

# The negative relationship between stock market and foreign exchange market in the Philippines: 2006 – 2013

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## ABSTRACT

*As the Philippines continuously work to build a stable and developed financial market, an important factor to consider is the relationship of the existing and active financial markets in the country, which are the stock market, and the foreign exchange market. Other countries have studied their interaction in the past and this is not a surprise considering that while both markets are seen to be indicators of macroeconomic growth in a country, these markets are also the most sensitive segments of a financial system. While examining the relationship of both financial markets, the data used for the study includes the daily data of the exchange rate of the Philippine peso pegged to the US dollar and the PSEi closing price. To accurately measure this relationship, the study make used of the Granger's Causality on a VAR Framework and the Correlation Test to further comprehend the nexus between the two markets. In addition to this, an Impulse Response Function was also conducted to trace the dynamic interaction among the variables. The study resulted to a bilateral relationship between the foreign exchange market and the stock market in the Philippines during the years 2006-2013. Also, with the employment of the Correlation Test it was determined that the two financial markets are negatively correlated throughout the research. Findings of the study are particularly helpful for the hedging and diversification of a corporation's portfolio as volatility of the foreign exchange rate influences a firm's value. Government officials and policy makers of a country (especially its central bank) will also be aided in their decision-making on both monetary and fiscal policies.*

**JEL Classification:** D53, E44

**Keywords:** stock market, foreign exchange market

## INTRODUCTION

Through the years, the Philippine financial system has been growing gradually with the implementation of monetary, economic and fiscal policies by the government and its central bank, the Bangko Sentral ng Pilipinas (BSP). These

policies were huge contributions to the growing development of the country. During the post war years, the basic pattern of the Philippine economy required a transformation as it was thoroughly devastated by World War II. At that time, the Philippines needed payment from the United States government for war damage and an influx of capital to go along with it.

There was a worldwide movement in the 1990's toward financial openness, which led to the growth of financial asset markets in less developed economies. Gulati and Kakhani (2012) stated, "the foreign exchange market and the stock market are the most sensitive segments of the financial system and are considered as the barometers of economic growth through which the country's exposure towards the outer world is readily felt". With this, we find it very important to know the relationship of the stock market and the foreign exchange market.

There have been numerous studies conducted in the past that examined the relationship of stock returns and foreign exchange within different countries having scopes and methodologies, which yielded different results. However, these studies focus on different countries which all differ in degrees of foreign exchange controls, foreign exchange rate system, economic and financial status, and development of their stock markets. This study will be a more recent work as compared to the others that covered years from the 1990's until the early 2000's. Also, different methodologies were used by the previous studies that will lead to different results as these methods have their own limitations and may not reveal consistent results as if other methodologies were used. This will also focus on just the Philippines' financial markets which are the stock market and the foreign exchange market – both of which still have a lot more to go through in terms of their development. Other financial products may not be present in the Philippines as compared to other countries, which ultimately alter the results, obviously showing more of how the Philippines are in terms of financial markets.

Thus, the main uncertainty now is whether the relationship between foreign exchange market and stock market is statistically significant in the Philippines. In order to further understand the Philippine financial markets, it is vital to identify the association between the stock market and foreign exchange market.

Our paper aims to answer, identify and investigate the association between the stock market and foreign exchange market. Our research ultimately revolves around determining the two-way relationship between the stock closing level (i.e closing level of PSEi) and foreign exchange rates (i.e PHP/USD) in the Philippines from 2006 to 2013 with the use of Granger's (1969, 1988) causality test and correlation test.

To examine this extensively, our paper presents four objectives:

- To identify whether a unidirectional relationship exists between the closing level of the Philippine Stock Exchange index (PSEi) and the foreign exchange rate (PHP pegged to USD), where stock closing level causes the movement of foreign exchange rate with the use of Granger's (1969, 1988) causality.
- To identify whether a unidirectional relationship exists between the foreign exchange rate (PHP pegged to USD) and the closing level of the

PSEi, where foreign exchange rate causes the movement of stock closing level with the use of Granger's (1969, 1988) causality.

- To identify whether a bilateral relationship exists between the closing level of the PSEi and the foreign exchange rate (PHP pegged to USD), where both markets influence each other's movement with the use of Granger's (1969, 1988) causality.
- To identify whether the stock index, PSEi is positively or negatively correlated with the foreign exchange rate (PHP pegged to USD), with the use of the correlation test.

In determining the relationship between the stock market and the foreign exchange market, we have adopted the following research hypotheses to be tested. The first set of hypothesis indicates whether a unidirectional causality exists between the stock index, PSEi and the peso-dollar exchange rate, where specifically the closing level of PSEi causes the movement of the peso-dollar exchange rate.

Ho<sub>1</sub>: Stock index, PSEi does not cause the change in peso-dollar exchange rate.

Ha<sub>1</sub>: Stock index, PSEi causes the change in peso-dollar exchange rate.

The second set of hypothesis indicates whether a unidirectional causality exists between the peso-dollar exchange rate and the stock index, PSEi, where specifically peso-dollar exchange rate causes the movement of the closing level of PSEi.

