

# ANALYSIS OF CARRY TRADE MANAGEMENT MODIFICATIONS IN THE GLOBAL CURRENCY MARKET

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## Abstract

In this paper the author analyzes some aspects of carry trade in the global currency market in which carry trade means that an investor borrows low-yielding currencies and lends high-yielding currencies. Such trading operation gives an opportunity to raise profits from the difference between the interest rates of the corresponding economic zones. One of the aspects of carry trade management is related to the structure of a currency portfolio based on negative trend correlation and positive interest rates correlation between the corresponding currency pairs. The author answers the question whether the annual recalculation of the currency portfolio structure impacts on total result. In the second part of the paper the author analyzes a possibility to feature carry trade by vector autoregressions as a mechanism to forecast a system of interrelated time series of the corresponding currency pairs.

Considered modifications of carry trade showed that the simplest way to manage carry trade in the global currency market is to follow long-term slope of currency portfolio return and not always modern econometric models can help to maximize profits generated by a currency portfolio traded in carry trade style.

*Keywords:* carry trade, currency portfolio, VAR.

*JEL Classification:* G11, G15, G17.

## Introduction

Modern financial markets are fully electronic and access to a financial market is simplified as much as possible offering different opportunities in money investment depending on the features of a market. Market participants like brokers offer different electronic trading platforms that can automate electronic trading very effectively using built-in programming language or API technology. On the other hand the variety of financial instruments creates unique opportunities in making specific transactions like hedging, arbitrage, etc. Carry trade is one of them. In the financial world the term carry trade is known as borrowing money at a lower rate and investing at a higher rate. In fact, such operations can be realized in different markets. Traditionally, the most usable financial instruments are the Japanese yen (due to very low borrowing interest rates) and US bonds (as a non-risk highly liquid financial instrument with guaranteed yield).

In this paper carry trade operations are analyzed in the global currency market from non-institutional investor's side, i.d. from a private person. In the global currency market carry trade means that an investor borrows low-yielding currencies and lends high-yielding currencies. Such trading operation gives an opportunity to raise profits from the difference between the interest rates of the corresponding economic zones. Unfortunately, carry trade operations have very high currency exchange risk especially in trading with margin which increases losses and profits in proportion to a margin ratio. The main problems of trading in carry trade style are closely related to the moment of opening and closing carry trade, currency portfolio return drawdown and portfolio structure.

## Basics of carry trade in the global currency market

In carry trade operations the difference between interest rates plays the main role: the greater interest rate spread the higher potential yield. For instance, in the Figure 1 there is the difference between the interest rates in Australia (AU) and Switzerland (CH), Switzerland and Japan (JP), respectively. Average spread between Australian and Swiss interest rates is equal to 3.5%, Swiss and Japan – 1%. Traditionally, the high-yielding currencies are NZD (New Zealand dollar), AUD (Australian dollar), GBP (British pound), CAD (Canadian dollar), EUR (European euro), CHF (Swiss franc), JPY (Japanese yen) and USD (US dollar), which periodically becomes more or less yielding currency vs. others (Alpari, 2011). The combination of these currency creates a variety of currency pairs which can be used in a currency portfolio traded in carry trade style.

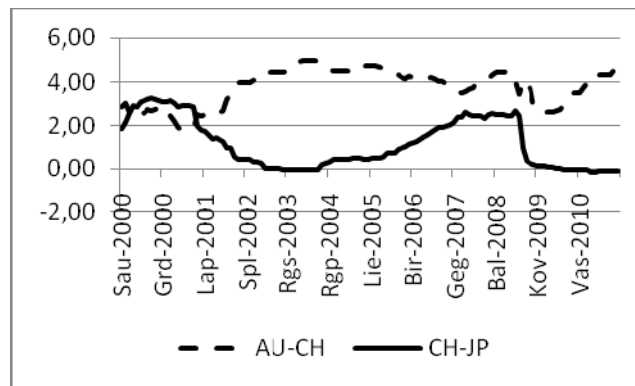


Figure 1. Interest rate spread, %

A private investor can borrow the corresponding currency and convert into another taking maximum interest rate spread, for instance, buying currency pair NZDJPY or AUDJPY. However, there is a very high currency exchange risk in such kind of operations buying only one currency pair. How to minimize this currency exchange risk and when to initialize carry trade in the global currency market are the main problems for a private investor trading with margin.

### Carry trade based on negative trend correlation and positive interest rates correlation

One of the methods of carry trade optimization is currency portfolio building based on negative trend correlation between two pairs and positive interest rates correlation. Such combination of two parameters allows accumulating positive swaps on two currency pairs while the first currency pair tries to compensate the second one's movement. (Kozlovskis, 2007) The main question is whether the total result depends on the currency portfolio structure built on the corresponding data or it should be rebuilt each year, for instance.

