The USDJPY carry trade channel and its impact on the US equity market

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***Abstract*—**The USDJPY was the most important channel for carry trade strategies during the last 20 years. Until 2008, the key interest rates in most of the developed markets were relatively high and the Japanese market became an important region where investments were financed. Most of those operations headed towards the US and the global capital market. The objective of this paper is to empirically test the influence of the USDJPY carry trade channel on the US equity market, a trading hypothesis related to the speculative funds that acted on this carry trade circuit. We would like to observe the changes that took place in the level of correlation and statistic characteristics of the samples used during the interval in which the carry trade channel has functioned.

***Keywords*—**carry trades, currency pairs, equity markets, regression analysis

I. Introduction

The concept of carry trade refers to a strategy where an investor sells a certain currency that offers a relatively low interest and uses the funds to buy or invest in another currency that offers higher yields [1].

Such strategies have gained a major importance in the second part of the last decade and the available statistics on off balance sheet positions in derivatives show that the highest positions are related to the yen. The Central Bank of Japan lowered the interest rate below 1% in 1995 and generated an important circuit on the USDJPY currency pair. Japan has been maintaining the lowest interest rate in the world for the past fifteen years. The market size of carry trade strategies involving the yen was estimated in 2007 to 1 trillion USD [2]. Theoretically, we should observe an increase in investment activity during expansion periods and we can imagine that large hedge funds could access loans in a weak currency that offers a low key interest rate. We can presume that these investments could be headed to equity markets [15,16].

So during the expansion period, investors should borrow and sell weak currency like the yen and this should lead to a depreciation of the weak currency. In periods of risk aversion investors will withdraw their investments to buy back the yen and we should observe an appreciation of the weak currency. The yen carry trade in particular has been a topical subject of debate over the last decade or more given the extended period of low interest rates in Japan.

The study conducted by Menkhoff, Sarno, Schmeling and Schrimpf on volatility indicates a significant negative relationship between yield strategies of carry trade and volatility in the Forex market. In other words, in periods of low volatility such strategies are significantly profitable and in turbulent times, the margin of profitability of strategies decreases [3].

Jylha, Suominen and Soderlind showed that the hedge fund investment strategy predicted by their model, which they call the risk-adjusted carry trade strategy, explains more than 16% of the overall hedge fund index returns and more than 33% of the fixed income arbitrage sub-index returns [4].

According to Barroso and Santa-Clara, a well-diversified equal-weighted carry trade portfolio has shown puzzling investment performance in the floating exchange rate era, producing a Sharpe ratio of 0.9 that is more than double the 0.4 of the US stock market. So far there is no consensus risk-based explanation for this result [5].

Our study plans to test and observe the differences in correlation indicators and individual statistic characteristics in the situation in which we change the range of the samples used according to the period in which the interest differential between US and Japan stimulated carry trade strategies.

II. The Mechanism of the Carry Trade Channel

Hattori and Hyun Song Shin state that "although the carry trade is often portrayed purely as a bet on the foreign exchange markets, the significance of the carry trade extends far beyond the narrow confines of the FX market, and arguably extends into all reaches of the global financial system. The key to understanding the wider significance of the carry trade is to follow the trail of leveraged bets through the financial system through interlocking balance sheets of the financial intermediaries involved. Take an example. A hedge fund that wishes to take on a larger position in a security obtains funding from its prime broker (a Wall Street investment bank, say) by pledging assets in a repurchase agreement (a repo). The prime broker, for its part, funds the loan to the hedge fund by borrowing from another party"[6].

A. The theory of uncovered interest rate parity

According to the theory of uncovered interest rate parity (UIS), the profit that was generated by the interest differential should be canceled by the exchange rate changes between the two countries but the reality of the statistics provided by different studies shows that this does not happen all the times [7,18]. Moreover, countries that maintain long-term low interest suffer currency depreciation and the ones that maintain high interest rates achieve a

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greater appreciation, which could increase the profitability of such strategies. According to Jakub Jurek, currency carry trades exploiting violations of uncovered interest rate parity in G10 currencies have historically delivered significant excess returns with annualized Sharpe ratios nearly twice that of the U.S. equity market (1990-2008) [8,17].