Ho<sub>2</sub>: The peso-dollar exchange rate does not cause the change in the stock index, PSEi.

Ha<sub>2</sub>: The peso-dollar exchange rate causes the change in the stock index, PSEi.

The third set of hypothesis indicates whether a bilateral causality exists between the peso-dollar exchange rate and the closing level of the PSEi, where a two way relationship can be attained.

Ho<sub>3</sub>: There is no bilateral relationship between the stock index, PSEi and the peso-dollar exchange rate.

Ha<sub>3</sub>: A bilateral relationship exists between the stock index, PSEi and the peso-dollar exchange rate.

Lastly, the fourth set of hypothesis indicates the degree of association between the closing level of PSEi and the peso-dollar exchange rate; where they can either have a direct or an indirect relationship.

Ho<sub>4</sub>: PSEi has no significant correlation with the peso-dollar exchange rate.

Ha<sub>4</sub>: PSEi has significant correlation with the peso-dollar exchange rate.

### DATA ANALYSIS

Daily observations on the stock market index and foreign exchange rate of the Philippine peso pegged to the US dollar for a period of 8 years (from January 2006 to December 2013) will be covered for the purpose of our study. We considered the population of this study as the whole Philippine stock market and chose the closing level of PSEi as its sample; since PSEi represents the movement of the entire Philippine stock market. The PSEi is a financial basket composed of the thirty biggest public companies in the Philippines chosen to represent the general movement of stock market prices. It is a capitalization-weighted index composed of stocks representative of the Industrial, Properties, Services, Holding Firms, Financial and Mining & Oil sectors of the Philippines (Bloomberg, 2014).

On the other hand, with regards to the foreign exchange market, we went with the most common determinant which is the peso-dollar exchange rate as their sample, due to the fact that the US dollars are considered as the world's currency and accepted almost everywhere according to an article from Global Financial Data. Both selected samples were also selected by Gulati and Kakhani (2012) in their study. The daily peso-dollar exchange rate was obtained from the BSP online website while its respective verification will be in accordance to the Central Bank of the United States of America.

Our study will use a causal and correlational design in determining the relationship of the stock index, PSEi and the foreign exchange rate (PHP pegged to USD) in the Philippines from 2006 to 2013. The causal research design is utilized with regards to our study employing a Granger's (1969, 1988) causality test. Taken from an article from Monroe College, a causal research design intends to establish that a cause-and-effect relationship exist amongst variables. This design will assess the variables (i.e the closing level of the PSEi and the peso-dollar exchange rate) in a more precise manner, pinpointing certain connections; that a change in PSEi can potentially influence the movement of the foreign exchange rate (PHP pegged to USD) or vice versa.

According to Shaughnessy et al (2012), "correlation exists when two different measures of the same people, events, or things vary together that is, when scores on one variable co-vary with scores on another variable". Therefore, a correlational study will help determine the association between two variables (i.e the PSEi and pesos-dollar exchange rate, for this study) with the aid of different approaches such as the correlation test where it can be ascertained whether they are positively or negatively correlated. The use of this test will help detect particular outcomes that can affect decision-making (Shaughnessy et al, 2002). It is imperative for this study to identify the relationship (i.e positive or negative) between the two variables, the PSEi and the peso-dollar exchange rate. Different econometric techniques were designed to prove the connection between the stock market and the foreign exchange market.

## **THEORETICAL FRAMEWORK**

### **Efficient Market Hypothesis**

The efficient market hypothesis characterizes an efficient financial market as one whose value is emulated from available information (Wang 2006). The Efficient market hypothesis establishes the premise that the market may not be overtaken due to its collective knowledge. According to the book of Aswath Damodaran (2012) entitled, "Investment Valuation", the efficient market hypothesis does not assume that all the respective prices of investments are at all times of its intrinsic value; but merely that the deviations that occur are unbiased throughout the market. This stems from the supposed "random walk" characteristic wherein there should be an equal (or random) chance that the investment's current price would move in either direction, (Jones and Netter, 2008).

