Distribution Agreement

Signature:
Jishu Zong 04/20/2009

Date

The Dynamic Relationship between the Exchange Rate of the Yen/USD and the Stock Prices in the Financial Market of United States

by

Jishu Zong

Adviser
Tetyana Molodtsova

Department of
Economics

_______ Tetyana Molodtsova________
Full Name of Adviser
Adviser

__________Elena Pesevento _______
Full Name of Committee Member 2

_________David Borthwick________
Full Name of Committee Member 3

__________4/20/2009___________
Date

The Dynamic Relationship between the Exchange Rate of the Yen/USD and the Stock Prices in the Financial Market of United States

By

Jishu Zong

Adviser
Tetyana Molodtsova

An abstract of
A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Department of
Economics

2009

Abstract

The Dynamic Relationship between the Exchange Rate of the Yen/USD and the Stock Prices in the Financial Market of United States

By Jishu Zong

This paper studies the relationship between U.S. stock prices and the exchange rate of the Japanese Yen to the U.S. Dollar. The motivation is to establish the causal relation between the performance of the U.S. stock market and the value of the Yen/USD in the foreign exchange market. Time series techniques include, the ADF test, the Cointegration test and the Vector Error Correction Model, are applied using the daily data from January 1, 2003 to January 1, 2006. The empirical results suggest a long run relationship between changes in U.S. stock prices on the previous trading day and the current exchange rate of the Yen/USD.This leads to the conclusion that U.S. stock prices hold a predictive power over the exchange rate of Yen/USD.

The Dynamic Relationship between the Exchange Rate of theYen/USD and the Stock Prices in the Financial Market of United States

By

Jishu Zong

Adviser
Tetyana Molodtsova

A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Department of
Economics

2009

Table of Contents

I. Introduction

The relationship between exchange rates and stock prices is of great interest to many academics. In the past twenty years, numerous studies have been carried out to investigate the interactions between exchange rates and stock prices in different financial markets around the world. The motivation of these studies is to establish the causal link between leading prices in the foreign exchange market and the stock market in the financial market of a particular country. However, most studies have focused on explaining the high-frequency, statistical relationship between stock prices and exchange rates within a country.

With the increasing integration of the global economy, the international financial market exhibits close interactions between exchange rates and stock prices across countries. Currently, there are only a few analyses that focus on the dynamic relationship of financial markets between countries, especially the interrelationship between the exchange rate of the currency in one country and the stock prices of another country. Amongst the interactions between major financial markets, the relationship between the exchange rate of the Yen and the stock prices in the U.S. is the most intriguing, as both U.S. and Japan are major players in the global financial market. Given that Japan is ranked third globally in the total value of international trade and that the U.S. is one of Japan’s major trading partners, changes in the financial market of one country will inevitably affect that of the other.

The results of previous studies on the relationship between Japan’s exchange rate and the stock prices in Japan as well as the intertemporal relation between the U.S.

and the Japanese stock markets reveal that an increase in the stock prices in Japan causes a depreciation of the Yen in the foreign exchange market (C.Nieh et al., 2001). There is also a strong correlation between the open to close returns for U.S. stocks on the previous trading day and the Japanese equity market performance in the current period (K.G. Becker et al., 1990). Since the performance of the U.S. market has a great impact on Japanese equities, the performance of the Japanese stock market, in turn, heavily affects the exchange rate of the Yen; it is suspected that the movements in the U.S. stock market hold predictive capabilities for the exchange rate of the Yen via the channel of the Japanese stock market. The purpose of this paper is to investigate the causality between these two financial variables. This study will first draw a hypothesis about the predicting power of the U.S. stock market prices on the price of the Yen in the foreign exchange market. The Granger's causality test will be implemented to test the short run relationship.

The main contributions of this study are twofold. First of all, it predicts the direction of the exchange rate of Yen/USD in the short run based on the changes in U.S. stock market prices. This may provide insights for currency traders and investors to make decisions about short term trading. Second, since the Japanese economy relies heavily on exports, and the U.S. is one of the major countries for Japanese exports, the exchange rate of Yen/USD poses an immense influence on the prices of Japanese exports. Thus, the link between U.S. stock prices and the exchange rate of Yen/USD bears long term policy implications for the Japanese government's attempt to stabilize their currency.

