THE PROFITABILITY OF CARRY TRADE

1. INTRODUCTION

The concept and practice of carry trade have gained popularity in recent years, particularly since the yen became a very low-interest currency. Although speculators lost their appetite for carry trade during the early stages of the global financial crisis in 2008, it is now business as usual for carry traders. Risk aversion that became widespread in the fourth quarter of 2008 caused massive unwinding of carry trade positions and the consequent collapse of the Australian dollar (a major target currency in carry trade) in October 2008. Since then, interest in carry trade has rebounded, with implications for the prevailing exchange rates. For example, the rapid appreciation of the Australian dollar against the U.S. dollar in 2009 can be attributed, to a large extent, to the resumption of carry trade.

A consequence of the failure of uncovered interest parity (UIP) is that profit can be made by going short on a low-interest currency (the funding currency) and long on a high-interest currency (the target currency). This is because the failure of UIP means that the currency denoting the long position does not depreciate against the currency denoting the short position by a percentage that wipes out the interest rate differential, hence producing a positive margin. Because the yen has been the major currency with the lowest interest rate, carry trade is typically associated with the yen (as the funding currency) to the extent that the operation is frequently referred to as ‘yen carry trade’.

Massive literature exists on the empirical failure of uncovered interest parity, implying the potential profitability of carry trade. Chinn and Meredith (2004) argue that

“few propositions are more widely accepted in international finance than that uncovered interest parity (UIP) is at best useless - or at worst perverse - as a predictor of future exchange rate movements”.

In a survey of 75 published estimates, Froot and Thaler (1990) report few cases where the sign of the coefficient on interest rate
I. Moosa
differential is consistent with UIP. Flood and Rose (2002) argue that
“a strong consensus has developed in the literature that UIP works poorly”.

They point out that countries with high interest rates tend to have appreciating currencies, which is the opposite of what is predicted by UIP, hence producing profit that would be unobtainable if UIP were valid. Likewise, Burnside et al. (2006) measure the economic significance of the failure of UIP in terms of the amount of money that can be made (through carry trade) by exploiting deviations from UIP. Gyntelberg and Remolona (2007) argue that “the failure of UIP is so well established that the phenomenon is called the forward premium puzzle”, and that “in a world of risk, UIP is almost certainly false”. They even describe carry trade as “essentially a bet against UIP”.

The objective of this paper is not to test UIP (at least not directly). Rather, the objective is threefold: (i) assessing the profitability of carry trade to find out if enthusiasm for this activity is exaggerated; (ii) to find out if carry trade is a yen-related operation, in the sense that currency pairs involving the yen provide more profitable carry trade operations than otherwise; and (iii) to evaluate the criteria used to select carry trade positions (currency pairs) that produce profitable operations. For this purpose, six currency combinations are examined, including cases where the interest rate differential changes sign over the sample period.

2. Facts and Figures

Very little academic work has been done on carry trade, which is probably due to the fact that the activity seems to attract more of the attention of practitioners and policy makers than that of academics. It has been observed that even inexperienced individual investors tend to indulge in this activity, presumably because it is profitable. It is for this reason that The Economist (2007) reported that Japanese retail investors had become “the carry trade’s greatest enthusiasts”.

\footnote{It is sometimes argued that the failure of UIP is due to the failure of the unbiased efficiency hypothesis because it is based on a misspecified model (Moosa, 2004a).}
An indicator of the popularity of carry trade is the creation of tradable indices as well as various forms of structured foreign exchange instruments referencing carry trade strategies. On the profitability of carry trade, Burnside et al. (2006) conclude that although the operation produces very large Sharpe ratios (because of the substantial failure of UIP) the amount of money produced by carry trade is rather small because of transaction costs and price pressure limits. They point out that the high Sharpe ratios cannot be interpreted as compensating market participants for bearing risk because the payoff is uncorrelated with the traditional risk factors\(^2\).

