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Causal Correlation between Exchange Rate and Stock Index: Evidence from VN-Index

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Abstract

This paper will examine the causal correlation of exchange rates and stock prices in Vietnam. The data is collected daily from March 1st 2007 to March 1st 2014. The whole sample period is divided into two sub-groups as before the stock market bottom, after stock market bottom and full sample period. Unit root tests are employed for checking the stationary of time series data such as ADF test, PP test and KPSS test. This paper employs the co-integration test and Granger causality test to identify the causal correlation between two variables. The results of paper prove that there is no causal correlation between exchange rate and stock price. It means that the stock price has no effect on exchange rate and vice versa. However, after stock market bottom from February 25th 2009 to March 1st 2014, this research finds that it has a long-run co-movement between these variables by applying the Johansen test.

Keywords: causal correlation, co-integration test, exchange rate, Granger causality test, stock price, unit roots, VN-Index

1. Introduction

Since the Bretton Woods pact was collapsed during the 1970s, the developed and developing countries have applied the flexible exchange rate policy. The development of the market has led to the opening of capital market. Because of market requirements, many researchers have investigated the correlation between the stock index and the exchange rate. Having a thorough grasp of this linkage, policy makers could manage the market in the better ways by policy decisions. For instance, in case of rising exchange rate have positive impacts on stock price movement, policy makers could send positive signals to stock market and attract investors by lower the value of domestic currency. Moreover, the effect of correlation between exchange rate and stock price can also influence enterprise and government through shares issued. Enterprise can attract large capital if the shares issued at the right time. Government can collect the amount of capital needed to call for investment and construction in infrastructure projects. Besides, this research is useful for investors as well because each small change in stock price and exchange rate will influence each individual property and profit of the company. Knowledge of causal correlation between exchange rate and stock price could help investors find out opportunities to analyze and predict stock market movements better to make their expected return or even abnormal return.

Classical economic theory assumes that the exchange rate and stock price can work with two theories as traditional approach and portfolio approach (Richards & Simpson, 2009; Granger et al., 2000). Traditional approach considers the current account of the economy and portfolio approach identifies as stock-oriented model. Traditional approach postulates that any movements in exchange rates would cause changes in stock prices (Richards & Simpson, 2009). It is constructed on the macroeconomics view because the stock price is usually defined as present values of future cash flow should adjust to the economic perspectives (Stavárek, 2005; Richards & Simpson, 2009). On the other hand, portfolio approach postulates the opposite of traditional approach that the change in stock prices can lead the movement in exchange rates (Richards & Simpson, 2009). According to Ghulam Ali et al. (2013), the demand for exchange rates is increased if rising trend is found in stock prices. Furthermore, according the Huang and Yang (2000), the drop down of stock prices caused the decrease in exchange rates during Asian Crisis period in 1997.

The empirical studies on causal correlation between stock prices and exchange rates have been document by

many researchers. For instance, Kutty (2010) finds that there is a short-run correlation between stock prices and exchange rates in Mexico from 1989 to 2006 by employing ADF, KPSS, Engle, and Granger and VAR model. Particularly, Granger-causality test shows that the stock index leads the exchange rate in the short-term. At the same time, Agrawal et al. (2010), in case of researching correlation between Nifty returns and Indian-US Dollar exchange rate from October 11st 2007 to March 9th 2009, have found that a rise in stock prices will cause a decline in exchange rates. More recently, Brazil, Russia, India, and China (BRIC countries) were tested in the research of Ghulam Ali et al. (2013) for the period from May 5th 2003 to September 6th 2010 by dividing the data into three sub-groups – before, during and after the financial crisis, 2009. As result, applying ADF, PP, KPSS tests and Tado-Yamamoto Causality (Modified WALD) test at different periods, paper shows no correlation during three periods. However, there are also many researches representing that there is no correlation between stock prices and exchange rates in specific market. For example, Zubair (2013), with 241 observations in Nigeria over the period April 2001 – December 2011, shows that there is non-integration between exchange rates and stock prices in this country before and during the global financial crisis.

Obviously, there are different results among different countries in different periods. Due to the typical features in particular economy, Vietnam market may shows the differences. Base on monthly data, Le (2012) and Vo (2013) detect that there is no correlation between exchange rates and stock returns from January 1st 2006 to December 31st 2010 and from from January 2001 to April 2013 respectively. While the former uses Dickey Fuller (1976-1979) to test unit root, the later applies Augmented Dickey Fuller (1981). Both of them have the same second method in employing Johansen and Juselius (1990) for the co-integration test. In addition, Huynh and Nguyen (2013), by using VAR model and Granger-causality test, find a very weak causal correlation from exchange rates to stock prices based on monthly data, which collected from October 2007 to October 2012 in Ho Chi Minh (VN-Index). Moreover, the research of Tu (2013) also discovers that there is a long- run correlation from exchange rates to stock prices based on the result of co-integration test by using Johansen (1991) from September 2007 to July 2013. However, in the short-run, the volatility of exchange rates does not explain the volatility of the stock price index based on the result of Autoregressive Distributed Lag (ARDL) test.