The rest of the paper is organized as follows: Section II establishes the theoretical background by reviewing previous studies and the results obtained in this field. Section III presents the data. Whereas Section IV the methodologies used to test the hypothesis. The empirical results will be discussed in Section V and Section VI summarizes the results and concludes this paper.

II. Literature Review

The dynamic relationship between stock prices and exchange rates has drawn the attention of numerous economists. Many researchers have studied the causal relationship between stock market prices and exchange rates in different countries with diverse economic environments. The results are somewhat mixed. Two different causal relations are supported by these studies. The first, known as the traditional approach, was first discussed by Aggarwal (1981) in his paper "Exchange Rates and Stock Prices: A Study of the US Capital Markets under Floating Exchange Rates". Aggarwal argues that a change in exchange rates could alter the stock prices of multinational firms; in other words, an adjustment in exchange rates will modify the value of firms' foreign operations, which will be reflected on their balance sheets as profit or loss. Consequently, the profit or loss contributes to the balance of the current account and the stock prices of that firm react accordingly (Granger, Huang and Yang, 2000). From this point of view, a change in the exchange rate is expected to give rise to changes in stock prices. The second causal relation, specified in the portfolio approach, states that a decrease in stock prices will cause a reduction in the wealth of domestic investors, which in turn leads to a lower demand for money with an ensuing lower interest rate. The lower interest rates encourage capital outflow *ceteris paribus*, thereby resulting in the depreciation of the currency (Granger, Huang and Yang, 2000). The relationship between stock prices and the exchange rate in Japan is examined in Nieh and Lee's paper (2001) "Dynamic relationship between stock prices and exchange rates for G-7 countries". One of the major findings is that an increase in stock prices causes the depreciation of the Yen in Japan on the next trading day. These findings have proved the linkage between the Japanese stock prices and Japan's exchange rate and they will be used to draw the hypothesis for this study.

Many studies have also focused on the area of international equity market linkage. Bennett and Kelleher (1988), Dwyer and Herfer (1988), and King and Wadhwani (1988) have found that the correlation between the U.S. and Japan market returns is generally significant. Becker, Finnerty and Gupta (1990) further study the synchronization of stock price movements in the U.S. and Japanese markets using more precise data: instead of employing only the closing data of the market, they used both opening and closing prices to test the overnight return of the other market. The results indicated a strong correlation between the open to close returns for U.S. stocks on the previous trading day and the Japanese equity market performance in the current period. Moreover, the U.S. stock market movements predict open to close returns in Japan the next day remarkably well (Becker et al., 1990).

Yau and Nieh (2006) have studied the interrelationship between stock prices of Taiwan and Japan and the NTD/Yen exchange rate. Besides using the linear conventional time series techniques, they also employ non-linear techniques to increase the testing power and thus to obtain more efficient estimates. Advanced time series techniques, elaborated in the paper by Zivot and Andrews (1992), are implemented to develop a unit root test with an endogenous structural break. This technique has been regarded as a more suitable test for the stationarity of series because it overthrew the implicit assumption made by the conventional unit root tests that the structural break is exogenous. Also, a multivariate extension of the univariate unit root test, proposed by Gregory and Hensen (1996) is used to enable testing over periods incorporating structural breaks. Yau and Nieh (2006) overcame the difficulty of interpreting the estimate coefficients of a VAR model by applying impulse response functions (IRF) and variance decomposition (VDC). Both long term and short term interrelationships between the stock prices of Taiwan and Japan and the NTD/Yen exchange rate were analyzed. The findings indicate that the stock prices of Taiwan and Japan impact each other in the short term. In addition, they demonstrate that in terms of the relationship between stock prices and exchange rates, the portfolio approach is supported for the short term, while the traditional approach is more plausible for the long term in Taiwan’s financial market (Yau and Neih, 2006).

In general, previous empirical findings suggest that the U.S. stock market movements predict the open to close returns in Japan the next day, and an increase in U.S. stock prices causes the depreciation of the Yen in Japan on the next trading day. Based on the theoretical background established by the previous studies, this paper will further investigate the linkage between the U.S. stock prices and the Yen/USD exchange rate.