Christian Wagner derived a speculative pendant to the standard UIP condition and showed that exchange rate returns comprise a time-varying risk-premium, how carry-traders are able to collect this risk-premium, thereby providing a direct rationale for the strategy, and that the forward bias puzzle originates from the omission of the risk-premium in standard UIP tests. “Disregarding the interecept in the Fama-regression leads to overestimating excess returns and consequently to overstating the economic value of currency speculation” [9].

Clarida, Davis and Pedersen show that yield curve level factors are positively correlated with carry trade excess returns while yield curve slope factors are negatively correlated with carry trade excess returns. Importantly, they show that this correlation is robust to the current crisis and to the inclusion of equity volatility in the model. What distinguishes carry trade returns in the current crisis from non crisis periods is not changed loading on yield curve factors but a much larger loading on the equity factor [10].

These results should indicate that the carry trade strategies are successful.

Usually in periods of high volatility low interest currencies tend to appreciate, because risk appetite declines and investors are repatriating their funds. In these periods low interest currencies tend to appreciate.

B. Testing a theoretical carry trade channel

We can test the theory of uncovered interest rate parity and the profitability of a carry trade strategy by handpicking the EUR/RON pair.

We could have accessed a loan in EUR in May 2009, the month when the European Central Bank lowered the interest rate down to 1%, the minimum key rate for the past years, sold EUR to buy RON at 4.17 and invested for a one year maturity in treasury bills in Romania where the official interest rate was at that time around 9.5%. After a year if one were to withdraw money from this strategy at a EURRON rate of 4.175 and taking into account transaction costs, one would have obtained a yield of approximately 8%. This annual performance is high for a fixed income investment made in the European area.

We presume that the initial flow generated by carry trade currency strategies, selling the weak currency or low interest currency for exposing on a currency that offers high interest rates should generate a flow that could reflect on the stock market. We can assume that the opening of positions on a currency carry trade should lead to a negative correlation between the trend of the weak currency and the equity market from the country with a higher interest rate.

For this reason a manager that has under administration a portfolio with a global exposure should take into account the possible effects that can run into action when we face a change in the circuit of a very important carry trade currency pair, similar to the carry trade circuit that was active on the USD/JPY during 1995-2008 [11]. These changes could have impact on equity market returns in regions where speculative money generated by such strategies is directed. The sudden change of the variables that sustain a carry trade strategy, like the interest rates from the two countries that are involved can lead to a massive selloff and could affect the short-term return on equities.

We propose to test the correlation between the most famous carry trade pair USD/JPY (and generates the highest flows) and the most representative stock market index from the U.S., the Standard & Poor's 500 (S&P500). We expect that the widening of the interest rate differential and hence the carry trade channel after important monetary policy decisions should increase the amount of speculative money that come from Japan and head to the U.S. equity market and thus the statistic characteristics of the samples and the correlation between them.

III. Analyzing the data and the correlation with the equity market

A. The data sample and the conditions of the analysis

The data used for empirical testing was taken from the Bloomberg database. For the study we chose initially a period of 16 years (March 1995 - March 2011) using monthly data series. This period includes two powerful cycles of economic expansion and two periods of contraction. We chose this period because the financial industry in the mid-90s (which focused on the carry trade between the dollar and the yen) has developed aggressively and gained dimension and there is more likely to find results during this period.

The data was grouped according to the moment when the central banks of both countries changed their monetary policy and made it possible to increase the carry trade phenomenon by widening the interest rate differential and the range of this interval. The S&P500 index is used as a proxy for the U.S. stock market. The values of the S&P index and the USD/JPY pair were log-sized in order to stabilize the series.

According to Strong “there are both theoretical and empirical reasons for preferring logarithmic returns. Theoretically, logarithmic returns are analytically more tractable when linking together sub-period returns to form returns over long intervals. Empirically, logarithmic returns are more likely to be normally distributed and so conform to the assumptions of the standard statistical techniques”[12].

