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Exploiting Uncovered Interest Rate Parity Failure Using Russian Ruble

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Abstract: The uncovered interest rate parity (UIP) is a parity condition stating that the interest rate differential between two currencies should equal to the expected change in exchange rate between them. But, it has been well documented though that such condition does not stand resulting in an opportunity to benefit from its failure. Traders take advantage of UIP failure by conducting a well-known strategy called carry trade where they borrow low interest rate currencies and invest in high interest rate currencies taking advantage of the interest rate differential and hoping that the movement in exchange rate would not offset it. With interest rate differential being the main components in conducting such strategy for carry traders, Russian ruble offers a very attractive opportunity for such investors. This paper examines the profitability of exploring the failure of UIP using carry trade by borrowing low interest rate currencies which are the U.S. dollar and the Japanese yen and investing in Russian ruble.

Keywords: Carry trade; Uncovered interest rate parity (UIP); Sharpe ratio; Sortino Ratio; Russian Ruble (RUB).

1. Introduction

Uncover interest rate parity (UIP) can be defined as a condition in which the difference in interest rates between two countries is equal to the expected change in the exchange rate between the countries' currencies. As a result if UIP does not holds then a profit opportunity might arise. It has been well documented that UIP does not hold resulting in a profit opportunity for international investors. Flood and Rose (2002) stated that "a strong consensus has developed in the literature that UIP works poorly". McCallum (1994) examined the validity UIP using various economic models and did not found any sufficient evidence supporting UIP. Speculators capitalize on this failure by conducting what is called carry trade and that is by borrowing low interest rate currencies and investing in high interest currencies and hope that the appreciation of the funding currency does not offset the interest rate differential.

Carry trade has always been a very popular speculation strategy among all levels of investors. The main reasons for such popularity is its lucrative returns and the high Shape ratio that is double of that of the stock market (Brunnermeier and Pedersen, 2009). Gyntelberg and Remolona (2007) conducted a study using Australian dollar against Japanese yen for the period 2001 to 2007 and showed that carry trade produced an annualized mean daily return of 12.5% compared to 3.6% for the S&P 500. Burnside *et al.* (2011) using the currencies of 20 countries for the period 3:1976 to 1:2012 showed that carry trade produced an annualized return of 4.5% with standers deviation of 5.20 producing a Sharpe ratio of 0.86. On the other hand for the same period the U.S. stock market produced an annual return of 6.5% with standard deviation of 15.8 producing a Sharpe ratio of 0.41. Jurek (2014) found that using the currencies of the G10 countries for the period 1:1990 to 6:2012 in carry trade produced a Sharpe ratio ranging from 0.40 to 0.55 which was higher of that of stock markets.

Emerging markets currencies have attracted much attention among carry traders in recent years. The reason for such interest is that the use of emerging markets currencies in carry trade has shown to produce a higher returns than using developed market currencies. Burnside *et al.* (2007) studied carry trade using the U.S. dollar as a funding