Five currency portfolios (AUDCHF-CHFJPY, AUDUSD-USDJPY, EURUSD-USDCHF, GBPUSD-USDCHF, NZDUSD-USDJPY) were chosen to check the impact of annual recalculating of currency portfolio structure on the total result. The author used daily close prices from 2003 to 2010 and currency pairs with correlation coefficient not greater than -0.81.

The Figure 2 shows the correlation values between two currency pairs AUDCHF and CHFJPY from 2003 to 2010. The correlation values are non-stable each year. If an investor follows strict rules on strong correlative interdependences, he will be not able to build a currency portfolio from 2006 (because a portfolio is formed on the previous data of 2005, when the correlation value is almost 0).

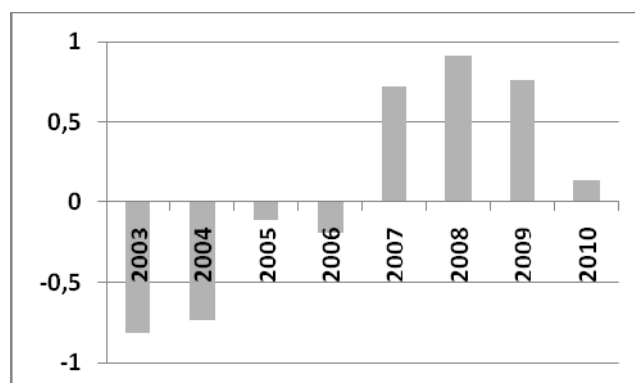


Figure 2. Correlation value between two currency pairs AUDCHF and CHFJPY from 2003 to 2010

The same result is typical for any currency pair because of macroeconomic shifts in the corresponding economic zones. Trading such currency portfolio it is extremely important to choose negatively correlated currency pairs. In this paper the author did not use the strict limitation related to correlation values.

The Table 1 represents the results of currency portfolio management during some years. Analyzing daily data of the previous a private investor builds the structure of a currency portfolio and manages the

portfolio during all time to the end of 2010 without recalculating portfolio structure. The same results were typical for other currency pairs with correlation value smaller than -0.81.

**Table 1.** Currency portfolio management without annual recalculating of its structure

	Currency portfolio	Portfolio structure, lots	Hold period (total), days	Profit by difference in price, USD	Average interest rates spread	Profit by interest rates, USD
1	2004-2010 (based on data of 2003)					
	audCHF	0.16	1057	390	3.5%	1630
	CHFJPY	1.12		-1320	1.0%	3244
	Total, USD (approx.)			-930		4874
2	2005-2010 (based on data of 2004)					
	audCHF	0.35	1004	4200	3.5%	3382
	CHFJPY	1.19		1510	1%	3276
	Total, USD (approx.)			5710		6668
3	2006-2010 (based on data of 2005)					
	audCHF	0.25	1030	1390	3.5%	2528
	CHFJPY	1.21		-3690	1%	3435
	Total, USD (approx.)			-2300		5963
4	2007-2010 (based on data of 2006)					
	audCHF	1.17	466	-950	3.5%	5232
	CHFJPY	0.72		-1090	1%	923
	Total, USD (approx.)			-2040		6155
5	2008-2010 (based on data of 2007)					
	audCHF	0.1	436	170	3.5%	418
	CHFJPY	0.1		-250	1%	119
	Total, USD (approx.)			-80		537
6	2009-2010 (based on data of 2008)					
	audCHF	0.1	371	1630	3.5%	355
	CHFJPY	0.1		-150	1%	101
	Total, USD (approx.)			1480		456
7	2010 (based on data of 2009)					
	audCHF	0.1	102	85	3.5%	97
	CHFJPY	0.1		290	1%	28
	Total, USD (approx.)			375		125

The Table 2 represents the results of currency portfolio management during corresponding years with recalculating the portfolio structure. It means that in the end of each year an investor analyzes daily data (close prices) and forms a new portfolio with new structure. The same results were typical for other currency pairs with correlation value smaller than -0.81.