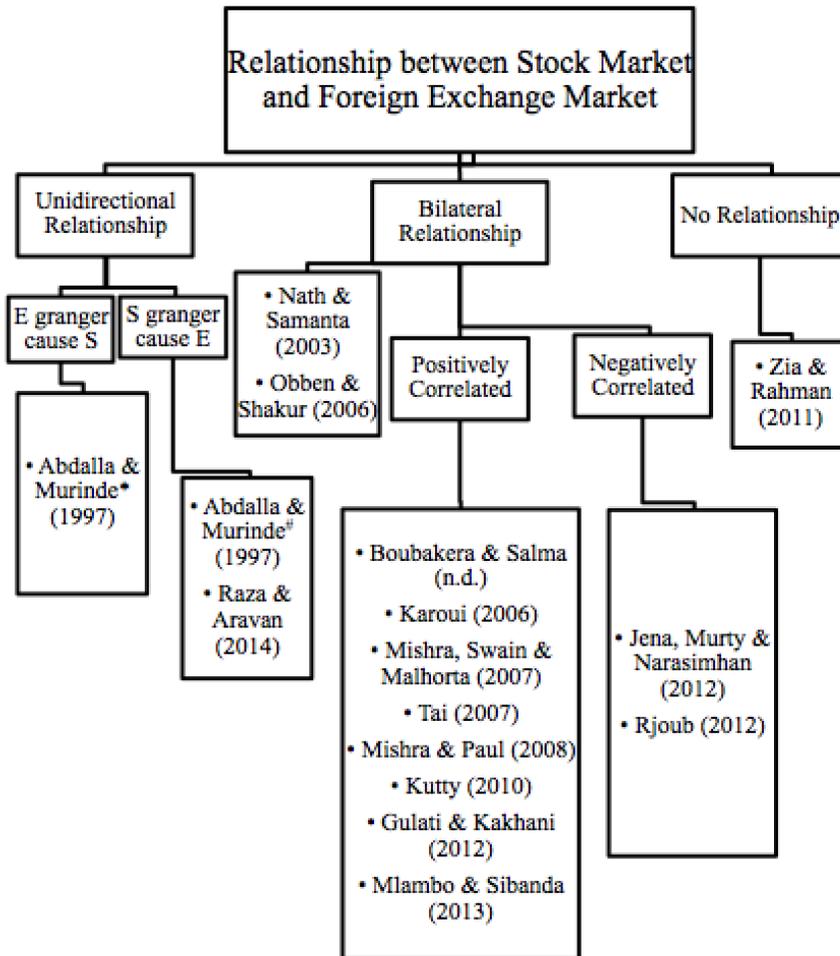
### **Portfolio Balance Approach**

According to a journal article published in Harvard, the portfolio balance approach takes into account relative prices of foreign and domestic investment options and the arbitrage opportunity between the two (Frankel, 1983). This arbitrage opportunity is then a contributing factor to the exchange rate fluctuations. This approach was also used as part of a theoretical framework in a study regarding the relationship between the stock prices and exchange rates in the EU and USA (Stavarek, 2005). Under the assumption that the foreign exchange rate regime is floating, the portfolio balance approach justifies the unidirectional causality of a country's stock market towards the same country's respective foreign exchange market (Nath and Samantha, 2003). The theory argues that currency prices are just as susceptible to the price impact of supply and demand. A booming stock market for example would attract plenty of foreign investors. This would result into a demand and simultaneous appreciation of that respective currency.

### **Flow Oriented Model**

The flow oriented model on the other hand explains unidirectional causality between the foreign exchange market and the stock market. According to Dornbushch and Fischer (1980), this model argues that any form of foreign exchange fluctuation would affect the international competitiveness of the country in the form of the firm's returns or stock price. There have been several studies that have reported a strong relationship between stock prices and the foreign exchange rate (Agrawal, 2010). For instance, that the currency appreciation negatively affects the profitability of an export dominant country which would most likely cause a similar effect on its respective stock price (and vice versa). According to a journal article published by the Asian Journal of Business and Management Sciences, a reduction in the stock prices which follows the flow oriented model, would connote a reduction in the country's liquidity and the wealth of the local investors (Agyapong, 2012). This would result in a reduction in the interest rates which would entail capital outflows which would ultimately lead to the depreciation of the respective currency.

These theoretical frameworks were also used by former studies with regards to further understanding the relationship between the two markets. The figure below shows the results of previous studies made regarding relationship of the stock market and foreign exchange market.



*"E" represents the foreign exchange rate*

*"S" represents the stock market index*

*"\*" represents the study was made in India, Korea and Pakistan*

*"#" represents the study was made in the Philippines*

#### METHODOLOGY

The employment of a unit-root test is necessary to ascertain that the regression executed is free from any bias that can question the reliability of the results (Mahadeva & Robinson, 2004). The test revolves around the data, examining

whether they have stationary or non-stationary variables. As described by Mahadeva and Robinson (2004), the variables are considered non-stationary, when the variables escalate or when they don't escalate but the results of modernization remains throughout the period of the study. To innovate unit-root testing, the Augmented Dickey-Fuller (ADF) test was done by Dickey and Fuller (Fuller, 1976). This unit root testing was used by Abdalla and Murinde (1997), Nath and Samata (2003), Yalama (2009) and Rjoub (2012) in their respective studies to check whether the data were stationary. It is crucial to remember that the ADF test adds the lagged difference of the dependent in order to handle the possible serial correlation in the error term (Gujarati and Porter, 2009, p758).