In 1991 Japan had the key interest rate at 6%. From 1991 to mid-1995, due to economic problems, Japan has accelerated and reduced the interest rate down to 0.5%, and maintained it around this value until now. During this period U.S. maintained the reference interest rate significantly above the 0,5% level and with one exception during 2002-2003, the federal rate was always above 2% until 2008. The FED adopted a lax monetary policy and reduced the key interest rate to a historically low in order to offset the contraction from 2008-2009 when they made the most aggressive interest cuts and we can mark the closing of a major carry trade channel that lasted for almost 13 years between U.S. and Japan. As seen in Fig. 1, the interest differential increases between 1994 and 1995, closes in 2001-2002 and reopens again in 2005.

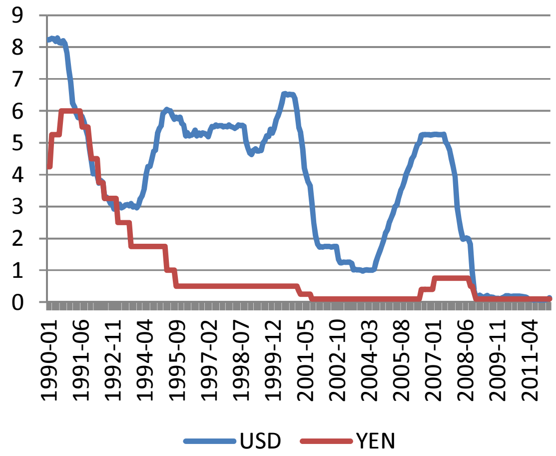

Fig. 1 Interest rates in US and Japan (1990-2011)

B. *Evaluating the statistic characteristics of the data and their variation during interval adjustment*

Before testing our main correlation hypothesis we would like to see the statistic value of our data by measuring the normal distribution of our samples. We will measure the level of standard deviation, asymmetry (skewness), flattening coefficient (kurtosis) and Jarque-Bera test for the S&P500 Index and the USDJPY currency pair.

The standard deviation of a financial time series is a measure of dispersion or spread in the series. The standard deviation is computed by:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(R_i-\bar{R})^2}{N-1}}. \qquad (1)$$

The skewness of a data population is defined as the third central moment. To be more precise, skewness is computed as the average cubic deviation of the individual observations from the sample mean, divided by the standard deviation raised to the third power. As a consequence of these considerations, we have calculated the sample skewness as follows:

$$\hat{S} = \frac{\frac{1}{N}\sum_{i=1}^{N}(R_i-\bar{R})}{\hat{\sigma}^3}. \qquad (2)$$

where $\hat{S}$ is the sample skewness; N is the total number of individual observations within the sample, R_i is the return of period t, $\bar{R}$ is the sample arithmetic mean and $\hat{\sigma}$ is an estimator for the standard deviation that is based on the biased estimator for variance ($\hat{\sigma} = \sigma\sqrt{(N-1)/N}$).

The skewness of a sym metric distribution, such as the normal distribution, is zero. Positive skewness means that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail.

According to Peiro, under normality hypothesis, the asymptotic distribution of $\hat{S}$ is given by $\hat{S} \to N(0,\frac{6}{T})$ [13].

Kurtosis is a measure of how outlier-prone a distribution is. The kurtosis of the normal distribution is 3. Distributions that are more outlier-prone than the normal distribution have kurtosis greater than 3; distributions that are less outlier-prone have kurtosis less than 3 [12].

The kurtosis of a distribution is defined as

$$K = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{R_i-\bar{R}}{\hat{\sigma}}\right)^4. \qquad (3)$$

where $\bar{R}$ is the mean of R_i, $\hat{\sigma}$ is the standard deviation of R_i, and N is the sample size. The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal. If the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal.