Carry trade has attracted the attention of policy makers because of the role this activity plays in exchange rate determination\(^3\). In its Annual Report, the Bank for International Settlements (2007) highlights this role by arguing that since carry traders are typically highly leveraged, they could be forced to unwind positions very quickly in response to changing market conditions, which might have a large impact on exchange rates, particularly in smaller markets (BIS, 2007, p. 84). It is also suggested that the sudden collapse of the dollar against the yen in October 1998 indicates that even large market segments can be affected by a sudden unwinding of carry trade positions. Furthermore, the BIS (2007) suggests that unwinding of carry trade positions during the period May 2006 ‑February 2007 might have contributed to the weakening of target currencies and strengthening of funding currencies. This is exactly what happened in the fourth quarter of 2008 as the global financial crisis gathered momentum. However, the BIS also makes the observation that estimating the size of the positions associated with carry trade and assessing their impact on exchange rates is notoriously difficult\(^4\).

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\(^2\) Incremental transaction costs arise because the bid-offer spread is an increasing function of order size. As for price pressure, they suggest that exchange rates change in response to net order flows, driving a wedge between average and marginal Sharpe ratios.

\(^3\) It is also argued that carry trade is an important feature of financial globalization. Gudmundsson (2007) discusses the implications of such globalization on the monetary transmission mechanism.

\(^4\) The Bank for International Settlements (2007) distinguishes between the cross-currency flows associated with carry trade and those arising from similar activities. The latter include (i) flows generated when domestic retail investors purchase higher-yielding assets denominated in foreign currency, and (ii) those arising when the residents of a high interest rate country borrow in a low-yielding currency to purchase domestic assets.
Likewise, Lenzner (2007) admits the difficulty of obtaining figures on carry trade, but he cites Brad Sester (an international economist) as saying that ‘the visible part’ of the activity is $300 billion\(^5\).

The impression one gets from the professional and media reports on carry trade is that it is exclusively associated with the yen as the funding currency. For example, an Australian anti-globalization newspaper declared the end of the ‘yen carry trade’ because

> “banks and others can no longer borrow hundreds of billions in zero interest yen from Japan to speculate with, because the yen is soaring in value” (The New Citizen, 2007).

A mainstream Australian newspaper commented on the strength of the Australian currency at the end of September 2007 with reference to carry trade, stipulating that

> “carry traders sold the low-yielding yen in greater volumes, seeking the higher interest rates offered by Australian and New Zealand dollars” (Sydney Morning Herald, 2007).

Lenzner (2007) also calls the activity ‘yen-carry trade’, describing the actions of the Bank of Japan in May 2006 (when it withdrew 12.2 trillion yen worth of excess liquidity) as intended to

> “warn investors not to count any longer on borrowing cheap yen and putting it to work without risk in higher yielding securities denominated in other currencies”.

Likewise, Stuart (2007) calls the activity ‘yen carry trade’.

The association of carry trade with the yen is evident in expressions of concern about the danger posed by the appreciation of the yen to this activity and the international financial system at large. The underlying idea is that hedge funds are deeply involved in ‘yen-based carry trade’, which means that strengthening of the yen may lead to simultaneous unwinding of the underlying positions. Stuart (2007) argues that

> “the end of the yen carry trade could be devastating for the world economy”.

Carry trade, however, is not exclusively yen-based, and not only in principle. For example, Galati and Melvin (2004) attribute the

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\(^5\) Galati et al. (2007) discuss the difficulties involved in estimating the size of global carry trade activity.
surge of foreign exchange trading in the BIS's 2004 triennial survey partly to carry trade, identifying the main funding currencies as the U.S. dollar, yen and Swiss franc and the main target currencies as the Australian dollar, New Zealand dollar and British pound. The Bank for International Settlements (2007) also identifies the yen and Swiss franc as the main funding currencies. Dennis (2007) refers to “low-yielding currencies such as the yen” as a description of funding currencies. He also describes the Swiss franc as “another favoured funding currency for the carry trade”.

Writing in the prestigious Risk Magazine, Pengelly (2007) describes the yen as “one of the most popular funding currencies” and the Australian and New Zealand dollars as “attractive funding currencies”.