**Table 2.** Currency portfolio management with annual recalculating of its structure

	Currency portfolio	Portfolio structure, lots	Hold period (total), days	Profit by difference in price, USD	Average interest rates spread	Profit by interest rates, USD
1	2004					
	audCHF	0.16	240	-68	3.5%	368
	CHFJPY	1.12		84	1.0%	736
	Total, USD (approx.)			16		1104
2	2005					
	audCHF	0.35	248	65	3.5%	832
	CHFJPY	1.19		514	1%	808
	Total, USD (approx.)			579		1640
3	2006					
	audCHF	0.25	101	56	3.5%	242
	CHFJPY	1.21		431	1%	324
	Total, USD (approx.)			487		576

		2007				
4	audCHF	1.17	31	-1152	3.5%	347
	CHFJPY	0.72		-52	1%	61
	Total, USD (approx.)				-1204	
		2008				
5	audCHF	0.1	65	-52	3.5%	62
	CHFJPY	0.1		-11	1%	17
	Total, USD (approx.)				-63	
		2009				
6	audCHF	0.1	195	129	3.5%	186
	CHFJPY	0.1		39	1%	53
	Total, USD (approx.)				168	
		2010				
7	audCHF	0.1	51	8	3.5%	48
	CHFJPY	0.1		29	1%	13
	Total, USD (approx.)				37	

The results shown in the Table 1 and Table 2 eliminates the interesting thing that a private investor can initialize carry trade operations using the previous year as a benchmark for the corresponding future portfolio return with non-changing structure based on the benchmark year. Such approach can help to maximize potential profits (see Table 3). Each year recalculating the currency portfolio structure also gives profitable carry trade positions but its value decreases.

**Table 3.** Results of currency portfolio management during time periods

Period	without recalculating	with recalculating
2004-2010	3944	4127
2005-2010	12378	3007
2006-2010	3663	788
2007-2010	4115	-275
2008-2010	457	521
2009-2010	1936	505
2010	500	98

Perhaps, each year recalculating the currency portfolio structure takes into account the imbalance between the currency pairs and decreases it with a new portfolio structure. Without changes it probably can use this effect for maximizing profits by carry trade.

### Carry trade featured by VAR

Carry trade is used for long-term time horizon. If two currency pairs are impacted by each other, it could be rational to use this interconnection. The main idea is to feature carry trade by vector autoregressions (VAR) used on higher time frames. One of the features of VAR is an opportunity to forecast a system of interrelated time series. Thus, evaluated VAR could forecast the movements of two currency pairs in higher time frames (for instance, weekly or monthly). If forecasted movements are favorable for carry trade, a private investor should participate in it.

As known, the mathematical representation of a VAR is:

$$y_t = \sum_{i=1}^p A_i y_{t-i} + Bx_t + \epsilon_t \quad (1)$$

where  $y_{t-i}$  - a vector of endogenous variables;  
 $x_t$  - a  $d$  vector of exogenous variables;  
 $A_i, B$  - matrices of coefficients to be estimated;  
 $\epsilon_t$  - a vector of innovations.

In this case to simplify VAR models the author did not use any exogenous variables. Empirical results are based on the time period from 2002.01.06 to 2010.12.26. The initial data were weekly close prices. If the sum of forecasted returns of currency pairs was positive then carry trade was opened for one week ahead. The Table 4 shows the results of currency portfolio management in carry trade style.

**Table 4.** Results of currency portfolio management by VAR from 2002.01.06 to 2010.12.26

	Currency portfolio	Portfolio structure, lots	Hold period (total), days	Profit by difference in price, USD	Average interest rates spread	Profit by interest rates, USD
1	audchf	0.10	3185	2134	3.5%	2625
	chfjpy	0.10			1.0%	875
	Total, USD (approx.)				2134	
2	audusd	0.15	126	37	2.0%	103
	usdjpy	0.10			3.0%	103
	Total, USD (approx.)				37	
3	eurusd	0.30	112	-74	0.0%	0
	usdchf	0.10			2.0%	61
	Total, USD (approx.)				-74	
4	gbpusd	0.31	105	-45	1.5%	134
	usdchf	0.10			2.0%	57
	Total, USD (approx.)				-45	
5	nzdusd	0.10	112	-83	2.0%	46
	usdjpy	0.10			3.0%	92
	Total, USD (approx.)				-83	

In the Table 4 it is clearly seen that currency portfolio was held too small period during almost 8 years except the one. Under taken conditions of opening carry trade the use of VAR emphasizes on forecasting future prices of financial assets but not on using the potential of interest rates spread.

### Conclusions

Carry trade can be also traded in the global currency market. Using margin a private investor should be very careful with opening positions in carry trade style. In the paper it is shown that

- 1) A private investor should choose a benchmark year, possibly a year with minimum correlation value between the currency pairs used in the currency portfolio traded in carry trade style.
- 2) It is not necessary to recalculate the structure of a currency portfolio because it leads to decreasing profits and losing the common long-term trend in portfolio return.
- 3) The author did not find any advantages of featuring carry trade by VAR.
- 4) The most effective approach of managing carry trade for a private investor is to follow long-term slope of currency portfolio return.

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