The Jarque-Bera test is a two-sided goodness-of-fit test suitable when a fully-specified null distribution is unknown and its parameters must be estimated. The test statistic is

$$JB = \frac{N}{6}\left(s^2 + \frac{(k-3)^2}{4}\right). \qquad (4)$$

where N is the sample size, s is the sample skewness, and k is the sample kurtosis. For large sample sizes, the test statistic has a chi-square distribution with two degrees of freedom. The reported probability (p-value) is the probability that a Jarque Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. A small probability value leads to the rejection of the null hypothesis of a normal distribution.

For the initial sample of the values containing the S&P 500 index we obtain a standard deviation of 0.2579, an asymmetry indicator (skewness) of -1.0066 which indicates that the left tail is longer, the mass of the distribution is concentrated on the right of the figure, a flattening coefficient (kurtosis) indicator of 3.431 which is a value larger than 3 and indicates that the sample has a outlier-prone compared to the normal distribution and a high value for the Jarque-Bera test of 34.09 as seen in Table 1.

Table 1. The statistics of the values for the initial unadjusted interval on S&P500 Index

Series: SPX	
Sample 1995:03 2011:03	
Observations 193	
Mean	6.976425
Median	7.030000
Maximum	7.350000
Minimum	6.220000
Std. Dev.	0.257943
Skewness	-1.006683
Kurtosis	3.431009
Jarque-Bera	34.09191
Probability	0.000000

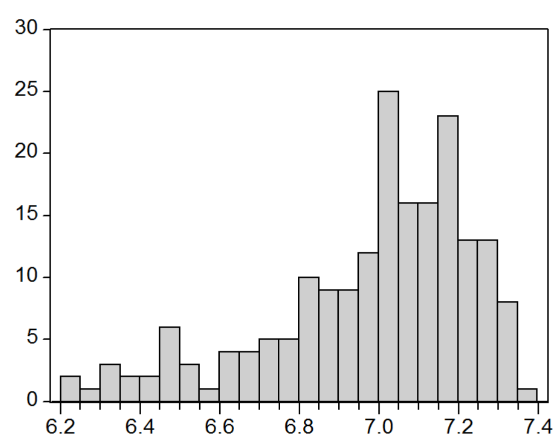

Fig. 2 The S&P 500 Index histogram for the initial unadjusted interval

The initial sample of USDJPY currency values has the following statistic properties: a standard deviation of 0.123, lower than the S&P500 Index, an asymmetry indicator (skewness) of -0.6244, a better result compared to the stockmarket index, it indicates that the left tail is longer, the mass of the distribution is concentrated on the right of the figure, a peakedness (kurtosis) indicator of 3.0462 which is a value a bit larger than 3 but smaller than the value of the S&P500 index and indicates that the sample has a outlier-prone compared to the normal distribution and a relatively low value for the Jarque-Bera test of 12.55.

Table 2. The statistics of the values for the initial unadjusted interval on USDJPY

Series: USDJPY	
Sample 1995:03 2011:03	
Observations 193	
Mean	4.699378
Median	4.713038
Maximum	4.974386
Minimum	4.387014
Std. Dev.	0.123022
Skewness	-0.624414
Kurtosis	3.046217
Jarque-Bera	12.55872
Probability	0.001875

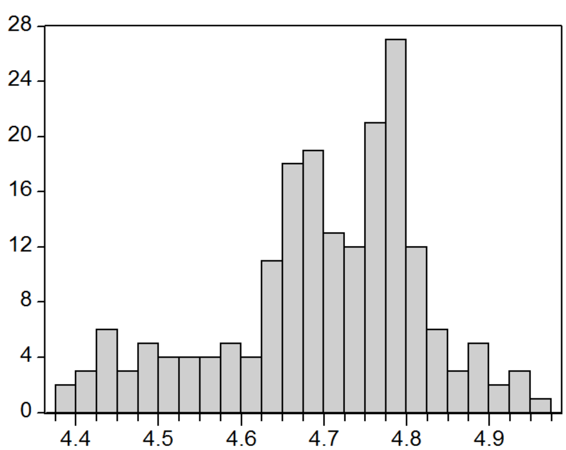

Fig. 3 The USDJPY histogram for the initial unadjusted interval

For the first interval adjustment we exclude the period at the end of the interval, when the U.S. Federal Bank aggressively reduced the interest rate in November 2008 and led to an interest differential of less than 2%.