In this article, we also examine the causal correlation between stock prices and exchange rates in Vietnam market. With the conditions that established the stock market traded in 2000 and was involved the World Trade Organization in 2007, Vietnam's economy has grown significantly, promoted the development of trade, investment, liberalization the financial sector, and the most evident is the strongest development of the stock market. The most important achievement when Vietnam has been joined WTO is that the significant increase of investment flows and domestic market. The most important factor, which affects the movement of foreign investment flows into Vietnam, is a stable of exchange rate (Tu, 2013). The movement of foreign investment flows will affect economic growth, thereby affecting the movement of stock price. By focusing on this market, this research will contribute to enhance the limited literature in researching causal correlation between stock prices and exchange rates in Vietnam. In addition, most of studies, which provide empirical evidence in Vietnam market, used monthly data and single model, which is either VAR or VECM to analyze. Therefore, the last result cannot bring absolute accuracy and detail while this research use daily data and both models as well as the updated data to ensure updated circumstances of market.

To evaluate the correlation between the exchange rate and stock index, this paper will estimate the response function with two variables (logarithmic form): the stock price, the exchange rate. Firstly, the paper initially use the Augmented Dickey – Fuller (ADF) (1981), Phillips - Perron (PP) (1988) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) (1992) to test the existence of unit root follow time series stock price and exchange rate. Then, the study applies the method proposed by Johansen (1988), Johansen and Juselius (1990) to test the co-integration of variables. Finally, the paper proceeds to find the causal correlation of these variables through VAR and VECM model proposed by Engle and Granger (1987). The remainder of this article is organized as follow. Section 2 illustrates the method and describes the data used in this research. Section 3 shows the findings. Section 4 reports the discussion as well as conclusion of the study.

2. Method and Data

2.1 Method

2.1.1 Unit Roots Test

For the researches use time series data format, the first testing is to check whether data is stationary or not. Moreover, a time sequence data considers as a stationary data if the average and variance of the equation are unchanged in time with the covariance value between two sections only depends on the distance or the time lag. It does not depend on the actual time that the covariance is calculated (Ramanathan, 2002). Stationarity of a time

series is important for estimation: applying least squares regressions on non-stationary variables will give misleading parameter estimates of the correlation between variables. In detail, a non-stationary data series means the variables of series that can increase or decrease over time or the effects of innovation do not die out with time. A major problem when working with a non-stationary variable is the conventional criteria, which used to judge whether there is a causal correlation between variables, are unreliable. Besides, checking for stationarity can also be important for forecasting: it will help us about what kind of processes we can apply to build into the model in order to make accurate predictions (Diebold and Kilian, 1999). For testing stationary and checking integrating determined order of real time series data, the paper uses Augmented Dickey-Fuller (ADF) test, Phillip-Person (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. Time lag in model is taken by references in previous researches for sample size and data characteristics in homology, through applying AIC criteria (Akaike Information Criteria) for lag determining. Finally, based on the result of pre-test unit root, the paper chooses the procedure of Johansen and Juselius to apply.

2.1.2 Co-integration

This paper will consider Johansen and Juselius (1990) and Johansen (1988) method to approach the co-integration test. The Johansen's method will take it starts point as the vector auto regression (VAR) of order ρ by follows:

$$\mu + A_1 Y_{t-1} + \cdots + A_p Y_{t-p} + \varepsilon_t = Y_t \quad (1)$$

Where: y_t is a $n \times 1$ vector of variables which are integrated of order one – commonly denoted I (1) and ε_t is a $n \times 1$ vector of innovations. The Johansen test base on VAR model can be rewritten as:

$$\mu + \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t = \Delta Y_t \quad (2)$$

Where: $\Pi = -I + \sum_{i=1}^{p} A_i$ and $\Gamma_i = -\sum_{j=i+1}^{p} A_j$

Johansen and Juselius proposed two tests as the trace test and the maximum eigenvalue.

The trace test checks H_0 of r co-integrating vectors against the alternative hypothesis of n co-integrating vectors.

$$-T \sum_{i=r+1}^{n} ln(1 - \hat{\lambda}_i) = J_{trace} \quad (3)$$

The maximum-eigenvalue test checks H_0 of r co-integrating vectors against the alternative hypothesis of (r + 1) co-integrating vectors

$$-Tln(1 - \hat{\lambda}_{r+1}) = J_{max} \quad (4)$$

Assume null hypothesis H_0: there is no co-integration vector between stock price and exchange rate. To accept or reject H_0, it needs to compare trace value or maximum eigenvalue value to critical values at 1%, or 5%, or 10%.