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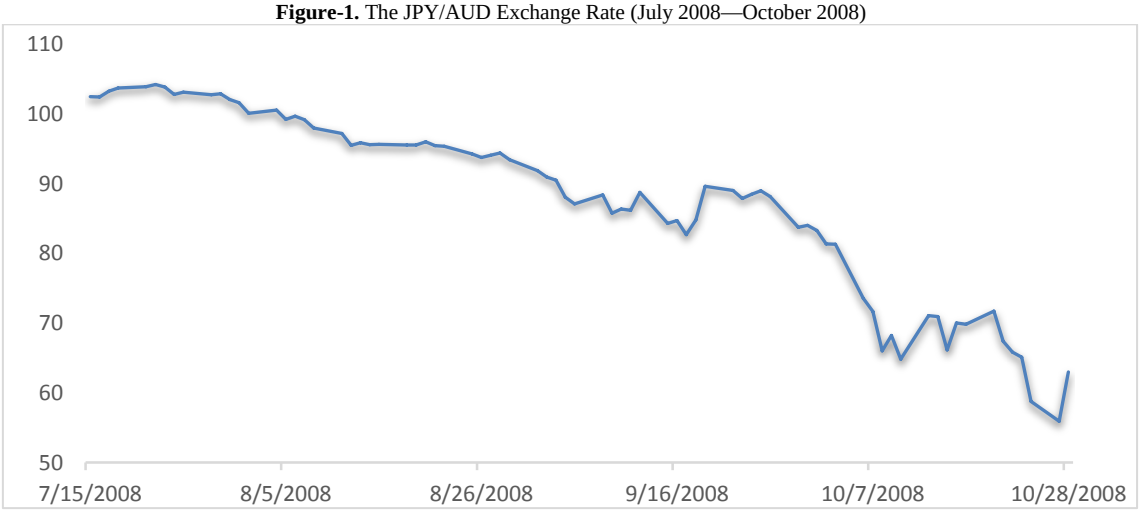
currency against the currencies of emerging countries for the period 10:1996 to 8:2006 and reported that carry trade is a profitable strategy producing an annualized Sharpe ratio of 1.32 compared to 0.23 for the U.S. stock market. AlAli and AlKulaib (2015) used the Qatari riyal, which is an emerging country that has its currency pegged to the U.S. dollar, against the currencies of 6 developed countries for the period 1:2001 to 12:2011. They found that the use of Qatari riyal in carry trade was profitable, producing a return ranging from 0.84% to 2.4% and a Sharpe ratio ranging from 0.44 to 1.57. Bhatti (2012) using the currencies of Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan and Moldova as investment currencies and the Swiss franc and Japanese yen as funding currencies for the period 1:1996 to 2:2010. He reported that using the these currencies which are considered emerging economies produced annualized return ranging from 12.7% to 32.50% compared to 5.79% and -3.4% for the Swiss market and the Nikkei 225 indices respectively. AlAli *et al.* (2017) used the Kuwaiti dinar against the currencies of 6 developed countries for the period 1:2001 to 12:2011. They found that using an emerging market currency which is pegged to a basket of currencies produced at positive returns ranging from 0.51% to 1.44% and a Sharpe ratio ranging from 0.204 to 0.70. AlAli and ElDukair (2017) used the Chinese yuan as an investment currency against both the Japanese yen and Swiss franc for the period 1:2000-12:2015. They found that carry trade produced an average mean return of 2.64% compared to 1.83% for the Nikkei 225 index and a Sharpe ratio of 1.44 compared to 0.59 for the stock market.

But despite carry trades attractive returns, it is a very risky strategy especially during high exchange rate volatility periods. Carry trade is a leveraged strategy, this feature could have damaging consequences during high exchange rate volatility periods. Due to the nature of carry trade any exchange rate swings would have a snowball effect on the market where it will trigger stop-loss orders for both carry traders and foreign exchange speculators. Such scenario happened many times in the past, for example, between 5-9 October 1998 the Japanese yen appreciated against the U.S. dollar from 134.54 to 117 that is almost 13%. Also between July and October 2008 the Japanese yen appreciated against the Australian dollar by almost 45% from 104.18 to 56.97 as seen in figure 1. AlAli (2016) examined carry trade using United Arab Emirates dirham (AED), which is a fixed exchange rate currency, against the currencies of six developed counties currencies during financial crises periods. He showed that simple carry trade produced negative returns during the East Asia financial crises in 1997, global stock market crash in 1998, and the global financial crisis 2008. These findings were inline with Jorda and Taylor (2009) and Darvas (2009) findings that carry trade works poorly during financial crises.

Figure-1. The JPY/AUD Exchange Rate (July 2008—October 2008)



2. Methodology

Carry trader's base their decisions on the interest rate differential as the sole selection criteria. This naïve strategy has proven to be rewarding in most cases despite its simplicity. This operation works as follows;

Let i_x and i_y be the interest rates for currencies *x* and *y*, respectively. In addition, let *S* be the spot rate between the two currencies measured as one unit of *y* against *x*, so appreciation of *y* against *x* would result in a higher *S*, and vice versa. Under conventional carry trade, carry traders would go long currency *y* and short currency *x* if $i_y > i_x$ and vice versa. In this case the return on carry trade is given by;

$$\pi = \frac{S_{t+1}}{S_t}(1 + i_y) - (1 + i_x), \quad (1)$$

which can be rewritten as

$$\pi = (i_y - i_x) + \dot{S}_{t+1} \quad (2)$$

Where $\dot{S}_{t+1}$ is the percentage change in the exchange rate between *t* and *t*+1. The carry trade operation is implicitly based on the assumption of random walk without drift (Moosa, 2004), which means that $\dot{S}_{t+1} = 0$. Thus, carry trade is profitable as long as $(i_y - i_x) > -\dot{S}_{t+1}$. (That is, as long as the interest rate differential is larger than the depreciation of currency *y* against currency *x*.)

