



An Empirical Evaluation Of Foreign Exchange Market Efficiency Of Chfjpy Currency Pair

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ABSTRACT

The purpose of this study is to analyze the efficiency of foreign exchange market using Random Walk Models. For the efficient market hypothesis, daily rates of CHFJPY currency pairs for 5 years period from 01/01/2008 to 31/12/2012 are taken. It is found that the foreign exchange market is not weak form efficient in respect of this currency pair, and traders of foreign exchange in respect of these current pair is able to predict their future values based on their values in the recent past.

KEYWORDS

CHFJPY, Unit root, Market efficiency, Randomness, ADF, Autocorrelation

Introduction

The purpose of this study is to analyze the efficiency of foreign exchange market using Random Walk Models, viz., Serial Correlation test (Autocorrelation test) and Augmented Dickey Fuller (ADF) test (also called as Unit root test). This is because of the fact that Efficient Market Theory and the Random Walk Model have been at the centre of debate in financial literature for several decades. In developing economies like India, analyzing the efficiency of the functioning of the foreign exchange market may help to solve the concerns of the investors and also can simulate their interest in foreign exchange market activities.

Methodology:

For the efficient market hypothesis, daily rates of selected currency pairs for 5 years period from 01/01/2008 to 31/12/2012 are taken. To test the randomness in the return sequence of selected currency pairs as well as the efficiency of the foreign exchange market in terms of these currency pairs, the statistical tools such as Autocorrelation (Serial correlation) and Augmented Dickey Fuller (ADF) test are used in the present study.

Objectives of the Study

The present study is undertaken with the following objectives:

1. To analyze the efficiency of the Foreign Exchange Markets relating to CHFJPY currency pairs.
2. To test whether the return from Foreign Exchange Market has a unit root or not in relation to CHFJPY Currency pair.

Review of Literature:

Christos Kollias et al. (2012), discussed that both the goods market hypothesis and the portfolio balance theory, suggested a nexus between exchange rates and stock prices, albeit with a different direction of causality. They used daily data, takes up the issue of the linkages between stock prices and exchange rates in the case of the euro-dollar rate and two composite European stock market indices: the FTSE Eurotop 300 and FTSE eTX All-Share index. The empirical results provided evidence of time-varying causality between the two markets. Mayowa Gabriel Ajao and Richard Osayuwu (2012) tested

weak form efficient market hypothesis in the Nigerian capital market. The serial correlation technique of data analysis was used to test for independence of successive price movement and the distributive pattern whileruns test was used to test for randomness of share price movement. They concluded that the past and future prices of stocks traded in the Nigerian Stock market are independent. Kuntara and Lee (2008) in their article on "Weak-Form Efficiency in Currency Markets" found the currencies trend and technical trading rules produced statistically and economically significant profits. In other words, foreign exchange markets were weak-form inefficient. The study examined this phenomenon with use of a new database of currency futures for 1975-2006 that included old and newly liquid currencies. The findings from the recent data are contradictory. The profitability of trend following eroded for major currencies and their associated cross exchange rates around the mid-1990s. Newly liquid currencies after 2000 do trend, however, just as major currencies did in earlier years. The evidence is consistent with early weak-form inefficiency followed by vanishing trends as traders learn and adapt their strategies. Reddy and Sebastin (2008) found that entropic analysis is a novel area in the Indian financial market and there is a lot of scope for the application of entropic analysis in the Indian markets. They applied entropic analysis to study interaction between forex and stock market and transfer entropy is found to be suited and it was found that only low level interactions existed between the two markets in India although theory suggests interactive relationship between the two markets. Samuel Dupernex (2007) defined and discussed Random Walk Model and outlined its relationship to the efficiency of markets. Empirical evidence is used to investigate the arguments for and against the model. He concluded that the EMH can be used as a benchmark for measuring the efficiency of markets, and from this the traders will have at least a rough idea as to whether the stocks are likely to follow a random walk.

Autocorrelation (Serial Correlation)

The autocorrelation on foreign exchange market returns series of selected currency pairs is run for 20 lags.

1.1 Autocorrelation of CHFJPY Currency Pair

Table 1.1
Autocorrelation Coefficients and Q Statistics for Price Movements in CHFJPY Currency Pair for Lags 1 through 20

Lag	Levels			First Difference		
	AC	Q Stat	p Value	AC	Q Stat	p Value
1	0.0420	2.31	0.1286	-0.4720**	291.06	0.0000
2	-0.0110	0.16	0.6898	-0.0140	0.25	0.6171
3	-0.0370	1.84	0.1755	-0.0360	1.70	0.1923
4	0.0060	0.05	0.8239	0.0200	0.51	0.4751
5	0.0110	0.17	0.6803	0.0010	0.00	1.0000
6	0.0160	0.32	0.5705	-0.0150	0.28	0.5967
7	0.0470	2.84	0.0917	0.0300	1.18	0.2774
8	0.0210	0.60	0.4389	0.0280	1.03	0.3102
9	-0.0580*	4.44	0.0351	-0.0710**	6.57	0.0104
10	-0.0010	0.00	0.9748	0.0220	0.63	0.4274
11	0.0140	0.25	0.6192	0.0020	0.00	1.0000
12	0.0260	0.86	0.3529	0.0050	0.03	0.8625
13	0.0270	0.97	0.3252	0.0280	1.07	0.3009
14	-0.0250	0.80	0.3723	-0.0670*	5.83	0.0158
15	0.0480	3.04	0.0812	0.0520	3.62	0.0571
16	0.0220	0.62	0.4314	-0.0080	0.08	0.7773
17	0.0090	0.10	0.7555	-0.0070	0.08	0.7773
18	0.0120	0.18	0.6722	0.0080	0.08	0.7773
19	-0.0020	0.01	0.9383	-0.0010	0.00	1.0000
20	-0.0120	0.20	0.6555	0.0010	0.00	1.0000
All Lags		19.74	0.4740		314.00	0.0000