In their study of the profitability of carry trade, Gyntelberg and Romolona (2007) use the yen and Swiss franc as the funding currencies. The yen, therefore, may be an attractive funding currency but it is not recognized as having an exclusive role in this respect.

The association of carry trade with the yen is perhaps motivated by the widespread use of the interest rate differential as a criterion for selecting the underlying positions as if a high interest differential (which the yen typically provides) is a necessary and sufficient condition for the profitability of carry trade. For example, Gyntelberg and Remolona (2007) point out that carry trade is pursued when the interest differential is wide enough to compensate for the underlying foreign exchange risk. Hottori and Shin (2007) find evidence indicating that volumes of carry trade involving the yen are high when interest differential against the yen are high. However, an adverse movement of the exchange rate could wipe out the gains from the interest rate differential, which makes exchange rate stability an important factor for the selection of positions. It is only when exchange rate volatility is low that the role of the interest rate differential becomes predominant. The Bank for International Settlements (2007) makes this point explicitly by arguing that “against the background of low exchange rate volatility, the

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6 This is why the unwinding of carry trade positions resulted in a massive depreciation of the Australian dollar against the U.S. dollar in October 2008. During the first ten days of October 2008, the Australian dollar experienced 8 and 9-sigma events. For details, see Moosa and Bhatti (2010).
continuing buildup of carry trades was an important mechanism through which interest rate differentials played a role”.

When volatility is high, however, both factors come into play\(^7\). It is for this reason that Pengelly (2007) defines the ‘volatility-based strategy’ as an operation in which currency positions are selected by using the ratio of the interest rate differential to the volatility of the exchange rate\(^8\).

In this paper we consider three indicators of the potential profitability of carry trade that can be used as criteria for the selection of carry trade positions. These include (i) the (absolute) interest rate differential; (ii) the coefficient of variation of the exchange rate; and (iii) the ratio of the interest rate differential to the coefficient of variation of the exchange rate. We also consider four measures of realized profitability, including (i) the frequency of obtaining positive margins; (ii) the mean margin; (iii) the ratio of the mean margin to its standard deviation; and (iv) the cumulative return. We examine correlation between the two sets of indicators to find out which of the three selection criteria leads to the most profitable carry trade operation.

3. THE MECHANICS OF CARRY TRADE

Let \(i_x\) and \(i_y\) be the interest rates on currencies \(x\) and \(y\) respectively, such that \(i_x < i_y\). Also let \(S\) be the spot exchange rate between the two currencies measured as the price of one unit of currency \(y\), which means that appreciation of \(y\) against \(x\) is represented by a higher value of \(S\) over time (that is, by the condition \(S_{t+1} > S_t\)), and vice versa. A carry trade operation consists of the following steps:

1. At time \(t\), one unit of \(x\) is borrowed at \(i_x\) for a period extending between \(t\) and \(t+1\).
2. The amount borrowed is converted at \(S_t\), obtaining \(1/S_t\) units of \(y\). This amount is then invested at \(i_y\).

\(^7\) The interest rate differential is a measure of the potential profitability of carry trade, whereas exchange rate volatility is a measure of the underlying risk. Carry traders, therefore, love to see a currency pair that has high interest differential and low exchange rate volatility.

\(^8\) The ratio of interest rate differential to exchange rate volatility is also known as carry-to-risk.
3. At $t+1$, the y value of the investment is $(1/S_t)(1+i_y)$.
4. The x currency value of the investment, converted at the spot rate prevailing at $t+1$ is $(S_{t+1}/S_t)(1+i_y)$.
5. At $t+1$, the loan matures, and the amount $(1+i_y)$ has to be repaid.

In this case, net profit (the margin) is given by

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

which can be approximated by the equation

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

where $\hat{S}_{t+1}$ is the percentage change in the exchange rate between $t$ and $t+1$. The operation will be profitable as long as $i_y - i_x - \hat{S}_{t+1}$ (that is, as long as the interest rate differential is higher the rate of depreciation of currency y or as long as currency y does not depreciate by more than the interest rate differential).