Because of the changes in interest rates differential, it is necessary to switch the role of the currencies, so the general formula for calculating the rate of return on the carry trade will be as follow:

$$\pi = \begin{cases} (i_y - i_x) + \dot{S}_{t+1} \\ (i_x - i_y) - \dot{S}_{t+1} \end{cases} \; if \; \begin{matrix} i_y > i_x \\ i_y < i_x \end{matrix} \quad (3)$$

The Sharpe ratio is used to measure risk-adjusted returns. According to Eling and Schuhmacher (2007), the Sharpe ratio is an effective measure of evaluating investments. Following Burnside *et al.* (2011), the Sharpe ratio is calculated as

$$SR = \frac{\bar{\pi}}{SD} \quad (4)$$

Where $\bar{\pi}$ is the mean return and SD is the standard deviation. While the overall volatility is used to calculate the Sharpe ratio, the Sortino ratio is calculated by using only the harmful volatility which is called downside deviation. The Sortino ratio is calculated as

$$Sortino\ Ratio = \frac{\bar{\pi}}{DSSD} \quad (5)$$

Where $DSSD$ is the downside standard deviation for the returns and $\bar{\pi}$ is the mean return for carry trade. The maximum drawdown (MDD) measures the loss in any losing period during the investment period. It is defined as the percent retrenchment from the investment peak value to the investment trough or valley value. The drawdown is in effect from the time the investment strategy retrenchment begins until a new investment strategy high is reached. It is calculated as

$$MDD = \frac{Trough\ Value - Peak\ Value}{Peak\ Value} \quad (6)$$

3. Data and Empirical Results

The empirical results presented in this paper were based on raw data obtained from Reuters Data Stream terminal and yahoo finance. The research used monthly data for the period from 1:2000 to 12:2015.

By looking at table 1, it can be seen that using the ruble in carry trade produced a return that is double of that of stock markets. Carry trade, in its plain vanilla form, produced mean return of 6.44% for USD/RUB and 7.09% for RUB/JPY. On the other hand, the returns on stock markets were 3.56%, 1.83%, and 2.51% for the S&P 500, Nikkei 225, and the Swiss SE respectively. On an average, carry trade produced a mean return of 6.77% compared to 2.63% for the stock markets.

When looking at the risk side, it can be seen that the average volatility on carry trade returns for the two pairs it was 4.355 compared to 4.69 for the stock markets which is in line with Brunnermeier and Pedersen (2009) findings that the volatility on carry trade returns are less than that of the stock markets. But when looking at the downside standard deviation, it can be seen that carry trade have an average of 4.21 compared to 3.43 for the stock market which can be interpreted that carry trade is much more riskier than the stock market during bearish periods. The maximum drawdown (MDD) is one of the key indicators used to assess the risk of a given investment strategy. It measures the largest peak-to-trough decline in the value of the investment before a new peak is achieved. It can be seen from table 1 that, on an average, carry trade had a MDD of 3.38% compared to 4.99% for the stock markets.

As a result of a higher mean returns and lower volatility, carry trade produced a higher Sharpe ratio than the stock markets. The Sharpe ratio for USD/RUB was 1.54 and 1.56 for the RUB/JPY compared to 0.82, 0.32, and 0.63 for the S&P 500, Nikkei 225, and the Swiss SE respectively. This confirms Neely and Weller (2013) findings that carry trade produces a Sharpe ratio that is double of that of the stock markets.

The interest rate differential has always been seen as the main force behind carry trade. But would that also means higher exchange rate volatility? By running a regression between the interest rate differential and the exchange rate volatility, the results have shown that there is no statistically significant relation between them. Running Granger causality test between interest rate differential and exchange rate volatility also showed that interest rate differential does not cause exchange rate volatility.