***Significant at 5% level; **Significant at 1% level**

From the table, it is understood that the autocorrelation for levels at all lags except at lag 9 is insignificant. However, the Q statistic of 19.74 for overall serial correlation from lag 1 through lag 20 is also not significant at required level. Hence, it is found that the daily foreign exchange market return series of CHFJPY currency pair is integrated of order zero I(0). However, the autocorrelation for the first differences of the return series of CHFJPY currency pair is negative and significant at three lags, i.e., at lag 1, lag 9 and lag 14. The significant negative autocorrelation indicates mean reversion in the daily price returns series of CHFJPY currency pair with stationary trend (first differences). At the same time, the serial correlation of daily returns with stationary trend decays gradually as the lag length increases. This indicated that historical information embedded in longer period of lags is less influential in determining the future price than that of

information embedded in shorter lag lengths. The overall autocorrelation coefficients from lag one through lag twenty for this currency pair is significant at one per cent level. This indicates that there is no randomness in the first differences of return series in turn establishing the fact that foreign exchange market is not weak form efficient in respect of CHFJPY currency pair.

1.2 Augmented Dickey-Fuller Test of CHFJPY Currency Pair Table 1. 2

ADF Test Results for Return Series of CHFJPY Currency Pair

Particulars		Without Drift & Trend (None)	With Drift (Constant)	With Drift & Trend (Constant & Trend)
ADF test statistics		-34.62**	-34.60**	-34.59**
#Test Critical values	1% level	-2.57	-3.44	-3.97
	5% level	-1.94	-2.86	-3.41
	10% level	-1.62	-2.57	-3.13
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(CHFJPYRT)				
CHFJPYRT(-1)	Coefficient	-0.9579	-0.9580	-0.9580
	SE	0.0277	0.0277	0.0277
	t-Statistic	-34.62**	-34.60**	-34.59**
	p Value	0.0000	0.0000	0.0000
C	Coefficient		-0.0001	-0.0001
	SE		0.0002	0.0004
	t-Statistic		-0.27	-0.29
	p Value		0.7841	0.7710
Trend	Coefficient			0.0000
	SE			0.0000
	t-Statistic			0.18
	p Value			0.8588
R ²	0.4792	0.4793	0.4793	
Adjusted R ²	0.4792	0.4789	0.4785	
SE of Regression	0.0073	0.0073	0.0073	
Sum of Squared Residuals	0.0697	0.0697	0.0697	
F Value of Regression		1197.46**	598.30**	
p Value		0.0000	0.0000	

#MacKinnon one-sided p-values; **Significant at 1% level

Table 1.2 presents the ADF test results for return sequence of CHFJPY currency pair. From the table, it can be observed that the ADF test statistic, -34.62, -34.60 and -34.59 obtained from test equation without constant and trend (none), with constant and with constant and trend is significantly less than the MacKinnon critical t-values at 1 per cent, 5 per cent and 10 per cent levels. Due to significant ADF values less than MacKinnon test statistic for all three levels (1%, 5% & 10%), the presence of unit root in the series is rejected and hence it is understood that the return sequence for CHFJPY currency pair has not followed a random walk. It is rather stationary and therefore the foreign exchange market in respect of this currency pair is inefficient. From the results of the test-equation with constant as well as with constant and trend, it becomes apparent that the coefficient against constant in both equation and coefficient of trend in equation with constant and trend is zero and values are significant (-34.62, -34.60 and -34.59). This has supported that there is no unit root in return sequence of CHFJPY currency pair. On the whole, it is found that CHFJPY does not have unit root and do not follow random walk and its future price is predictable (foreign currency market is inefficient). The CHFJPY currency pair has behaved non-randomly in the foreign exchange market. That is, the current prices of these currency pairs are depending upon their prices in the recent past. The daily foreign exchange market return series of CHFJPY currency pairs are integrated of order zero I(0) but not integrated of order one I(1). That is, there is a randomness in the returns series at levels (there is no serial dependence in the daily price returns series at levels) but not at the first difference in the case of CHFJPY currency pair. Based on the findings, the traders of foreign currencies can have faith in technical analysis to predict the future exchange rates based on the exchange rates in the recent past.

Conclusion:

It is concluded that there is non-randomness in the daily exchange rate return series of CHFJPY currency pair. This is also supported by the presence of serial correlation in the daily exchange rate return series as obtained from Autocorrelation analysis and absence of unit root as revealed by ADF test. From Autocorrelation test and ADF test, it is concluded that the current or future exchange rate is predictable from the exchanges in the recent past for CHFJPY currency pairs.

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