III. Data

The sample period selected is from January 1, 2003 to January 1, 2006. The rationale behind the selection of this specific sample period is that the global economic environment is relatively stable during this period of time; as such, the behaviors of the stock prices and exchange rates can be studied without considering much of the economic uncertainty. Data on the Nikkei 250 Average Index, the Dow Jones Industry Index and the exchange rate between the Japanese Yen (Yen) and the U.S. Dollar (USD) were obtained from Data Stream. Daily data is used to capture the interactions between the variables for the reasons that in a financial world where information flow is almost perfect, the time lag would be fairly short; investors react almost immediately to fluctuations in the markets. As the exchange rates and stock prices indices are dynamic and their fluctuations are robust and vigorous, pooling lengthy periods may not capture the hit-and-run behaviors and, thus, fail to provide investors and traders real time information.

Figure 1 presents the percentage change of the monthly average of the Nikkei 250 Index, the Dow Jones Industry Index and the Yen/USD exchange rate in the sample period. By representing the data visually, co-movement between the Nikkei 250 Index and the Dow Jones Industry Index is evident. There is also a noticeable synchronization between the Yen/USD rate and the Dow Jones Industry Index. This provides a particularly interesting opportunity to study the relationship between US stock prices and the exchange rate of the Dollar to the Yen. The Unit root test, Cointegration test and Vector Error Correction Model (VECM) are implemented to examine this relationship.

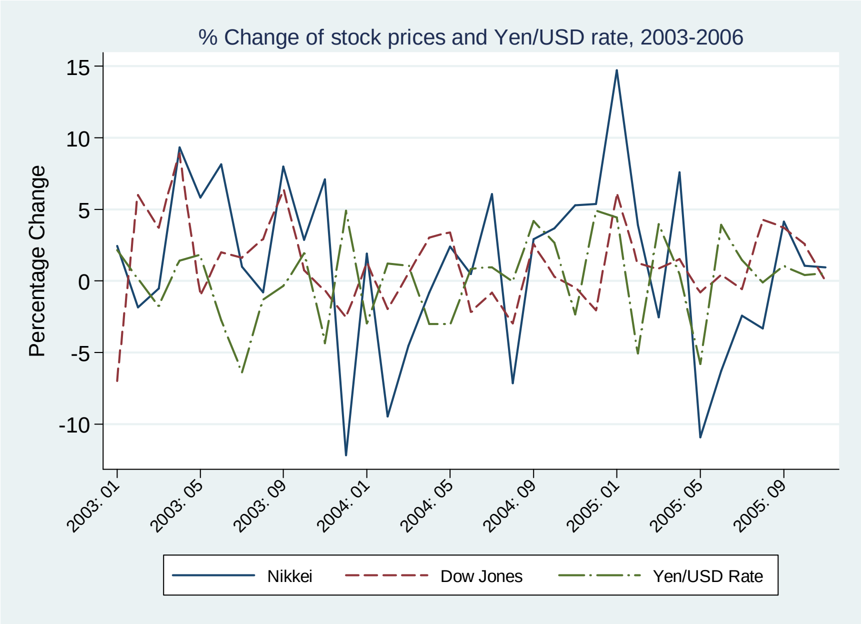

Fig. 1. Time series of U.S. and Japan stock prices and the Yen/USD exchange rate

IV. Methodologies

Unit root test

Prior to carrying out the Granger Causality test (1969), it is necessary to test for the stationarity (the presence of unit root) of each variable. A non-stationary time series Y_t is said to be integrated of order d, [$Y_t \sim I(d)$], if it achieves stationarity after being differenced d times. To determine the order of integration, unit root tests have been developed. The most common unit root test is known as Augmented Dickey Fuller test (ADF), in which a hierarchy of three models is formulated and tested.

(1) $$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \varepsilon_t$$

(2) $$\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \varepsilon_t$$

(3) $$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \varepsilon_t$$

Model (1) is a pure Random Walk Model which will first be used to test for the zero-value coefficient of Y_{t-1} Model (2) includes a drift. Model (3) is a Random Walk Model with both a time trend and a drift.

The null hypothesis for the ADF is H_0: $\gamma=0$, with the alternative H_1: $\gamma<0$. By comparing the test statistic obtained with the relevant critical value for the Augmented Dickey-Fuller Test; if the test statistic (in absolute value) is greater than the critical value, the null hypothesis is rejected and there is no sufficient evidence to indicate the presence of the unit root.