The first adjustment on the S&P 500 sample has the following statistic properties: a standard deviation of 0.2579, an asymmetry indicator (skewness) of -1.0056 which indicates that the left tail is longer, the mass of the distribution is concentrated on the right of the figure, a flattening coefficient (kurtosis) indicator of 3.2239 which is a value higher than 3 and indicates that the sample has a outlier-prone compared to the normal distribution and a high value for the Jarque-Bera test of 27.81, slightly lower than the initial sample as seen in Table 3.

The most notable modification of the statistic characteristic for the initial adjustment of the S&P series is that the flattening coefficient and the Jarque-Bera test have slightly lower values.

Table 3. The statistics of the values for the first adjustment of the interval for the S&P500 Index

Series: SPX	
Sample 1995:05 2008:11	
Observations 163	
Mean	6.985092
Median	7.050000
Maximum	7.350000
Minimum	6.240000
Std. Dev.	0.266853
Skewness	-1.005685
Kurtosis	3.223967
Jarque-Bera	27.81713
Probability	0.000001

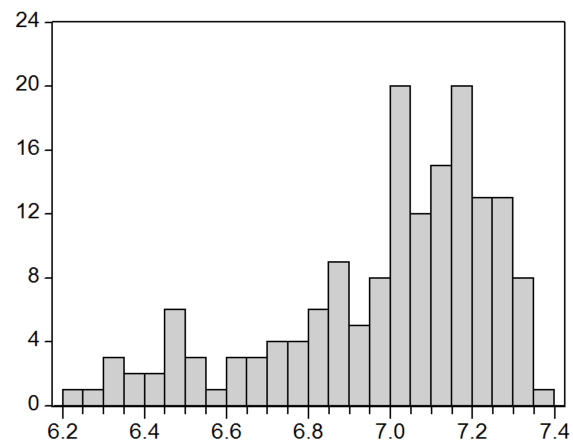

Fig. 4 The S&P 500 histogram for the first adjustment of the interval

The first adjustment on the USDJPY sample has the following statistic properties: a standard deviation of 0.0894, an asymmetry indicator (skewness) of -0.4259 which indicates that the left tail is longer, the mass of the distribution is concentrated on the right of the figure, a peakedness (kurtosis) indicator of 4.494 which is a value larger than 3 and indicates that the sample has a outlier-prone compared to the normal distribution and a high value for the Jarque-Bera test of 20.08, higher than the initial sample as seen in Table 4.

We can flag a first sign of statistic deterioration for the USDJPY currency pair as the flattening coefficient (kurtosis) has marked a much consistent higher value a sign that could indicate that the shrinking of the interval according to the condition necessary for the carry trade channel has shifted the representation of the sample away from the normal distribution.

Table 4. The statistics of the values for the first adjusted interval on USDJPY currency pair

Series: USDJPY	
Sample 1995:05 2008:11	
Observations 163	
Mean	4.737186
Median	4.743279
Maximum	4.974386
Minimum	4.434856
Std. Dev.	0.089442
Skewness	-0.425961
Kurtosis	4.494002
Jarque-Bera	20.08847
Probability	0.000043

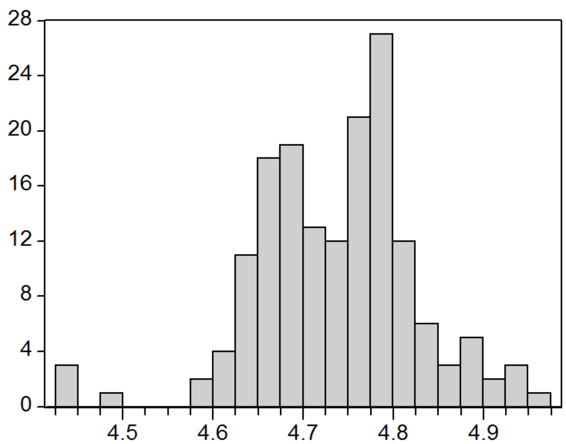

Fig. 5 The USDJPY histogram for the initial adjustment of the interval

In the case of the second adjustment, we optimized the interval by eliminating also the period between December 2001 and January 2005, a period in which in order to counter the negative effects of the recession from 2001, the FED kept interest rates below 2%.