The study conducted by Faegh and Rajashekar (2014) with the subject of correlation between financial markets in India encountered data problems where their data was deemed non-stationary by the Augmented Dickey Fuller test. Because this would cause errors in the regression, the recourse they took was to transform their data to a first difference in order for it to be stationary (Faegh and Rajashekar, 2014). It is stated that regressing data in its first difference form often eliminates multicollinearity (Gujarati and Porter, 2009, p.417). The first difference of a time series is defined as the series of changes from one period to the next. If  $Y_t$  denotes the value of the time series  $Y$  and period  $t$ , then the first difference of  $Y$  at period  $t$  is equal to  $Y_t - Y_{t-1}$  (Nau, 2014). It is expected that the first-difference estimator will substantially underestimate the true impact of the lagged dependent variable, particularly if  $y$  is large. With this, the first-difference estimator will yield a statistically significant result (Verbeek, 2008). Another advantage of this approach is that, whether the random of fixed model is appropriate, it is able to remove the latent heterogeneity from the model (Greene, 2010).

Generally speaking, a vast majority of economic variable data sets are non-stationary and may possibly fall victim to the spurious regression problem. This is the case when two unrelated time-series data have been tested under conventional methods and the results apparently yielded a significant relationship. According to Gujarati and Porter (2009), "since the estimated error term are based on the estimated cointegrating parameter  $\beta_2$ , the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) critical significance values are not quite appropriate". It is believed that the Engle-Granger (EG) test serves as a solution to this.

In an economic journal article published by the University Putra Malaysia published in 2004, it was stated that when performing autoregressive models, the pre requirement in its application would be to determine the autoregressive lag length. "Generally, in structure modeling, an investigator must often choose a suitable model among a collection of visible candidates" as stated by Neath (1999). Among the model selection tools are the Akaike Information Criterion, the Schwarz Information Criterion (also known as the Baysean Information Criterion), Hannan-Quinn Information Criterion and the Final Prediction Model (Liew, 2004). For the purpose of this study, the Akaike Information Criterion will be implemented.

$$AIC_p = -2T[\ln(\hat{\sigma}_p^2)] + 2p$$

The Akaike Information Criterion (AIC) was introduced by Hirotugu Akaike in 1973. This model selection criterion uses the “Max Likelihood Principle” which as its underlying basis. Today, the AIC is the most generally accepted model selection tool (Cavanaugh, 2012). An important characteristic of the AIC is its flexibility when it comes to model selection. Basically, the AIC is designed to determine the model what will most accurately predict and will be less concerned with having too much parameter. “Since there is no true model in practice, consistency might not be a relevant property in application” (Shibata, 1980). This would deem AIC, the asymptotically efficient model, to be regarded as the most generally acceptable model. The advantage of AIC is that it takes into the account the probability that there is no true model, which makes it favorable to an array of statistical frameworks (Tsai, n.d.). Another advantage would be that the criterion also designed for minimizing forecasting error variances (Babu & Rao, 2012). AIC however has been constantly been criticized as well due to its inconsistency and impossibility to be asymmetrically precise in which other models may do so.

The Vector Autoregression (VAR) model was developed by Christopher Sims when he wanted to eliminate the current distinction between endogenous and exogenous variables (Gujarati and Porter, 2009, p.784). An article from Reed College defines exogenous variables as variables that are not affected by any changes in the endogenous variable (or dependent) or any other variable in the equation. Stock and Watson (2001) defined VAR as:

*“This simple framework provides a systematic way to capture rich dynamics in multiple time series, and the statistical toolkit that came with VARs was easy to use and interpret. As Sims (1980) and others argued in a series of influential early papers, VARs held out the promise of providing a coherent and credible approach to data description, forecasting, structural inference, and policy analysis.”*

VAR is believed to be simple method, since it makes use of the usual Ordinary Least Square (OLS) method, also there is no need for determining to whether the indicated variables are dependent or independent variables; “all variables in VAR are dependent” (Gujarati & Porter, 2009).

If cointegration has been detected between the series, it implies that there is a long-term equilibrium relationship between them. The Vector Error Correction Model (VECM) is then applied in order for the short-run properties of the cointegrated series to be evaluated. However, if there a cointegration does not exist, the VECM is no longer required and the data may go straight to Granger’s causality test for the causal links between the two variables to be established (Asari et al, 2011). When it comes to cointegrated variables, the VAR framework may only be an appropriate model after using a vector error correction model. The model sets the parameter constraints on the cointegrated variables on the equation (Parker, 2014). The equation is fit to the first differences and will include an error-correction term that measures the previous period’s deviation from the long-run equilibrium (Parker, 2014).

According to Gulati and Kakhani (2012), to further investigate the relationship of the stock market and the foreign exchange market Granger's (1969, 1988) causality test is employed. As proposed by Granger (1969), this test states that if past values of a variable, closing level of PSEi significantly forecast the value of the other variable, foreign exchange rate (PHP pegged to USD), then the closing level of PSEi Causes the change in foreign exchange rate and vice versa.

The correlation coefficient is used to compute for correlation and the coefficient ranges from -1 and +1 (Gulati & Kakhani, 2012). A correlation coefficient of +1 which is known to be a perfect positive correlation implies that as one security moves, the either security will move in the same direction whether it is up or down.. Alternatively, a correlation coefficient of -1, which is a perfect negative correlation, means that as one security moves, the other security will move in the opposite direction. Lastly, if the correlation coefficient is 0, it is said that there is no correlation with the movements of the securities and this ultimately means that they randomly move.