Result:

1. If trace value or maximum eigenvalue value is larger than critical value at 1%, or 5%, or 10%: reject hypothesis H_0, the time series of stock prices and exchange rates are cointegrated.

2. If trace value or maximum eigenvalue value is smaller than critical value at 1%, or 5%, or 10%: fail to reject hypothesis H0, the time series data of stock prices and exchanges rate are not cointegrated.

2.1.3 Granger Test

First, a simple definition of Granger's causality (1969) that is a time series data X_t Granger-causes time series data Y_t if Y_t can be predicted with better accuracy by using past values of data X_t rather than using the history of Y_t alone. In other words, variable X_t fails to Granger-cause variable Y_t if $Pr(Y_{t+m}|¥_t) = Pr(Y_{t+m}|\Omega_t)$

Where:

- Pr() conditional probability
- $¥_t$ set of information available at t
- Ω_t the information obtained by exclude all information on X_t from $¥_t$

Next, two models can be applied in Granger causality test named VAR model and VECM model. Based on the results obtained from Johansen test, the thesis will use each model for Granger causality test proposed by Engle and Granger (1987) in each period:

1. If there is no co-integration between SP and EX, the Granger causality test will apply VAR model. Thus, the formula of Granger causality test between two stationary series SP and EX by estimating the following VAR model as follows:

$$a_0 + a_1 SP_{t-1} + \ldots + a_p SP_{t-p} + \beta_1 EX_{t-1} + \ldots + \beta_p EX_{t-p} + u_t = SP_t \quad (5)$$

$$\varphi_0 + \varphi_1 EX_{t-1} + \ldots + \varphi_p EX_{t-p} + \Phi_1 SP_{t-1} + \ldots + \Phi_p SP_{t-p} + v_t = EX_t \quad (6)$$

2. If there is a co-integration between SP and EX, the Granger causality test will apply VECM model. Thus, the formula of Granger causality test between two stationary series SP and EX by estimating the following VECM model as follows:

$$a_0 + a_1 SP_{t-1} + \ldots + a_p SP_{t-p} + \beta_1 EX_{t-1} + \ldots + \beta_p EX_{t-p} + \theta_1 ECT + u_t = SP_t \quad (7)$$

$$\varphi_0 + \varphi_1 EX_{t-1} + \ldots + \varphi_p EX_{t-p} + \Phi_1 SP_{t-1} + \ldots + \Phi_p SP_{t-p} + \theta_2 ECT + v_t = EX_t \quad (8)$$

Where

- a_0 and φ_0 are the constant
- a, β, φ, Φ are long-run prameters
- ECT is the lagged error correction term derived from the long-term co-integration
- u_t, v_t are white noise residuals
- p is suitably chosen positive integer

Then, the paper set null hypothesis for both cases H_0: $\beta_1 = \beta_2 = \ldots = \beta_p = 0$, is a test that EX does not Granger-cause SP. Similarly, the study also sets null hypothesis H_0: $\Phi_1 = \Phi_2 = \ldots = \Phi_p = 0$, is a test that SP does not Granger-cause EX.

In general, there are four possibilities as follows:

(i) One-way Granger causality (SP → EX): Stock price causes exchange rate. Therefore, the past values of stock price can be used for prediction of future values of exchange rate.

(ii) One-way Granger causality (EX → SP): Exchange rate causes stock price. Hence, the past values of exchange rate can be used for prediction of future values of stock price.

(iii) Two-way Granger causality (SP ⇆ EX): Stock price (exchange rate) causes exchange rate (stock price). So, the values of exchange rate can be predicted using the histories of stock price values and vice versa.

(iv) Non-Granger causality (SP ↹ EX): There is no causal correlation between stock price and exchange rate if the variations in the latency of exchange rate have no effect on the variations in the latency of stock price and vice versa.

For testing H_0, the study compares prob. value calculated with critical value at 0.05 checking in Granger test panel.

Result:

1. If $prob.value < 0.05$: reject hypothesis H_0, there exists a causal correlation between stock prices and exchange rates.
2. If $\text{prob.value} > 0.05$: fail to reject hypothesis H0, there does not exist a causal correlation between stock prices and exchange rates.

2.2 Data

Secondary data will be used in this study and collected from document and internet gateways. They are the daily data of exchange rate and stock price in State Bank of Vietnam and Ho Chi Minh Stock Exchange. Particularly, stock price data has been collected from Ho Chi Minh Stock Exchange as the VN-Index. The value of VN-Index was the closing price of stock index on that day. The data of stock prices in the model are collected from Ho Chi Minh Stock Exchange website. Exchange rate data has been collected from the State Bank of Vietnam website. All the data is daily time series from March 1st 2007 to March 1st 2014. The paper converts all the data into the logarithmic to facilitate the calculation and analysis. EViews 7 is used for performing the testing and estimation data for time series in Vietnam.