Cointegration test

If variables are non-stationary (i.e. the unit roots are present in the variables), the Engle and Granger two-step cointegration test will be used to capture the long-run equilibrium relationship between non-stationary variables. The first step involves the OLS estimation of the following static cointegration regressions:

(4) $SP_t = \alpha_t + \beta ER_t + \varepsilon_{1t}$

(5) $ER_t = \alpha_t + \beta SP_t + \varepsilon_{2t}$

where α_t denotes a deterministic term which can be either an intercept (γ) or an intercept with a linear time trend ($\gamma+\delta t$); SP denotes the stock prices and ER denotes the exchange rate. Then, the ADF test is applied to the estimated residuals ($\hat{\varepsilon}_{1t}$ and $\hat{\varepsilon}_{2t}$ obtained from the OLS estimation) to find the possible cointegration between (4) and (5).

(6) $\Delta\hat{\varepsilon}_t = \rho\hat{\varepsilon}_{t-1} + \sum_{i=1}^{p}\varphi_i \Delta\hat{\varepsilon}_{t-i} + \eta t$

The null hypothesis is H_0: SP_t and ER_t are not cointegrated (i.e.$\rho=0$), and the null hypothesis will be rejected if the ADF test statistic for the residuals is greater than the critical value.

Granger Causality tests

If the variables are non-stationary *and* cointegrated, the appropriate method to examine the causal relations is the Vector Error Correction Model (VECM).

$$(7)\qquad \Delta SP_t = \alpha_0 + \varphi_1 (SP_{t-1} + \omega ER_{t-1}) + \sum_{i=1}^{q} \alpha_{1i} \Delta SP_{t-i} + \sum_{i=1}^{q} \alpha_{2i} \Delta ER_{t-i} + \xi_{1t}$$

$$(8)\qquad \Delta ER_t = \beta_0 + \varphi_2 (SP_{t-1} + \omega ER_{t-1}) + \sum_{i=1}^{r} \beta_{1i} \Delta ER_{t-i} + \sum_{i=1}^{r} \beta_{2i} \Delta SP_{t-i} + \xi_{2t}$$

A hypothesis is drawn from each model:

H_0: $\alpha_{21}=\alpha_{22}=\ldots=\alpha_{2q}=0$ from model (7)

H_0: $\beta_{21}=\beta_{22}=\ldots=\beta_{2r}=0$ from model (8)

An F-test is conducted on each of the null hypotheses. The first step is to estimate the following restricted equation by OLS:

$$(9)\qquad SP_t = c_t + \sum_{i=1}^{q} \gamma_i SP_{t-i} + \mu_{1t}$$

$$(10)\qquad ER_t = d_t + \sum_{i=1}^{r} \delta_i ER_{t-i} + \mu_{2t}$$

Then, their respective sums of squared residuals are computed.

$$RSS_{11} = \sum_{t=1}^{T} \hat{\xi}_{1t}^2 \qquad RSS_{12} = \sum_{t=1}^{T} \hat{\mu}_{1t}^2$$

$$RSS_{21} = \sum_{t=1}^{T} \hat{\xi}_{2t}^2 \qquad RSS_{22} = \sum_{t=1}^{T} \hat{\mu}_{1t}^2$$

Finally, the test statistics TS_1 and TS_2 are calculated and the test statistics are compared with the F-statistics.

$$TS_1 = \frac{(RSS_{12} - RSS_{11})/q}{RSS_{11}/(T-2q-1)} \sim F_{q,T-2q-1}$$

$$TS_2 = \frac{(RSS_{22} - RSS_{21})/r}{RSS_{21}/(T-2r-1)} \sim F_{r,T-2r-1}$$

The null hypothesis $H_{0:}\ \alpha_{21}=\alpha_{22}=\ldots=\alpha_{2q}=0$ is rejected if the test statistic is greater than the corresponding critical value. Failing to reject the null hypothesis implies that the exchange rate does not Granger cause the stock prices. Likewise, failing to reject $H_{0:}\ \beta_{21}=\beta_{22}=\ldots=\beta_{2r}=0$ suggests that stock prices do not Granger cause the exchange rate.

