual investors might leverage up the carry trade positions at the expense of increased downside risk, as discussed in Darvas (2009). Huang (2002) and Hochradl and Wagner (2010) improve on these simple equally weighted portfolios by including information on currency covariances, and Wagner (2012) defines trader inactive ranges. We do not explore volatilities of individual currency pairs to improve trading signals beyond the interest rate differential, as in Bhansali (2007) and Della Corte et al. (2013). The carry investment strategy we employ is also popular among practitioners. The Deutsche Bank G10 Currency Future Harvest Index follows a similar methodology as we use; see https://index.db.com/staticPages/DBCFH.html. This index serves also as a reference index for investment funds.

[4] The VIX Index changed in 2003 using the S&P 500 instead of the S&P 100 as the reference index, as well as some technical modifications. In Bloomberg the new series based on the S&P 500 index is available for our entire sample.