3. Results

3.1 Stock Price Volatility

According to that chart, Vietnam stock market had a sharp decline in VN-Index following a strong growth phase earlier. Specifically, the VN-Index fell from a peak which was 1170.7 points in March 2007 to 235.5 points in February 24th 2009. It was also the lowest price since then. The cause of the slump was derived from both inside and outside the country. In more details, in the period 2007 – 2008, the instability of the U.S. economy has

started the world economic crisis. It made bankruptcies of some large banks such as Lehman Brothers, Washington Mutual, etc. Even worse, it also led many countries fall into recession or on the brink of bankruptcy such as Europe, Greece, etc. Meanwhile in Vietnam, a rapidly developing economy faced with high inflation (Year 2007 with 12.63%, Year 2008 with 19.89%) (Agribank, 2008). In this situation, the State Bank of Vietnam had adopted tight monetary policy and raised interest rates to curb inflation. Under the pressure from the global financial crisis and the difficulties of Vietnam economy, the investors in Vietnam feel anxious and constantly sell-off shares. This made the VN-Index plummeted from 2007 to 2009.

Figure 1. Vietnam stock market (VN-Index)

Soon after, Vietnam's economy could fall into deflation because the monetary policy was too much tightened. Then, Vietnam government had launched economic stimulus package worth $ 6.9 billion (equivalent to 122 thousand billion VND) (Government Portal, 2009). At that time, the VN-Index had risen from the bottom (235.5 points) to more than 600 points in the last months of 2009.

However, due to lack of experience in the management and control of the economic stimulus package, Vietnam economy continued to face inflation risk (Year 2010 with 11.75%, Year 2011 with 18.13%) (General Statistics Office of Vietnam 2013). Hence, in the period 2011-2014, the State Bank of Vietnam have applied continuously monetary tightening policy; keep high interest rates and some construction projects which funded by State has paused and tested efficiency (Government Portal 2011). Consequence, the growth of Vietnam economy had slowed and the investor confidence index in Vietnam also declined. On the other hand, the inflation rate has been significantly reduced (Year 2012 with 6.81%, Year 2013 with 6.04%) (General Statistics Office of Vietnam 2013) and the consumer demand had improved. These issues were reflected in the fluctuation of VN-Index in 2010 - 2014.

In brief, the volatility of VN-Index over the period of nearly 10 years was affected by many factors including: money supply, monetary policy, inflation, world economy, etc. and exchange rates. In our research, the correlation between the volatility of two variables will be clarified through empirical model.

3.2 Exchange Rate Volatility

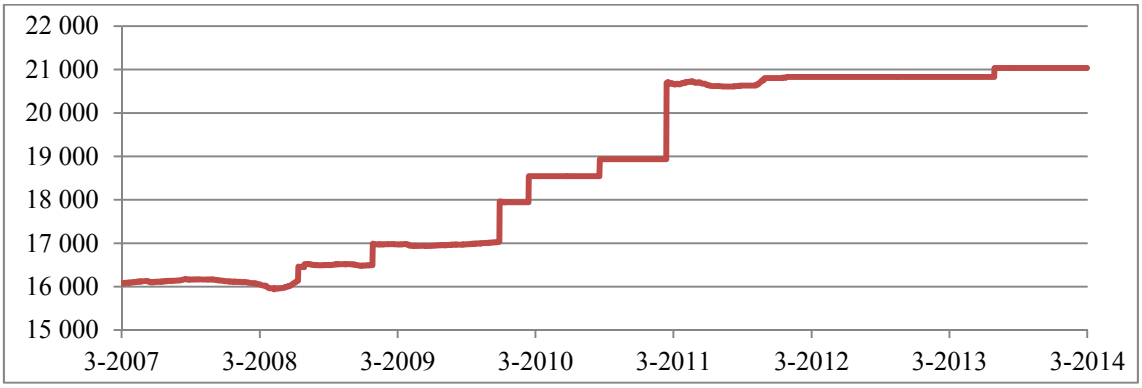

Figure 2. Exchange rate in Vietnam (VND/USD)

The chart shows the volatility of the exchange rate in Vietnam during the period from March 1st 2007 to March 1st 2014. Overall, the exchange rate increased in the period from March 2007 to March 2014. On March 1st 2007, the exchange rate was traded at 16 079 VND per USD. It was up to 21 036 VND per USD on February 28th 2014 by increasing over 30%.