Carry trade is therefore a specific form of uncovered interest arbitrage, where the decision rule is to go short on a low-interest currency and long on a high-interest currency. This is not the only form of carry trade, however. Since covered interest parity tells us that a low-interest currency should be selling at a forward premium and a high-interest currency should be selling at a forward discount, another form of carry trade is to take a short position on a currency that sells at a premium and a long position on a currency that sells at a discount. Since covered interest parity must hold as an arbitrage or a hedging condition, the two forms of carry trade are equivalent.

However, Burnside et al. (2006) point out that the operation based on forward rates is more profitable because lower transaction costs are involved.

4. **Measuring the Profitability of Carry Trade**

In this section the profitability of carry trade is measured by conducting operations on the basis of historical data on six exchange
rates involving four currencies: U.S. dollar (USD), Japanese yen (JPY), Canadian dollar (CAD) and British pound (GBP). The data sample, which was obtained from the DX data base, covers the period December 1999 to September 2006. The interest rates are annualized monthly rates.

In this exercise carry trade transactions are conducted on a monthly basis throughout the sample period. Short and long positions are taken on the low and high interest currencies, respectively, at the end of each month, then the margin is calculated for the following month\(^{12}\). In all, the margin is calculated for 81 consecutive months (January 2000-September 2006). Measures of realized profitability are then calculated as follows. The frequency of positive margins is calculated as the percentage of total number of operations (81). The mean margin is the average of positive and negative margins. The ratio of the mean margin to its standard deviation is clear and needs no explanation. Finally, the cumulative return is calculated by compounding a principal (say, 100) at the monthly margin over the sample period.

Figure 1 displays the interest rates on the six possible currency pairs to identify the high and low interest currencies (hence the funding and target currencies in each case). We can see that the interest rate on the yen is always lower than the interest rates on the other three currencies, which means that the yen is always used as the funding currency in this exercise. In the other three cases involving the USD, CAD and GBP, the interest rate differential switches signs, which means that the two currencies involved switch roles in the sense that the funding currency becomes the target currency and vice versa. In carry trade, it is always the case that the funding currency is the low-interest currency.

Table 1 reports the three selection criteria for the six currency pairs. The JPY/GBP offers the highest interest rate differential, whereas the lowest differential is offered by the CAD/USD combination. In terms of the coefficient of variation, low values are sought because the stability of the exchange rate is important for this purpose. The CAD/GBP is the most stable rate. The two factors can be combined by calculating the ratio of the interest rate differential to the coefficient of variation of the exchange rate, in which case the JPY/GBP rate offers the best combination.

\(^{12}\) The calculated margins are annualized for ease of comparison with the risk-free rate.
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Figure 1 - Interest Rates on Currency Pairs

Table 1 - Selection Criteria for Carry Trade Positions

<table>
<thead>
<tr>
<th>Currency Pair</th>
<th>Mean Absolute Interest Differential</th>
<th>Coefficient of Variation of Exchange Rate</th>
<th>Interest Differential/Coefficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD/USD</td>
<td>0.89</td>
<td>11.60</td>
<td>0.076</td>
</tr>
<tr>
<td>JPY/USD</td>
<td>3.18</td>
<td>6.50</td>
<td>0.485</td>
</tr>
<tr>
<td>GBP/USD</td>
<td>1.56</td>
<td>10.09</td>
<td>0.154</td>
</tr>
<tr>
<td>JPY/CAD</td>
<td>3.40</td>
<td>11.21</td>
<td>0.304</td>
</tr>
<tr>
<td>JPY/GBP</td>
<td>4.42</td>
<td>8.16</td>
<td>0.541</td>
</tr>
<tr>
<td>CAD/GBP</td>
<td>1.03</td>
<td>5.75</td>
<td>0.179</td>
</tr>
</tbody>
</table>
When it comes to measures of realized profitability, as shown in Figure 2, the percentage of positive margins picks the JPY/GBP combination as the best performer and the CAD/GBP combination as the worst performer. The other three measures are consistent in picking the JPY/CAD combination as the best performer and the CAD/GBP as the worst performer. Figures 3-5 show the relations between the selection criteria and measures of realized profitability.