For the final adjusted sample of the values of the S&P 500 index we obtain a standard deviation of 0.2944, an asymmetry indicator (skewness) of -1.067 which indicates that the left tail is longer, the mass of the distribution is concentrated on the right of the figure, a peakedness (kurtosis) indicator of 2.9394 which is a value slightly lower than 3, this time and indicates that the sample has a less outlier-prone compared with the normal distribution and a high value for the Jarque-Bera test of 24.30.

We can highlight that the S&P 500 Index sample hasn't been statistically deteriorated compared to the initial values after we have adjusted the interval according to the interest rate differential condition necessary for the carry trade channel, contrasting the evolution of the USDJPY sample.

Table 5. The statistics of the values for the last adjustment of the interval on S&P 500 Index

Series: SPX_ADJ	
Sample 1 128	
Observations 128	
Mean	6.998882
Median	7.113972
Maximum	7.345610
Minimum	6.243604
Std. Dev.	0.294466
Skewness	-1.067036
Kurtosis	2.939481
Jarque-Bera	24.30896
Probability	0.000005

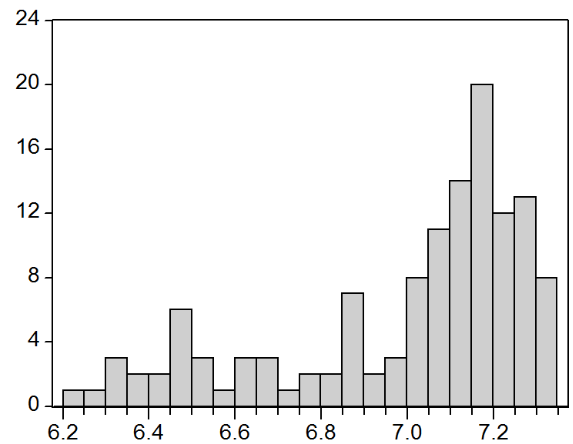

Fig. 6 The USDJPY histogram for the final adjustment of the interval

The final adjusted sample of USDJPY currency values has the following statistic properties: a standard deviation of 0.0944, the lowest standard deviation from the studied samples, an asymmetry indicator (skewness) of -0.452 which indicates that the left tail is longer, the mass of the distribution is concentrated on the right of the figure, a peakedness (kurtosis) indicator of 4.3397 which is a value larger than 3 and indicates that the sample has a outlier-prone than the normal distribution and a relatively low value for the Jarque-Bera test of 13.93. Even though the standard deviation and the skweness test have better statistic results, the kurtosis and Jarque-Bera test indicate that this sample is much less closer to the normal distribution. The increased value of the kurtosis and the left tail can indicate that during the carry trade period the values of the USDJPY were predominantly high, a result that should indicate that the yen currency had a tendency for depreciation versus the dollar as the carry trade funds exited Japan during that period and headed towards US.

Table 6. The statistics of the values for the final adjusted interval on USDJPY

Series: USDJPY_ADJ Sample 1 128 Observations 128	
Mean	4.731864
Median	4.741055
Maximum	4.974386
Minimum	4.434856
Std. Dev.	0.094412
Skewness	-0.452014
Kurtosis	4.339725
Jarque-Bera	13.93136
Probability	0.000944