Before 2009, the margins of exchange rate were low among years. However, after the crisis in 2009, the margins became extremely higher and higher by year. Especially, the margin was the highest in 2009 up to ± 5% (Agribank, 2009). This adjustment was aim to help exchange rate fluctuates more flexible and keep stick to foreign currency supply and demand in the market. By the way, it supported to banks and firms proactively plan for their business in 2009. Since then, the exchange rate margin was remained at ±3% for the certain purposes (Vietnam Construction Bank 2010). For example in February 2010, the goal was to balance harmoniously the supply and demand for foreign currency, increased the circulation of foreign currency in the market, and helped control the trade deficit and macroeconomic stability (Circular No. 03/2010/TT-NHNN 10/02/2010) (Government Portal 2010).

In addition, the margin in 2011 is very high on the chart. On February 11th 2011, SBV announced to changes in exchange rates from 18 932 VND per USD to 20 693 VND per USD (an increase of 9.3%). At the same time, the government narrowed trading margin to ± 1% (Nguyen, 2011). After 2011, the exchange rates changed slightly and it remained 21 036 VND per USD until March 2014.

3.3 Relationship between Stock Price Volatility and Exchange Rate Volatility in Vietnam

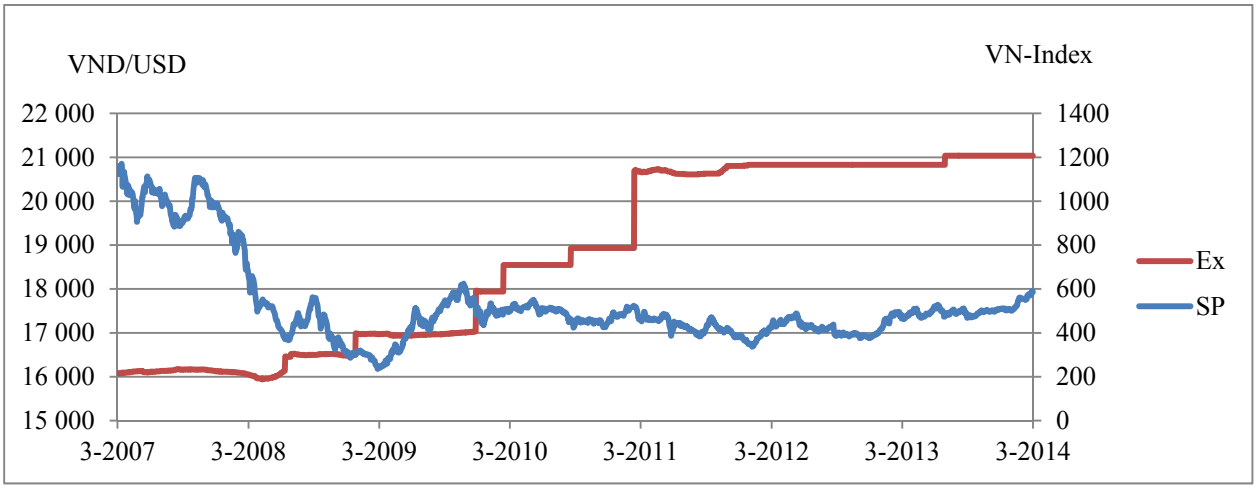

Figure 3. Stock price and Exchange rate in Vietnam

This chart illustrates the movements of exchange rate and stock price from March 1st 2007 to March 1st 2014. Based on the chart, it is analyzed by dividing into two periods because there are significant differences between before the stock market bottom (March 1st 2007 - February 24th 2009) and after the stock market bottom (February 25th 2009 - March 1st 2014).

Before the stock market bottom, the stock indices decrease rapidly. The overheating of the stock market in 2007 was a sign that the stock would face many difficulties in the next year 2008. In addition, on the first months of 2008, the economy fell into this time of high inflation and Government used monetary tightening policies to curb the inflation that caused stock market indices made a rapid decline. On the other hand, since 2007, due to the massive increase of FII inflows into Vietnam, the supply of dollars has increased dramatically. Vietnam's foreign exchange market had excess supply of dollars causing the decline of exchange rate in this period. From 2008, the exchange rate was raised slightly with three times changing the rate margin, ±1% on March 10th 2008, ±2% on June 27th 2008, and ±3% on November 7th 2008.

After the stock market bottom, the year of 2009 began with the increase in exchange rate margin event that began in March 24th 2009, was up to ± 5%. Since then, the exchange rate grew significantly from 2009 to 2011 and remained stable from 2012 to 2014. Besides, the stock indices also increased rapidly from 2009 to 2010. On February 25nd 2009, the VN-Index was 244.3 point and grew to the highest point, 624.1 point, on October 22nd 2010. After then, it decreased slowly and remained 586.5 point on February 28th 2014.

3.4 Analyze the Correlation between Stock Price and Exchange Rate in Vietnam

3.4.1 Unit Roots

Table 1 reports the result of ADF, PP unit root tests and KPSS stationary test for the period from March 1st 2007 to March 1st 2014. It shows the time series of stock price and exchange rate are stationary with integration level of 1 at the 1% significant level. Therefore, they are totally appropriate for the next statistical analysis of paper. To continue, the next step will examine co-integration for each period by using Johansen test.