Even after running the Granger-causality test, there is still a chance that the results do not show the complete story behind the interactions between the variables in a system. Often in applied work, it is highly recommended to discover "the response of one variable to an impulse in another variable in a system that involves a number of further variables as well" (Rossi, 2010). This means investigating the impulse response relationship between two variables (in this case the stock market and the foreign exchange market in the Philippines) in a higher dimension. Given that a reaction of one variable exists to another variable's impulse, it is then possible to state the impulse causal for the reaction (Rossi, 2010).

Impulse response function (IRF) is then used to trace dynamic interaction among variables. It displays how the dynamic response of all the variables in the system to a shock in each variable (Mishra and Paul, 2008). Before computing for the IRF, it is important to make sure that the variables are ordered and that the system is represented by a moving average process (Mishra & Paul, 2008).

The function is also used to understand the implied dynamics of a VAR model and answers the basic question that covers how a change in one variable affects the system in the future (Russell, 2014). The IRF in VAR is used to determine the response of the dependent variable to certain shocks to the equation, especially when the coefficient has alternate signs (Gujarati and Porter, 2009, p.798). In a VAR framework, impulse responses trace the response of the current and future values of each variable to a one-unit increase or a one-standard deviation increase in the current value of one of the VAR errors, assuming that the error returns to zero in subsequent periods and that all the other errors are equal to zero (Iacoviello, 2009).

## RESULTS AND DISCUSSION

The Augmented Dickey-Fuller Test was used to check whether the unit root problem exist with the peso-dollar exchange rate and PSEi data to avoid the "problem of spurious regression" as Rjoub (2012) stated. According to an article from the American University (2011), in understanding the results from Stata with regards to the Augmented Dickey-Fuller Test, when the p-value for Z-score or the

$Z(t)$  is less than or equal to a specified significance level, the null hypothesis (i.e.  $H_0 =$  data is non-stationary) is rejected. In addition to this, when the absolute value of the t-statistics is greater than the absolute value of the 1% critical value then the null hypothesis is also rejected. Both p-values of the  $Z(t)$  are greater than any significant level (i.e. 0.01, 0.05, and 0.1) and their respective absolute value of t-statistics are less than the absolute value of the 10% critical value; therefore the data is non-stationary.

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Augmented Dickey-Fuller Test of the peso-dollar exchange rate.

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
$Z(t)$	-2.366	-3.43	-2.86	-2.57
MacKinnon approximate p-value for $Z(t) = 0.1517$				

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Augmented Dickey-Fuller Test of the PSEi.

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
$Z(t)$	-0.587	-3.43	-2.86	-2.57
MacKinnon approximate p-value for $Z(t) = 0.8739$				

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To solve the unit root problem, we decided to use the first difference method, which was also used by Faegh and Rajashekar (2014) in their study to eliminate said drawback. This technique will take the latest value of the peso-dollar exchange rate and PSEi and subtract it to the previous value respectively; this can also be called as "change" or  $\Delta$ . The first difference data is also found in Appendix A. To make sure that the first differenced data is free from the unit problem, the Augmented Dickey-Fuller Test was once again done.

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Augmented Dickey-Fuller Test of the change in peso-dollar exchange rate after employing the first difference method.

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
$Z(t)$	-38.121	-3.43	-2.86	-2.57
MacKinnon approximate p-value for $Z(t) = 0.0000$				

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Augmented Dickey-Fuller Test of the PSEi after employing the first difference method.

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
$Z(t)$	-39.54	-3.43	-2.86	-2.57
MacKinnon approximate p-value for $Z(t) = 0.0000$				

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Both p-values of the  $Z(t)$  are less than any significant level (i.e. 0.01, 0.05, and 0.1) and their respective absolute value of t-statistics are greater than the absolute value of the 10 percent critical value; therefore the null hypothesis (i.e.  $H_0 =$  data is non-stationary) is rejected.

It is essential to establish whether the two variables, namely the peso-dollar exchange rate and the PSEi is cointegrated or not. We employed the Engle-Granger cointegration test to check for the said matter. In addition to this, Engle-Granger cointegration test does not only measure the long run co-movement of the two variables, but also transform a non-stationarity data into a stationary data (Boero, 2009). The same method was done in the research by Raza and Aravan (2014) and Zia and Rahman (2011).

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Augmented Dickey-Fuller Test for e for the Engle-Granger Cointegration Test				
	Test	1% Critical	5% Critical	10% Critical
	Statistics	Value	Value	Value
Z (t)	-39.938	-3.430	-2.860	-2.570
MacKinnon approximate p-value for Z (t) = 0.0000				

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As explained, when the p-value for Z (t) is less than the significant level which in this case is 0.05, therefore, the data is non-stationary. In Table 8, the p-value for Z (t) that is 0.000 is less than the significant level 0.05, for this reason e is stationary. According to Boero (2009), if e is stationary therefore the peso-dollar exchange rate and the PSEi are cointegrated.