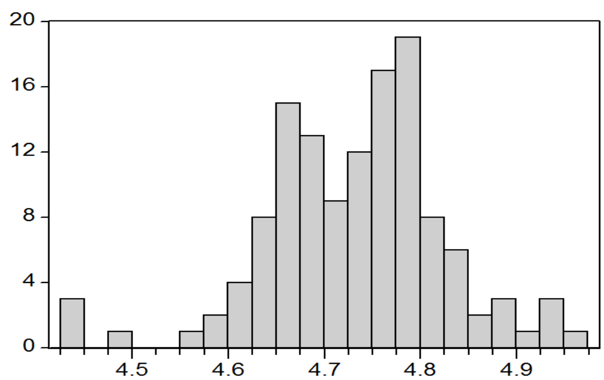

Fig. 7 The USDJPY histogram for the final adjusted interval

C. Measuring the evolution of the correlation indicators during the carry trade period

We test the level of correlation on the entire interval (March 1995 - March 2011) and we compare these results with the results obtained by restricting the range of the data by excluding the moments in which the monetary policy changes of the two countries have reduced the interest rate differential, making very hard to initiate carry trade strategies. After adjusting the time range we should obtain a higher degree of positive correlation between S&P500 and USDJPY and we could assume that this increase in correlation would be due to the speculative funds that are active through the carry trade channel in such periods.

As we have mentioned in the first part of the analysis, for the first interval adjustment, we exclude the period at the end of the interval, when the U.S. Federal Bank aggressively reduced the interest rate in November 2008 and led to an interest differential of less than 2%. We estimate the following two regressions using the simple least squares method:

$$SPX\_95\text{-}11 = C(1)^* \; USDJPY\_95\text{-}11 + C(2). \quad (5)$$
$$SPX\_95\text{-}08 = C(1)^* \; USDJPY\_95\text{-}08 + C(2). \quad (6)$$

We note *SPX* as the log-sized monthly returns of the S&P500 equity index and the *USD/JPY* as the log-size values of the monthly USD/JPY fluctuations. The first regression provides the results for the initial interval (1995 – 2011) and the second regression provides the results for the first adjustment.For the first regression we obtain a positive beta indicator of 0.38, a coefficient of determination of 3.4% and a rather small F-statistic value of 6.67 as presented in Table 7.

Table7. Results for S&P Index and USDJPY'95-'11

Dependent variable: SPXmar95-mar11 Method: Least Squares Included observations: 193		
Variable	Coefficient	Std. Error
USDJPY_95-11	0.385415	0.149128
t-Statistic	Prob.	Corr. Coeff.
2.584459	0.0105	0.02223
R-squared		0.033789
Adjusted R-squared		0.028730
S.E of regression		0.254210
Durbin-Watson stat		0.036468
S.D. dependent var		0.25794
Akaike info criterion		0.10900
Schwarz criterion		0.14281
F-statistic		6.67942
Prob(F-statistic)		0.01049

Obtaining these figures we cannot highlight many conclusions regarding the relationship between S&P500 stock index and the currency pair USD/JPY except that the two variables have a slight measure of positive correlation.

As we predicted, with the first tightening of the interval, we obtain a higher beta (0.73), almost double the coefficient of determination (6.1%), a higher F-statistic test and a correlation coefficient 2.3 higher as seen in Table 8.

These figures represent a much stronger result compared to the one from the first regression, our presumption gaining a degree of significance.

As mentioned before, in the case of the second and final adjustment, we optimized the interval by eliminating also the period between December 2001 and January 2005, a period in which in order to counter the negative effects of the recession from 2001, the FED kept interest rates below 2%.

Table 8. Results for the S&P Index and USDJPY between 1995 and 2008

Dependent variable: SPXapr95-nov08 Method: Least Squares Included observations: 163		
Variable	Coefficient	Std. Error
USDJPY_95-08	0.737010	0.227847
t-Statistic	Prob.	Corr. Coeff.
3.234666	0.0105	0.05191
R-squared		0.061022
Adjusted R-squared		0.055190
S.E of regression		0.259384
Durbin-Watson stat		0.036997
S.D. dependent var		0.266853
Akaike info criterion		0.151182
Schwarz criterion		0.189142
F-statistic		10.46306
Prob(F-statistic)		0.001478