Table 1. Unit Root test results (During March 1st 2007 to March 1st 2014)

Variables	ADF		PP		KPSS	
	Level	First difference	Level	First difference	Level	First difference
SP	-2.305 013	-32.380 44*	-2.124 761	-32.4043*	0.668 616**	0.075 133
EX	-1.624 294	-41.447 34*	-1.631 794	-41.446 76*	0.634 218**	0.116 501

Note. ADF, PP and KPSS are the Augmented Dickey-Fuller, Phillip-Person unit root test and Kwiatkowski-Phillips-Schmidt-Shin stationary test. * indicates that the null hypothesis of ADF and PP test is rejected at 1st difference. ** indicates that the null hypothesis of KPSS test is rejected at level.

3.4.2 Co-integration

This paper uses the value of Johansen test "Trace value" and "Maximum Eigen value" to find the co-integration between the stock price and the exchange rate data. Therefore, the results are as follows:

Table 2. Johansen Co-integration tests before the stock market bottom period (March 1 2007 - February 24 2009)

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.014 437	10.748 43*	18.397 71*	0.4111
At most 1	0.007 545	3.680 792**	3.841 466**	0.0550
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.014 437	7.067 638^{+}	17.147 69^{+}	0.7056
At most 1	0.007 545	3.680 792^{++}	3.841 466^{++}	0.0550

Note. *,** indicate that the null hypothesis of no co-integration vector is fail to reject at the 5% significance level in Trace test. $^{+}$,$^{++}$ indicate that the null hypothesis of no co-integration vector is fail to reject at the 5% significance level in Maximum Eigen-value test.

Table 3. Johansen Co-integration tests after the stock market bottom period (February 25th 2009 - March 1st 2014)

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.019 011	27.040 84*	18.397 71*	0.0024
At most 1	0.002 471	3.087 106	3.841 466	0.0789
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.019 011	23.953 73^{+}	17.147 69^{+}	0.0044
At most 1	0.002 471	3.087 106	3.841 466	0.0789
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				

Note. * indicates that the null hypothesis of no co-integration vector is rejected at the 5% significance level in Trace test. + indicates that the null hypothesis of no co-integration vector is rejected at the 5% significance level in Maximum Eigen-value test.

Firstly, Table 2 presents the results of the Johansen co-integration test for the period before the stock market bottom reveals that both Trace statistics test and Maximum Eigen-value test suggest no co-integration between two variables at significance level of 0.05. In other words, there is no long-run co-movement between exchange rates and stock prices in the period from March 1st 2007 - February 24th 2009.

Secondly, the results in Table 3 show that both Johansen co-integration test "Trace test" and "Maximum Eigen-value test" demonstrate that the stock price and the exchange rates are co-integrated and confirms existence of one co-integrating vector at the 0.05 significance level for the period February 25th 2009 - March 1st 2014. This proves that there is a long-run co-movement between variables after stock market bottom period.

Table 4. Johansen Co-integration tests for the full sample period (March 1st 2007 - March 1st 2014)

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.003 862	7.987 886*	18.397 71*	0.6841
At most 1	0.000 729	1.267 224**	3.841 466**	0.2603
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.003 862	6.720 662+	17.147 69+	0.7431
At most 1	0.000 729	1.267 224++	3.841 466++	0.2603

Note. *,** indicate that the null hypothesis of no co-integration vector is fail to reject at the 5% significance level in Trace test. +,++ indicate that the null hypothesis of no co-integration vector is fail to reject at the 5% significance level in Maximum Eigen-value test.

Finally, as can be seen from Table 4, the study concludes that there is no evidence of co-integration between variables. Therefore, for the full sample period, stock price and exchange rate do not have any long-run correlation.

In briefs, during the period of economic instability before the stock market bottom and the period from March 1st 2007 to March 1st 2014, the long-run co-movement does not exist between stock prices and exchange rates. However, during the period of economic stabilization after stock market bottom, the time series of exchange rate and stock price have a long-run co-movement.

3.4.3 Granger Test

Firstly, based on the result of Johansen test for the period from March 1st 2007 to February 24th 2009, the paper does not find the co-integration between two variables. Therefore, this paper will continue apply the VAR model for Granger-causality test in the period before the stock market bottom.

Table 5. Granger causality test for the period before the stock market bottom (March 1st 2007 - February 24th 2009)

Null Hypothesis	Chi-sq	Prob.	Result
DEX does not Granger Cause DSP	5.587 574	0.1335	Fail to reject H_0
DSP does not Granger Cause DEX	1.517 704	0.6782	Fail to reject H_0

Note. Critical value of Granger test is 0.05

Looking at Table 5, the study can conclude that the exchange rate has no effect on stock prices and vice versa. It means that the volatility of the exchange rate cannot explain the volatility of stock prices and vice versa, at the 5%

significance level for the period before the stock market bottom.