The interest rate differential picks correctly the highest and lowest profitability in terms of the percentage of positive margins. However, the ratio of interest differential to the coefficient of variation correctly picks the JPY/CAD combination as the most profitable in terms of mean margin, ratio of the mean margin to its standard deviation, and cumulative return. Although the results appear to show that currency combinations involving the yen are the most profitable,
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The superiority of these combinations is not evident in terms of the percentage of positive margins. And even in terms of the other three measures of realized profitability, the JPY/USD does not produce those much different results compared to the GBP/USD and CAD/USD combinations, which exclude the yen.

The results also show that the interest rate differential on its own is not as good as the ratio of the differential to the coefficient of variation in picking the most profitable currency combination. This is a different conclusion from that reached by Gyntelberg and Remolona (2007) who attribute the higher rate of return obtained
from yen-based operations as opposed to Swiss franc operations to the wider interest rate differential associated with the yen.

The attractiveness of carry trade diminishes even further when one looks at the results reported in Table 2. The results show that the frequency of positive margins is rather low and that the reason why the mean margin is always positive is that the mean positive margin is consistently higher than the (absolute) mean negative margin. However, this means that on a single occasion a carry trader could incur significant losses, putting the trader out of business.
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Figure 5 - Realized Profitability versus Ratio of Interest Rate Differential to the Coefficient of Variation of Exchange Rate

Table 2 - Estimated Margins

<table>
<thead>
<tr>
<th>Currency Pair</th>
<th>Frequency of Positive Margin (%)</th>
<th>Mean Positive Margin (Annualized)</th>
<th>Mean Negative Margin (Annualized)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD/USD</td>
<td>57.3</td>
<td>21.33</td>
<td>-18.78</td>
</tr>
<tr>
<td>JPY/USD</td>
<td>59.8</td>
<td>25.52</td>
<td>-23.99</td>
</tr>
<tr>
<td>GBP/USD</td>
<td>57.3</td>
<td>24.13</td>
<td>-20.93</td>
</tr>
<tr>
<td>JPY/CAD</td>
<td>59.8</td>
<td>29.83</td>
<td>-20.33</td>
</tr>
<tr>
<td>JPY/GBP</td>
<td>63.4</td>
<td>28.50</td>
<td>-24.65</td>
</tr>
<tr>
<td>CAD/GBP</td>
<td>47.6</td>
<td>27.55</td>
<td>-24.32</td>
</tr>
</tbody>
</table>
Severe losses on a single occasion may render the trader incapable of recouping losses in subsequent operations that may produce positive margins\textsuperscript{13}. A high interest differential is no guarantee of striking a positive margin.

5. **Hypothesis testing and Monte Carlo simulations**

Table 3 reports the results of testing two null hypotheses about the estimated values of the proportion of positive margins ($\hat{P}$) and the mean value of the margin ($\bar{\pi}$). These hypotheses are (i) the proportion of positive margin is not significantly different from 0.5; and (ii) the mean margin is not significantly different from the highest value of 9.76 produced by the JPY/CAD combination. The table also reports the estimated values of $\hat{P}$ and $\bar{\pi}$ for all currency combinations. The results show that the first hypothesis is rejected in one case only, that of the JPY/GBP combination. Even in other combinations involving the yen there is a fifty-fifty chance of making profit on a single carry trade position. The second hypothesis is rejected in one case only, that of the CAD/GBP combination. These results cast doubt on the proposition that carry trade is a yen-based operation. Other currency combinations, except the CAD/GBP combination, are just as profitable as the JPY/CAD combination.