To proceed, it is crucial to determine the appropriate number of lags in this study, since when having more than the ideal may result in forecast errors while having too few lags on the other hand may cause the model to miss out of relevant information, this is according to an article from Princeton University. With the help of Stata, the number of lags needed can be determine, since it can conduct results that includes different criterion for optimal lag selection, among these are the FPE, AIC, HQC and the SIC. When all four have a similar result in selecting the number of lags, whichever result they produce would be deemed the ideal one for practitioners. When they are not in accordance in the other hand, we shall be implementing the lag selection of AIC as it is the most flexible and generally accepted modelling selection tool. For the purpose of our study, selection criterions were conducted for both directions of data and came up with identical results.

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Optimal Lag Selection when the dependent variable is the peso-dollar exchange rate and the independent variable is the PSEi.

lag	LL	LR	Df	P	FPE	AIC	HQC	SBIC
0	-9758.9				74.4301	9.98561	9.98771	9.99132
1	-9584.7	348.42	4	0	62.5353	9.81149	9.81778	9.82861
2	-9569.2	31.101	4	0	61.8007	9.79967	9.81016*	9.8282*
3	-9562.7	13.039	4	0.011	61.6417	9.79709	9.81178	9.83704
<b>4</b>	<b>-9556.2</b>	<b>12.926*</b>	<b>4</b>	<b>0.012</b>	<b>61.4865*</b>	<b>9.79457*</b>	<b>9.81345</b>	<b>9.84593</b>

Note: The value with “\*” represents the number of the lags for the said criterion.

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Optimal lag selection when the dependent variable is the PSEi and the independent variable is the peso-dollar exchange rate.

lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-9758.9				74.4301	9.98561	9.98771	9.99132
1	-9584.7	348.42	4	0	62.5353	9.81149	9.81778	9.82861
2	-9569.2	31.101	4	0	61.8007	9.79967	9.81016*	9.8282*
3	-9562.7	13.039	4	0.011	61.6417	9.79709	9.81178	9.83704
<b>4</b>	<b>-9556.2</b>	<b>12.926*</b>	<b>4</b>	<b>0.012</b>	<b>61.4865*</b>	<b>9.79457*</b>	<b>9.81345</b>	<b>9.84593</b>

Note: The value with "\*" represents the number of the lags for the said criterion.

According to AIC and FPE in both tables, the optimal number of lags is four, HQC and SIC on the other hand says that the optimal number of lags is two. Since we have already deemed AIC to be the primary information criterion for this research, the number of lags to be included in the model is four.

#### Vector Autoregression

	Coef.	P> z	[95% Conf. Interval]	
Der				
Der				
L1	0.1512491	0.000	.1068233	.1956749
L2	-0.0221262	0.334	-.067024	.0227715
L3	0.0013894	0.951	-.0433176	.0460965
L4	-0.0019269	0.926	-.0428572	.0390035
Dpsei				
L1	-0.0011849	0.000	-.0013122	-.0010576
L2	0.0003519	0.000	.0002142	.0004897
L3	-0.0001335	0.059	-.000272	5.05e-06
L4	-0.0000187	0.791	-.0001568	.0001194
_cons	-0.001714	0.613	-.008364	.004936
Dpsei				
Der				
L1	-18.28194	0.020	-33.73761	-2.826258
L2	-17.23958	0.031	-32.85944	-1.61972
L3	-9.206896	0.246	-24.76042	6.346628
L4	8.665989	0.233	-5.573608	22.90559
Dpsei				
L1	0.1017909	0.000	0.0575082	0.1460736
L2	-0.0609498	0.013	-0.1088812	-0.0130185
L3	-0.0599362	0.015	-0.1081206	-0.0117517
L4	-0.0806038	0.001	-0.1286324	-0.0325752
_cons	1.967278	0.096	-.3462339	4.280789

The Vector Autoregression (VAR) model basically provides linear relationship functions of all the variables involved including the lagged values of each variable. According to Statacorp (n.d.), the only prerequisite to this function is testing the data and declaring it to be of time-series format. It is imperative to

realize that the execution of the VAR and Granger's Causality on a VAR framework should be simultaneous in testing the effects of the independent variable to the dependent variable, this serves as a prerequisite in using Stata, according to Statacorp (n.d.). As anticipated, the two set of VAR and Granger's Causality produced identical results, whether the dependent variable is the peso-dollar exchange rate or the PSEi.

In the previous table, L1 denotes the value for yesterday or when t-1, L2 denotes the value two days earlier or when t-2, L3 denotes the value three days earlier or when t-3, and L4 denotes the value four days earlier or when t-4. In interpreting the results in Table 11, it is crucial to take into consideration the different lag values as part of the regression equation, that L4 affects L3 which also affects L2 then affects L1 and that every one of these lag values altogether influence the present value of a certain variable. To read between the lines, each significant lagged values will be interpreted, this only include coefficients that have p-values less than 0.05, since this is tested in a 95% confidence interval.