Secondly, as mentioned above, the study finds that there is a co-integration between stock prices and exchange rates for the period after the stock market bottom. Based on this result, the study will apply the VECM model for Granger-causality test in this period.

Table 6. Granger causality test for the period after the stock market bottom (February 25th 2009 - March 1st 2014)

Null Hypothesis	Chi-sq	Prob.	Result
DEX does not Granger Cause DSP	2.324 594	0.3128	Fail to reject H_0
DSP does not Granger Cause DEX	3.178 669	0.2041	Fail to reject H_0

Note. Critical value of Granger test is 0.05

From the upper Table 6 of results, the paper proves the stock price values cannot lead the exchange rate values and vice versa for the period after the stock market bottom.

Thirdly, the result of Johansen test for the full sample is the same with the period from March 1st 2007 to February 24th 2009. Thus, the Granger causality test will be constructed based on VAR model for full sample period.

Table 7. Granger causality test for the full sample period (March 1st 2007 - March 1st 2014)

Null Hypothesis	Chi-sq	Prob.	Result
DEX does not Granger Cause DSP	2.279 597	0.5164	Fail to reject H_0
DSP does not Granger Cause DEX	2.532 384	0.4695	Fail to reject H_0

Note. Critical value of Granger test is 0.05

In Table 7, the results of full sample periods show that there is not causal correlation between exchange rate and stock price.

Therefore, the results of this research contradicts other studies as shown on the literature review, but it is in line with the findings of Abdalla et al. (1997), Morales (2007), Rahman and Uddin (2009), Kenani et al. (2012) and Zubair (2013).

Furthermore, the finding of research is similar with almost previous researches results in Vietnam case from Le (2012) and Vo (2013) that have suggested there is no correlation between exchange rate and stock price. It is also repeated and updated the finding of Tu (2013) that there is a long- run correlation from exchange rates to stock prices from September 2007 to July 2013. By contrast, it differs from the study of Huynh and Nguyen (2013) that suggested a very weak correlation between stock price and exchange rate from October 2007 to October 2012.

4. Discussion

In summary, the paper does not find any significant causal correlation between stock prices and exchange rates for both sub-periods and for all sample period in the case of VN-Index from March 1st 2007 to March 1st 2014. The end results are not belong to any initial assumptions approaches (portfolio and traditional). It means both portfolio approach and traditional approach are rejected in this paper. Therefore, the study suggests that the exchange rate has no effect on stock prices and vice versa. However, in the period after stock market bottom from February 25th 2009 to March 1st 2014, the paper finds that there is a long-run co-movement between the variables base on the result of Johansen test. Hence, it concludes that the past values of exchange rate cannot use for prediction of future values of stock price and vice versa but in the long-term, the volatility of the two indices can affect each other. On the other hand, Vietnam's stock market is also influenced by rumors of market and investors (Ho, 2012) as well as shows the characteristics of inefficient market in the weak form (Le, 2011). With a fledgling stock market, most of investors are completely dominated by the rumors from the spreading false information or from the largest shareholders. Therefore, Vietnam stock market does not usually reflect the actual situation of market, as well as Vietnam's economy. Hence, the volatility of exchange rates cannot affect directly to the stock index and vice versa. However, in the long term, the fluctuation of exchange rates can affect the stock index.

In detail, when the exchange rates increase or Vietnam currency devaluation against the U.S. dollar, it creates a competitive advantage for Vietnamese goods and products on the international market (Tu, 2013). Thus, the revenue of exported companies will grow up and it makes the stock index increases. In addition, the increase of exchange rate also affects the imported companies. The cost of materials for input will rise and make the cost of output be higher. Thus, it leads to the CPI to grow up and makes the development of economic slower. Hence, this affects negatively for the stock index in long run. To sum up, there is an existence of indistinct long-term correlation between exchange rates and stock prices. As far as investors are concerned, long-run co-movement between exchange rates and stock prices could be useful for investors more than short-term stockjobbers to make decisions, whenever exchange rates have changes, especially investing in import-export business.

On the other hand, the paper also provides some suggestions for policy makers to do their works in the best way. Particularly, at first the Government should stabilize the market to attract the capital from foreign investment and apply the exchange rate policy more flexible to create favorable conditions for some companies affected by the exchange rate policy. Thereby, the economic situation based on the movement of exchange rate will reflect clearly and accurately. Secondly, State Securities Commission of Vietnam should manage the disclosure of listed companies better, examine and control sources of information carefully to investors. Thus, it creates the clarity and transparency for investors and the rumors may eliminate. This helps investors analyze and make the right decisions in stock market. Therefore, the stock market will operate stably and follow the rules. As a result, the stock market forecast based on economic indicators such as the exchange rate will be easier and more convenient.