On the other hand, if the variables are stationary, an adequate method to examine the causal relations is a Vector Autoregressive Model (VAR), which is a Vector Error Correction Model (VECM) without the error correction term:

$$(11) \qquad \Delta SP_t = \alpha_0 + \sum_{i=1}^{q} \alpha_{1i} \Delta SP_{t-i} + \sum_{i=1}^{q} \alpha_{2i} \Delta ER_{t-i} + \xi_{1t}$$

$$(12) \qquad \Delta ER_t = \beta_0 + \sum_{i=1}^{r} \beta_{1i} \Delta ER_{t-i} + \sum_{i=1}^{r} \beta_{2i} \Delta SP_{t-i} + \xi_{2t}$$

In this study, the VECM is employed as the main method to test the causal relation.

V. Empirical results

The first step is to test for the presence of the unit roots in the variables. Both the level data and the first differenced data are used to run the ADF test. Akaike's information criterion (AIC) is employed to determine the optimal number of lags based on the "principle of parsimony", and the optimal number of lags is presented in the bracket next to the test statistic. The results in Table 1 show that the null hypothesis of non-stationarity cannot be rejected for any of the level series at the 1%

significance level. However, after first differencing, the null hypothesis is rejected for all series.

A more powerful unit root test, the DF-GLS test, is carried out to further detect the presence of the unit roots. Optimal lags are selected using both the Schwert Criterion (SC) and the Modified Akaike's Information Criterion (MAIC). The test statistics in Table 1 show that the null hypothesis cannot be rejected for all the level series. After the data is first differenced, however, the null hypothesis is only rejected for the Japanese stock variable since the DF-GLS test statistic for the Japanese stock under the SC is -22.227, which is much smaller than the 1% critical value of the DF-GLS. The result indicates the presence of the unit roots in the Yen/USD exchange rate variable and the U.S. stock prices variable. Therefore, a cointegration test is necessary to investigate the cointegrating relationship between these two non-stationary variables.

Table 1

ADF and DF-GLS unit root tests

Variable	JP Stock		US Stock		EX Rate	
DF-GLS	SC	MAIC	SC	MAIC	SC	MAIC
Level	-2.023 (1)	-2.017 (13)	-2.130 (1)	-1.847 (7)	-1.383 (1)	-1.383 (1)
First difference	-22.227 (1)*	-11.429 (6)	-2.232 (13)	-2.418 (19)	-3.729 (8)	-2.040 (21)
ADF						
Level	-1.285 (1)		-1.030 (1)		-1.960 (1)	
First Difference	-22.384 (1)*		-24.007 (1)*		-23.618 (1)*	

Notes: (1) The numbers in the brackets indicate the optimal lag length. (2) The optimal lag length for the ADF test is chosen by the Akaike's Information Criterion (AIC). (3) The optimal lag length for the DF-GLS test are chosen by SC and MAIC. (4) The 1% critical values are -3.480 for the DF-GLS test and -3.430 for the ADF test. (5) The symbol * denotes the significance at 1% level.

The Engle-Granger cointegration test is implemented to estimate the long-run equilibrium between U.S. stock prices and the exchange rate of Yen/USD. The results are summarized in Table 2. The results show that the ADF test statistics(in absolute value) are much higher than the critical value at the 1% level. The null hypothesis (i.e. there is no cointegration relation between variables) is strongly rejected for all variables. Thus, a strong cointegration relationship is observed between all pairs of variables especially between U.S. stock prices and the exchange rate.

Table 2

Engle-Granger cointegration test

Variables	JP Stock	US Stock	EX Rate	1% Critical Value
JP Stock	-	-22.754*	-22.344*	-3.430
US Stock	-24.504*	-	-24.025*	-3.430
EX Rate	-23.575*	-23.635*	-	-3.430

Note: (1) The optimal lag length for each variable is selected by AIC. (2) The symbol * represents the significance at 1% level.

Based on the emipirical results that the exchange rate of Yen/USD and U.S. stock prices are cointegrated, the VECM is chosen as an appropriate method to examine the long-run causal relationship between U.S. stock prices and the exchange rate of Yen/USD. The results are displayed in Table 3. The optimal lag length is determined based on the AIC and is indicated in the bracket next to the dependent variable. In this case, the optimal number of lags for both variables is two. In Table 3, ΔUS_t represents the change in U.S. stock prices and ΔEX_t represents the change in the exchange rate of Yen/USD.