When the dependent variable is the change in the peso-dollar exchange rate then the independent variables include all statistically significant lagged coefficients of both the change in peso-dollar exchange rate and the change in PSEi. Variables included as dependent variables are L1 of the change in peso-dollar exchange rate (p-value of  $0.000 < 0.05$ ), L1 of the change in PSEi (p-value of  $0.000 < 0.05$ ), and L2 of the change in PSEi (p-value of  $0.000 < 0.05$ ). Since the coefficient of the constant or the intercept is insignificant (p-value of  $0.613 > 0.05$ ), hence it is not included in the statistically significant regression equation. This scenario is represented in Equation 29.3.

$$\text{Der}_t = 0.1512491\text{Der}_{t-1} + \text{Dpsei}_t + \mu \quad (29.1)$$

$$\text{Dpsei}_t = -0.0011849\text{Dpsei}_{t-1} + 0.0003519\text{Dpsei}_{t-2} + \mu \quad (29.2)$$

$$\text{Der}_t = 0.1512491\text{Der}_{t-1} + (-0.0011849\text{Dpsei}_{t-1} + 0.0003519\text{Dpsei}_{t-2}) + \mu \quad (29.3)$$

As seen in Equation 29.1, a per unit increase in the change ( $\Delta$ ) of peso-dollar exchange rate yesterday would increase the change ( $\Delta$ ) of peso-dollar exchange rate today by 0.1512491. In Equation 29.2, it is interpreted as a per unit increase in the  $\Delta$  of PSEi yesterday would decrease the  $\Delta$  of PSEi today by 0.0011849. And that a per unit increase in the  $\Delta$  of the PSEi two days prior would increase the  $\Delta$  of PSEi today by 0.0003519. The change of sign from increase to decrease of the effects of the  $\Delta$  of PSEi two days prior and yesterday respectively is due to the volatility of the stock market. Thus, we can combine all these by saying a per unit increase in the  $\Delta$  of peso-dollar yesterday will increase the  $\Delta$  of peso-dollar today by 0.1512491 also, a per unit increase in the  $\Delta$  of the PSEi today can decrease or increase the  $\Delta$  of peso-dollar today by the value depending on what is concluded in Equation 29.2.

When the dependent variable is the change in the PSEi then the independent variables include all statistically significant lagged coefficients of both

the change in PSEi and the change in peso-dollar exchange rate. Variables included as dependent variables are L1 of the change in peso-dollar exchange rate (p-value of  $0.020 < 0.05$ ), L2 of the change in peso-dollar exchange rate (p-value of  $0.031 < 0.05$ ), L1 of the change in PSEi (p-value of  $0.000 < 0.05$ ), L2 of the change in PSEi (p-value of  $0.013 < 0.05$ ), L3 of the change in PSEi (p-value of  $0.015 < 0.05$ ), and L4 of the change in PSEi (p-value of  $0.001 < 0.05$ ). Since the coefficient of the constant or the intercept is insignificant (p-value of  $0.096 > 0.05$ ), hence it is not included in the statistically significant regression equation. This scenario is represented in Equation 31.3.

$$\begin{aligned} Dpsei_t = & Der_t + 0.1017909Dpsei_{t-1} - 0.0609498Dpsei_{t-2} \\ & - 0.0599362Dpsei_{t-3} - 0.0806032Dpsei_{t-4} \\ & + \mu \end{aligned} \quad (30.1)$$

$$\begin{aligned} Der_t = & -18.28194Der_{t-1} - 17.23958Der_{t-2} \\ & + \mu \end{aligned} \quad (30.2)$$

$$\begin{aligned} Dpsei_t = & (-18.28194Der_{t-1} - 17.23958Der_{t-2}) + 0.1017909Dpsei_{t-1} \\ & - 0.0609498Dpsei_{t-2} - 0.0599362Dpsei_{t-3} - 0.0806032Dpsei_{t-4} \\ & + \mu \end{aligned} \quad (30.3)$$

As seen in Equation 30.1, a per unit increase in the  $\Delta$  of the PSEi yesterday would increase the  $\Delta$  of PSEi today by 0.1017909. Also, a per unit increase in the  $\Delta$  of the PSEi two days prior would decrease the  $\Delta$  of PSEi today by 0.0609498. Moreover, a per unit increase in the  $\Delta$  of the PSEi three days prior would decrease the  $\Delta$  of PSEi today by 0.0599362 and that a per unit increase in the  $\Delta$  of the PSEi four days prior would decrease the  $\Delta$  of PSEi today by 0.0806032. The change of sign from decrease to increase of the effects towards the  $\Delta$  of PSEi today is due to the randomness of the stock market. As seen in Equation 30.2, a per unit increase in the  $\Delta$  of the peso-dollar exchange rate yesterday would decrease the  $\Delta$  of peso-dollar exchange rate today by 18.28194, and that a per unit increase in the  $\Delta$  of the peso-dollar exchange rate two days prior would decrease the  $\Delta$  of peso-dollar exchange rate today by 17.23958. Thus, we can combine all these by saying a per unit increase in the  $\Delta$  of peso-dollar today will decrease the  $\Delta$  of PSEi today by the value depending on what is concluded in Equation 30.2. Also, a per unit increase in the  $\Delta$  of the PSEi yesterday, two days prior, three days prior and four days prior would increase the  $\Delta$  of PSEi today by 0.1017909, decrease the  $\Delta$  of PSEi today by 0.0609498, decrease the  $\Delta$  of PSEi today by 0.0599362, decrease the  $\Delta$  of PSEi today by 0.0806032 respectively.