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Appendix

Data of stock price and exchange rate

Time	SP	EX	LNSP	LNEX
3/1/2007	1123.1	16 079	7.024	9.685

Time	SP	EX	LNSP	LNEX
3/2/2007	1147.7	16 076	7.046	9.685
3/5/2007	1158.9	16 075	7.055	9.685
3/6/2007	1133.3	16 078	7.033	9.685
3/7/2007	1132.2	16 080	7.032	9.685
3/8/2007	1141.6	16 083	7.040	9.686
3/9/2007	1155.7	16 081	7.052	9.685
3/12/2007	1170.7	16 085	7.065	9.686
3/13/2007	1158.3	16 087	7.055	9.686
3/14/2007	1114.2	16 089	7.016	9.686
3/15/2007	1065.5	16 088	6.971	9.686
3/16/2007	1109.8	16 092	7.012	9.686
3/19/2007	1133.3	16 089	7.033	9.686
3/20/2007	1117.2	16 094	7.019	9.686
3/21/2007	1111.6	16 091	7.014	9.686
3/22/2007	1099.8	16 089	7.003	9.686
3/23/2007	1090.6	16 090	6.994	9.686
3/26/2007	1072.2	16 094	6.977	9.686
3/27/2007	1034.2	16 097	6.941	9.686
3/28/2007	1031.8	16 099	6.939	9.687
3/29/2007	1068.7	16 101	6.974	9.687
3/30/2007	1071.3	16 100	6.977	9.687
4/2/2007	1055.1	16 103	6.961	9.687
4/3/2007	1027.5	16 105	6.935	9.687
4/4/2007	1050.9	16 103	6.957	9.687
4/5/2007	1049	16 107	6.956	9.687
4/6/2007	1033.9	16 105	6.941	9.687
4/9/2007	1041.4	16 108	6.948	9.687
4/10/2007	1039.7	16 112	6.947	9.687
4/11/2007	1034.7	16 114	6.942	9.687
4/12/2007	1027.6	16 112	6.935	9.687
4/13/2007	1013	16 115	6.921	9.688
4/16/2007	983	16 115	6.891	9.688
4/17/2007	965.7	16 117	6.873	9.688
4/18/2007	1001.1	16 120	6.909	9.688
4/19/2007	998.1	16 118	6.906	9.688
4/20/2007	968.9	16 121	6.876	9.688
4/23/2007	931.2	16 119	6.836	9.688
4/24/2007	905.5	16 122	6.808	9.688
4/25/2007	923.9	16 126	6.829	9.688
5/2/2007	935.5	16 127	6.841	9.688
5/3/2007	937.5	16 130	6.843	9.688
5/4/2007	947.2	16 128	6.854	9.688
5/7/2007	983.6	16 132	6.891	9.689
5/8/2007	1015.4	16 128	6.923	9.688
5/9/2007	1020	16 120	6.928	9.688
5/10/2007	1020	16 122	6.928	9.688
5/11/2007	1039.6	16 117	6.947	9.688

Time	SP	EX	LNSP	LNEX
5/14/2007	1066	16 114	6.972	9.687
5/15/2007	1054.7	16 104	6.961	9.687
5/16/2007	1041	16 102	6.948	9.687
…	…	…	…	…
1/15/2014	526.7	21 036	6.267	9.954
1/16/2014	533.5	21 036	6.279	9.954
1/17/2014	543.6	21 036	6.298	9.954
1/20/2014	553.7	21 036	6.317	9.954
1/21/2014	559.9	21 036	6.328	9.954
1/22/2014	551.9	21 036	6.313	9.954
1/23/2014	553.5	21 036	6.316	9.954
1/24/2014	560.2	21 036	6.328	9.954
1/27/2014	556.5	21 036	6.322	9.954
2/6/2014	554.7	21 036	6.318	9.954
2/7/2014	549.7	21 036	6.310	9.954
2/10/2014	555.9	21 036	6.321	9.954
2/11/2014	553.9	21 036	6.317	9.954
2/12/2014	564.2	21 036	6.335	9.954
2/13/2014	570.2	21 036	6.346	9.954
2/14/2014	572.2	21 036	6.349	9.954
2/17/2014	570.2	21 036	6.346	9.954
2/18/2014	574.6	21 036	6.354	9.954
2/19/2014	578.1	21 036	6.360	9.954
2/20/2014	571	21 036	6.347	9.954
2/21/2014	570.6	21 036	6.347	9.954
2/24/2014	576.6	21 036	6.357	9.954
2/25/2014	586.2	21 036	6.374	9.954
2/26/2014	589.8	21 036	6.380	9.954
2/27/2014	584.8	21 036	6.371	9.954
2/28/2014	586.5	21 036	6.374	9.954

(Source: HSX & SBV)