<table>
<thead>
<tr>
<th>Currency Combination</th>
<th>$\hat{P}$</th>
<th>$\bar{\pi}$</th>
<th>$H_0: \hat{P} = 0.5$</th>
<th>$H_0: \bar{\pi} = 9.76$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD/USD</td>
<td>57.3</td>
<td>4.26</td>
<td>1.32</td>
<td>-1.23</td>
</tr>
<tr>
<td>JPY/USD</td>
<td>59.76</td>
<td>5.67</td>
<td>1.77</td>
<td>-0.83</td>
</tr>
<tr>
<td>GBP/USD</td>
<td>57.3</td>
<td>4.96</td>
<td>1.32</td>
<td>-1.02</td>
</tr>
<tr>
<td>JPY/CAD</td>
<td>59.76</td>
<td>9.76</td>
<td>1.77</td>
<td>0.00</td>
</tr>
<tr>
<td>JPY/GBP</td>
<td>63.41</td>
<td>9.17</td>
<td>2.42*</td>
<td>-0.12</td>
</tr>
<tr>
<td>CAD/GBP</td>
<td>47.54</td>
<td>0.35</td>
<td>-0.44</td>
<td>-1.87*</td>
</tr>
</tbody>
</table>

* Significant at the 5% level. $\hat{P}$ is the estimated percentage of positive margins (the test statistic is normally distributed with a critical value of 1.96). $\bar{\pi}$ is the estimated mean margin (the test statistic has a $t$ distribution with a critical value of -1.65).

\textsuperscript{13} A similar conclusion was reached by Gyntelberg and Remolona (2007) although they tend to believe that carry trade is, on average, profitable. They found ‘occasional’ periods of negative returns (margins), implying some probability of large losses. Our results show that negative margins occur so frequently that the possibility of large losses is higher than what is portrayed by Gyntelberg and Remolano (2007).
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The last exercise to be conducted in this study involves the performance of Monte Carlo simulations on the estimated margin. For this purpose, a distribution is fitted to the estimated values of the margin over the sample period, then the fitted distribution is used to simulate the margin for the underlying currency pair using 100,000 iteration. Table 4 reports the fitted distributions, showing that the margin associated with the CAD/USD pair follows a beta distribution, that of the CAD/GBP pair follows a gamma distribution, whereas the other four follow a logistic distribution. The table also reports the parameters defining the fitted distributions. In no case is the margin normally distributed, which corroborates Gyntelberg and Remolona (2007) who found that “carry trade returns are not normally distributed”.

**Table 4 - Fitted Distributions of the Margin**

<table>
<thead>
<tr>
<th>Distribution</th>
<th>CAD/USD</th>
<th>JPY/USD</th>
<th>GBP/USD</th>
<th>JPY/CAD</th>
<th>JPY/GBP</th>
<th>CAD/GBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Beta</td>
<td>Logistic</td>
<td>Logistic</td>
<td>Logistic</td>
<td>Logistic</td>
<td>Gamma</td>
</tr>
<tr>
<td>Scale</td>
<td>5.48</td>
<td>5.47</td>
<td>9.67</td>
<td>9.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>-80.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>67.01</td>
<td>15.91</td>
<td>18.41</td>
<td>18.75</td>
<td>4.22</td>
<td></td>
</tr>
<tr>
<td>( \alpha )</td>
<td>4.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \beta )</td>
<td>3.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>-240.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td></td>
<td>57.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The beta distribution is defined in terms of four parameters: minimum, maximum, \( \alpha \) and \( \beta \). The logistic distribution is defined in terms of two parameters: mean and scale. The gamma distribution is defined in terms of two parameters: location and shape.

Table 5 reports the results of Monte Carlo simulations using the fitted distributions, whereas Figure 6 displays the simulated distributions. The certainty level is basically the frequency of positive margins or the probability that a positive margin will be produced by any single carry trade operation for the underlying currency pair. These certainty levels are too low for comfort, and it is even less than 0.50 in the case of the CAD/GBP pair (the probability of getting a positive margin in this case is 0.49). Except for two cases involving the yen (JPY/CAD and JPY/GBP), the 40% percentile is negative, and in one case (CAD/GBP) even the 50% percentile is negative (the mean of the distribution is no more than 0.4 in this case). Most of the distributions have positive (excess) kurtosis, thus heavier tails.
than under a normal distribution, but skewness is negligible\(^\text{14}\). These results make one wonders about the excessive enthusiasm for carry trade.