Table 3

VECM for U.S. stock market indices and the YEN/USD exchange rates

Dependent Variable	Constant	ΔUS_{t-1}	ΔEX_{t-1}	EC term
ΔUS_t (2)	0.0002093	-0.0668106	-0.026179	-0.0058833
(Std. Err.)	(0.0002659)	(0.0307124)	(0.041617)	(0.0044205)
ΔEX_t (2)	-0.0001962	0.0445651	-0.014298	-0.006278
(Std. Err)	(0.0001976)	(0.0228272)	(0.030932)	(0.0032855)

Note: (1) The optimal lag length for each variable is selected by AIC. And is presented inside the parenthesis. (2) Standard error is reported in the bracket under each coefficient.

The following two observations can made based on the results: (1) With the change in U.S. stock prices at time t (ΔUS_t) as the dependent variable, the coefficient for the change in Yen/USD exchange rate at time t-1 (ΔEX_{t-1}) is -0.026179, which is very close to 0. (2) Similarly, with the change in the exchange rate of Yen/USD at time t (ΔEX_t) as the dependent variable, the coefficient for the change in U.S. stock prices at time t-1 (ΔUS_{t-1}) is 0.0445651, which is also very close to 0. Based on these observations, the following hypotheses are drawn. Firstly, the change in the exchange rate of Yen/USD in the previous period (ΔEX_{t-1}) does not Granger cause the change in the U.S. stock prices in the current period (ΔUS_t). Secondly, the change in U.S. stock prices in the previous period (ΔUS_{t-1}) does not Granger cause the change in the current exchange rate of Yen/USD.

Table 4

Pairwise Ganger causality tests

Null hypothesis (H_0)	F statistics	10% Critical value	Results
U.S. Stock does not Granger cause EX Rate	3.81***	2.71	Reject H_0
EX Rate does not Granger cause U.S. Stock	0.04	2.71	Accept H_0

Note: (1) The symbol *** represents the significance at 10% level.. (2) The 10% critical value for F-statistic with degree of freedom of 1 and a sample size of 1039 (1041-2*1-1) is 2.71.

The Granger causality test is implemented to test the hypotheses. The results of the test are reported in Table obtained show that the F-statistic of the first Granger causality test is statistically significant at the 10% significance level since the test statistic (i.e. 3.81) is higher than the 10% critical value (i.e. 2.71). Thus, the null hypothesis is rejected and this impleis that changes in U.S. stock prices on the previous trading day do Granger cause changes in the current exchange rate of Yen/USD. On the other hand, the F-statistic of the second Granger causality test is lower than the 10% critical value. Therefore, it is not statistically significant and thus, fails to reject the null hypothesis: changes in the exhange rate of Yen/USD on the previous trading day do not Granger cause changes in U.S. stock prices in the current period. Finally, the result of the VECM suggests that, in the long run, changes of the U.S. stock prices on the previous trading day affect the exchange rate of Yen/USD on the current day.

VI. Conclusion

Previous studies have suggested a co-movement between the U.S. stock market and the Japanese stock market and a correlation between the performance of the Japanese stock market and the exchange rate of Yen. Based on these findings, this study draws a hypothesis on the causal link between U.S. stock prices and the exchange rate of the Japanese Yen to the Dollar.

To test the hypothesis, a number of time series techniques is applied to explore the short-run and long-run relationship between U.S. stock prices and the value of Yen/USD in the foreign exchange market. Both the ADF and the DF-GLS tests are employed to detect the presence of the unit roots. The results confirm the unit roots property in the U.S. stock prices variable and the exchange rate variable. The Engle-Granger cointegration test is carried out in the next step to test the long-run cointegration relation between the two non-stationary variables. The result demonstrates the existence of cointegration between U.S. stock prices and the exchange rate of Yen/USD.

Based on the result of the cointegration test, the Vector Error Correction Model is chosen as an appropriate method to examine the long run relationship. The findings exhibit a strong causal link between the exchange rate of the Yen and the Dollar. More specifically, the movements in the U.S. stock market on the previous trading day will affect the current value of the Japanese Yen in the foreign exchange market. This confirms the hypothesis that the performance of the U.S. stock market holds predictive power over the value of the Japanese Yen.