We introduce the following regression and estimate the coefficients using the least square method:

SPXadjusted = C(1)* USDJPYadjusted + C(2). (7)

The second adjustment brings much more representative results even compared to the first adjustment for all statistical indicators as shown in Table 9. We obtain a beta indicator slightly higher than 1, which indicates that during this last interval that was adjusted twice, the US stock market and the USD/JPY moved exactly at the same pace. The correlation coefficient is three times higher compared to the initial figures,

Gradually adjusting the series according to the criteria in which the carry trade strategy should function properly we managed to obtain significant results in terms of correlation and regression dependency for a model that compares the evolution between the S&P500 stock index and the USD/JPY currency pair.

Table 9. Results for the S&P Index and USDJPY for the final adjusted interval

Dependent variable: SPX_adjusted		
Method: Least Squares		
Included observations: 128		
Variable	Coefficient	Std. Error
USDJPY_adjusted	1.006217	0.263000
t-Statistic	Prob.	Corr. Coeff.
3.825917	0.0002	0.06916
R-squared		0.104081
Adjusted R-squared		0.096970
S.E of regression		0.279824
Durbin-Watson stat		0.046722
S.D. dependent var		0.294466
Akaike info criterion		0.306192
Schwarz criterion		0.350755
F-statistic		14.63764
Prob(F-statistic)		0.000204

The results can be considered as interesting facts if we take into account that the final interval adjustment brought up a Beta indicator, a coefficient or slope, that expresses the volatility of the S&P 500 Index in relation to the volatility of the USDJPY currency pair, at a value almost equal to 1, meaning that stock market index should not vary over time more or less than the USDJPY currency pair.

Albeit the distribution of the USDJPY series has shifted from the normal distribution we can suspect that the size of carry trade strategies, the funds that were financed and rolled from Japan to the U.S. capital market, towards treasury bonds or equities, had a role in influencing the foreign exchange rate between the two countries and the return of stock market index.

Our statistic results are according to the general conclusions made by Hattori and Shin related to yen liabilities which fund not only pure currency carry trades, but also fund the general increase in balance sheets of hedge funds and financial intermediaries.

IV. Conclusion

This study shows that during the periods in which the monetary policy facilitated carry trade strategies, the correlation between the S&P500 stock index and the USDJPY currency pair has grown significantly and we can suspect that the amount of funds that were financed at a very low costs in Japan and headed to the U.S. capital market, towards treasury bonds or equity markets, had a major impact in the studied period and influenced the returns of the stock market indexes and the evolution of the USD/JPY.

The increased value of the kurtosis and the left tail could indicate that during the carry trade period the values of the USDJPY were predominantly high, a result that should indicate that the yen currency had a tendency for depreciation versus the dollar as the carry trade funds exited Japan during that period and headed towards US.

If in the case of the first interval restriction, when we have excluded the period starting from the moment when the FED reduced the key interest rate below 2% in late 2008, we can argue that the higher degree of correlation is generated by market conditions, in a period of a major global economic contraction equity markets drop and weaker currencies like the US dollar are appreciating, in the case of the second adjustments we are not dealing with a severe global crisis, Japan lost around 1.5% of GDP (Gross Domestic Product) in the three quarters of decline from 2001 and in U.S. the recession was merely technically in 2001, not having two consecutive quarters of GDP decline [14]. We can conclude that we have obtained higher results in the level of correlation, and especially the beta indicator, mostly because of the adjustments based on the interest differential needed for carry trade strategies.

The results brought by the analysis of the statistical characteristics of the series should also be taken into account. The market conditions confirmed the tendency of modifying the statistic values, a situation in which asset allocation based on these characteristics must be periodically overviewed and updated.

A fund manager that oversees a portfolio with a global exposure should take into account any changes in monetary policy that can affect large currency carry trades and hence the large flows that might enter or be withdrawn through this circuit and could affect major stock market indices and foreign exchange rates.

For the future we consider analyzing other factors related to monetary policies that might generate speculative funds that could affect important stock market performances and thus the global equity markets

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