6. Conclusion

In this study an attempt has been made to assess the profitability of carry trade using six currency combinations and historical data covering the period December 1999-June 2006, with three objectives in mind: (i) to evaluate the profitability of carry trade in general; (ii) to find out if carry trade is an exclusively yen-based operation; and (iii) to evaluate the criteria used for the selection of carry trade positions. The results seem to cast doubt on the profitability of carry trade as there is mostly a fifty-fifty chance that profit can be made from a single carry trade operation. The results also show that carry trade is not an exclusively yen-based operation because the interest rate differential is not the only factor determining the profitability of these operations. As a result, a proper criterion for selecting carry trade positions must embody both the interest rate differential and exchange rate volatility.

\(^{14}\) Gyntelberg and Remolona (2007) found positive kurtosis and negative skewness in their distributions.
The poor performance of carry trade, as demonstrated in this paper, would have been worse if we had taken into account the bid-offer spreads in interest and exchange rates, as these spreads are identified as a factor that negatively affects the amount of money made on carry trade. A question that arises is the following: how do we reconcile this finding with the empirical failure of UIP? The answer is simple because, unlike what is typically stated in the literature, the
failure of UIP does not necessarily mean that carry trade is profitable. UIP tells us that a high-interest currency will depreciate against a low-interest currency by a percentage that is equal (or close to) the interest rate differential. The failure of UIP could take two forms: (i) the high-interest currency depreciates by less than the interest rate differential or even appreciates, and (ii) the high-interest rate currency depreciates by more than the interest rate differential. The first form of failure produces profitable carry trade, but the second form means a loss is incurred on the underlying carry trade position.

It seems, therefore, that over-enthusiasm about carry trade is motivated by no more than herd behaviour. Particularly risky is the mere consideration of the interest rate differential without due regard to exchange rate volatility (hence, the enthusiasm about the yen as the funding currency). There are indeed some myths about the profitability of carry trade.

IMAD MOOSA

Monash University, Department of Accounting and Finance, Victoria, Australia

REFERENCES


The profitability of carry trade is investigated using six currency combinations and historical data covering the period December 1999-June 2006. Hypothesis testing and Monte Carlo simulations produce results that cast doubt on the profitability of carry trade, as there is mostly a fifty-fifty chance that profit can be made from a single carry trade operation. The results also show that carry trade is not an exclusively yen-based operation, in the sense that currency combinations not involving the yen can be as profitable as combinations involving the yen. Because the interest rate differential is not the only factor determining the profitability of carry trade, a proper criterion for selecting the underlying positions must embody both the interest rate differential and exchange rate volatility. It is concluded that over-enthusiasm about carry trade is a reflection of herd behaviour.

JEL Numbers: G15
Keywords: Carry Trade, Uncovered Interest Parity
RIASSUNTO

La redditività del carry trade

In questo studio si analizza la redditività del carry trade utilizzando sei combinazioni di valute riferite al periodo dicembre 1999-giugno 2006. I risultati dei test e le simulazioni Monte Carlo pongono dei dubbi sulla redditività del carry trade, in quanto la probabilità di ottenere guadagni da una singola operazione è del 50 per cento. Tali risultati mostrano anche che il carry trade non è una pratica da basare esclusivamente sullo yen, perché le combinazioni di valute che non includono lo yen possono essere redditizie al pari di quelle che lo comprendono. Poiché il differenziale del tasso di interesse non è il solo fattore che determina la redditività del carry trade, un criterio opportuno di selezione deve incorporare anche la volatilità del cambio. Si conclude che l’eccesso di entusiasmo circa il carry trade è il risultato di un herd behaviour.