The final result can be explained in several ways. The performance of the U.S. stock market is an important indicator of the well-being of the U.S. economy. It is also an crucial indicator of the well-being of the global economy. Better performance of the U.S stock market will increase global investors' confidence in the U.S. economy. More investors will be willing to hold the U.S. dollar as it is deemed the "safe" currency. The increased buying of the Dollar will lead to the Dollar to appreciate. As a result, the exchange rate of Yen/USD goes down. Better perfomance of the U.S. stock market will also increase Japanese investors' confidence in the future of the global economy, which will be reflected in the perfomance of the local stock market. This has been proved by the results of the previous studies where a positive correlation between the U.S. stock market and the Japanese stock market has been found. An increase in U.S. stock prices will lead to an increase in Japanese stock prices. As a result of the increase in Japanese stock prices, more money will be pulled out of the foreign exchange market to invest in the stock market and other equity markets. High selling of the Japanese Yen will lead to the depreciation of the currency.

Although this study has proved the predictive power of the U.S. stock prices on the rate of Yen/USD, there are still many other crucial factors that affect the exchange of Yen/USD. Some of the examples are: the interest rate in both the United States and Japan, the Consumer Price Index (CPI) and the current account balance in both countries. Therefore, a promising way to proceed in further empirical investigation would be to incorporate more variables in determining the value of the currency in the foreign exchange market. Also, a basket of currencies can be used to obtain a more holistic picture of the fluctuation of the currency. The results obained by using more variables and employing more advanced time series techniques will be more powerful in term of predicting the movement of the currency under different circumstances.

References

1. A. Gregory and B. Hansen, Residual-based test for co-integration in models with regime shifts, *Journal of Econometrics 70* (1996) 99-126.

2. Benjamin M. Tabak, The dynamic relationship between stock prices and exchange rates: evidence for Brazil, *International Journal of Theoretical and Applied Finance* Vol. 9, No. 8 (March 2006) 1377-1396

3. Bennett, Paul and Jeanette Kelleher, 1988, The international transmission of stock price disruption in October 1987, *Federal Reserve Bank of New York Quarterly Review*, 17-33.

4. C. Nieh and C. Lee, Dynamic relationship between stock prices and exchange rates for G7 countries, *Quarterly Review Of Economics and Finance* 41 (2001) 477-498.

5. C.W.J.Granger, Investigating causal relations by econometric models and cross spectral methods, *Econometrica* 37 (1969) 424-439.

6. C.W.J. Granger, B.Huang and C. Yang, A bivariate causality between stock prices and exchange rates: Evidence from the recent Asian Flu, *Quarterly Review of Econometrics and Finance* 40 (2000) 337-354.

7. D.A.Dickey and W.A. Fuller, Likelihood ratio statistics for autoregressive time series with a unit root, *Econometrica* 49 (1981) 1057-1072.

8. Daniel Stavarek, Stock prices and exchange rates in the EU and the United States: Evidence on their mutual interactions, *Czech Journal of Economics and Finance (Finance a uve* , (2005), vol. 55, issue 3-4, pages 141-161

9. Desislava Dimitrova, The relationship between exchange rates and stock prices: studied in a multivariate model，*Issues in Political Economy*, Vol. 14, (August 2005)

10. Dwyer, Gerald P. and R.W.Hafer, 1988, Are the national stock markets linked? *Federal Reserve Bank of St. Louis Review*, 3-14.

11. Hwey-Yun Yau and Chien-Chung Nieh, Interrelationship among stock prices of Taiwan and Japan and NTD.Yen exchange rate, *Journal of Asian Economics* 17 (2006) 535-552.

12. Issam S.A. Abdalla and Victor Murinde, Exchange rate and stock price interactions in emerging financial markets: evidence on India, Korea, Pakistan and the Philippines, *Applied Financial Economics* (1997) 7, 25- 35

13. John H. Cochranel, *Time Series for Macroeconomics and Finance (1997)*

14. Kent G..Becker, Joseph E. Finiierty, and Manoj Gupta, The intertemporal relation between the U.S. and Japanese stock markets, *The Journal of Finance Vol. XLV No.4 (1990).*

15. King, Mervyn A and Sushil Wadhwani, 1988, Transmission of volatility between stock markets, *London School of Economics Financial Markets Working Paper*.

16. R. Aggarwal, Exchange rates and stock prices: A study of the US capital markets under floating exchange rates, *Akron Business Economics Review* 12 (1981) 7-12.

17. Zivot, E. and D.W.K. Andrews, Further evidence on the great crash, the oil-price shock and the unit-root hypothesis, *Journal of Business and Economic Statistics* 10 (1992) 251-270.