Figure-2. Carry Trade Returns

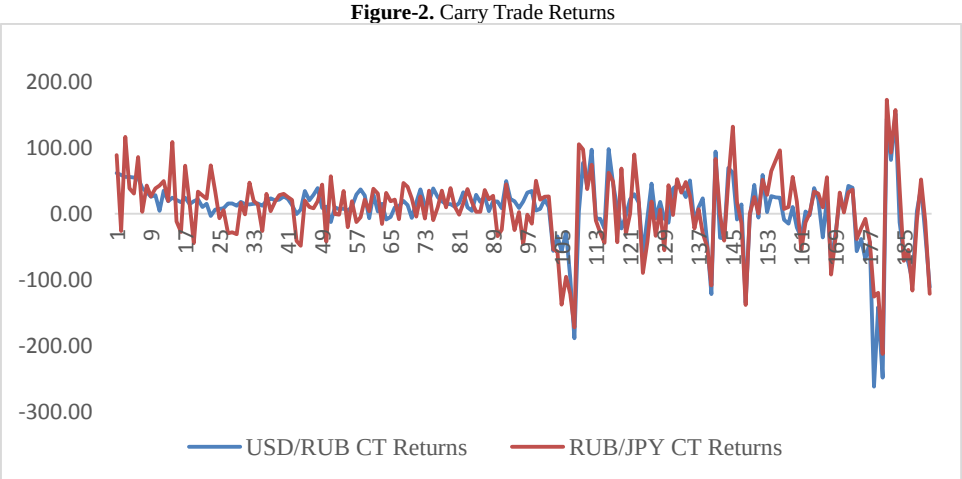
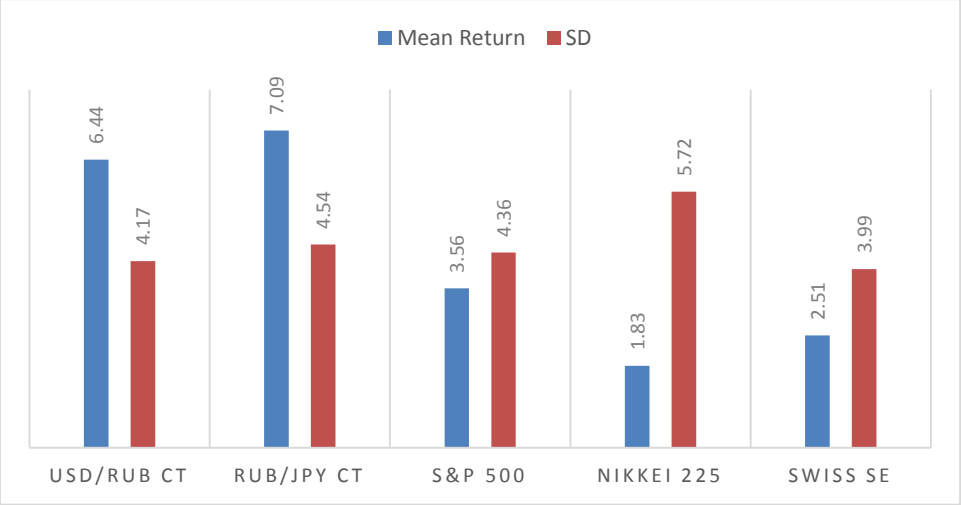


Table-1. Main Results

	USD/RUB	RUB/JPY	S&P 500	Nikkei 225	Swiss SE
Mean Interest Differential	11.02	13.29	-	-	-
Mean Return	6.44	7.09	3.56	1.83	2.51
Standard Deviation	4.17	4.54	4.36	5.72	3.99
Sharpe Ratio	1.54	1.56	0.82	0.32	0.63
Downside Standard Deviation	4.71	3.71	3.26	4.05	2.98
Sortino Ratio	1.37	1.91	1.09	0.45	0.84
Maximum Drawdown (MDD)	4.07	2.69	5.81	6.41	2.75
VaR 95%	6.12	8.50	7.95	9.40	7.15
VaR 99%	16.22	11.81	10.99	11.88	9.77

While the overall deviation is used to calculate the Sharpe ratio, Sortino ratio only takes the harmful deviation into consideration when calculating it. For the two carry trade pairs, the average downside standard deviation was 4.21 compared to 3.43 for the stock markets which means that returns on carry trade are more vulnerable to negative returns than the stock market. But despite that, carry trade produced a higher Sortino ratio than the stock indices and that is due to the higher returns for carry trade. Another widely risk-adjusted measure is the value-at-risk (VaR) at both 99% and 95% confidence levels. Value-at-risk estimates how much an investments might lose, given normal market conditions, in a set time period such as one day or one month at a certain confidence level. At the 95% confidence level, RUB/JPY showed that the maximum expected loss would be 8.50% compared to 6.12% for the USD/RUB. When comparing it to the stock markets, it can be seen that the average for carry trade was 7.31% compared to 8.17% for the stock markets. At the 99% confidence level the picture is somewhat different, on an average, the expected loss for carry trade was 14.02% compared to 10.88% for the stock markets.

Figure-3. Mean Return and Standard Deviation



4. Conclusion

The results presented in this paper showed that using the Russian ruble in carry trade, in its simplest form, produced a positive return which was inline with the literature. Using the Russian ruble in carry trade created a higher return than the stock market for the period under study. In addition, the results showed that carry trade outperformed the stock markets when using the risk and risk-adjusted measures. The only concern in this matter is the conversion risk since the Russian ruble is not a very active currency in the foreign exchange market that might cause a higher bid-offer spread during the conversion.

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