Since the two variables are cointegrated, we also employed a vector error correction model (VECM) to amend any error in the said equation. The outcome of the VECM is in fact reasonably similar with the findings published by VAR.

Vector Error Correction Model		Coef.	P> z	[95% Conf. Interval]	
D_er					
	_ce1				
	L1.	-	0.018	-.0061406	-.0005804
		0.0033605			
	er				
	L1D.	0.1517985	0.000		0.1073205
					0.1962766
	L2D.	-0.0212171	0.335		-0.0661716
					0.0237374
	L3D.	0.0022643	0.921		-0.0424989
					0.0470275
	L4D.	-0.0012982	0.950		-0.0422778
					0.0396814
	psei				
	L1D	-0.0011798	0.000	-.0013073	-
					.0010523
	L2D	0.0003534	0.000		.0002155
					.0004914
	L3D	-0.0001311	0.064	-.0002698	7.57e-
					06
	L4D	-0.0000164	0.816		-.0001546
					.0001218
	_cons	0.0170399	0.048		.000157
					.0339228
D_psei					
	_ce1				
	L1	.3524836	0.476	-.6159692	1.320936
	er				
	L1D	-18.33957	0.020	-33.83371	-2.845426
	L2D	-17.33494	0.030	-32.99504	-1.674834
	L3D	-9.298661	0.242	-24.89212	6.294794
	L4D	8.600046	0.238	-5.675393	22.87549
	Psei				
	L1D	.1012512	0.000	.0568359	.1456666
	L2D	-.0611063	0.013	-.1091564	-.0130563
	L3D	-.0601833	0.015	-.1084899	-.0118767
	L4D	-.0808456	0.001	-.1289958	-.0326954
	_cons	.0001625	1.000		-5.881072
					5.881397

In the previous table, L1 denotes the value of the correction of error for yesterday or when t-1, L1D denotes the  $\Delta$  in value today, L2D denotes the  $\Delta$  in

value two days earlier or when t-2, L3D denotes the  $\Delta$  in value three days earlier or when t-3, and L4D denotes the  $\Delta$  in value four days earlier or when t-4. In interpreting the results in Table 12, it is crucial to take into consideration the different lag values as part of the regression equation, that L4D affects L3D which also affects L2D then affects L1D and that every one of these lag values altogether influence the present value of a certain variable. Looking carefully, only statistically significant  $\Delta$  in lagged values will be interpreted, the equation will only contain coefficients that have p-values less than 0.05, since this is tested in a 95% confidence interval.

When the dependent variable is the change in the peso-dollar exchange rate then the independent variables include all statistically significant coefficients of  $\Delta$  in lagged values of both the peso-dollar exchange rate and the PSEi. Variables included as dependent variables are L1D of the peso-dollar exchange rate (p-value of  $0.000 < 0.05$ ), L1D of the PSEi (p-value of  $0.000 < 0.05$ ), and L2D of the PSEi (p-value of  $0.000 < 0.05$ ). Also the L1 coefficient of the correction of error is also included given that its p-value of 0.018 is less than 0.05. Since the coefficient of the constant or the intercept is significant (p-value of  $0.048 < 0.05$ ), hence it is included in the statistically significant regression equation. This scenario is represented in Equation 31.3

$$D_{er_t} = 0.0170399 + 0.1517985er_{t-1} + pseit + \mu \quad (31.1)$$

$$pseit = -0.0011798pseit_{-1} + 0.0003534pseit_{-2} + \mu \quad (31.2)$$

$$D_{er_t} = 0.0170399 + 0.1517985er_{t-1} + (-0.0011798pseit_{-1} + 0.0003534pseit_{-2}) + (-0.0033605ce1_{t-1}) + \mu \quad (31.3)$$

As seen in Equation 31.1, given that intercept is equal to 0.0170399, a per unit increase in the change ( $\Delta$ ) of peso-dollar exchange rate yesterday would increase the change ( $\Delta$ ) of peso-dollar exchange rate today by 0.1517985. In Equation 31.2, it is interpreted as a per unit increase in the  $\Delta$  of PSEi yesterday would decrease the  $\Delta$  of PSEi today by 0.0011798. And that per unit increase in the  $\Delta$  of the PSEi two days prior would increase the  $\Delta$  of PSEi today by 0.0003534. The change of sign from increase to decrease of the effects of the  $\Delta$  of PSEi two days prior and yesterday respectively is due to the volatility of the stock market. Thus, we can combine all these by saying a per unit increase in the  $\Delta$  of peso-dollar yesterday will increase the  $\Delta$  of peso-dollar today by 0.1517985, a per unit increase in the  $\Delta$  of the PSEi today can decrease or increase the  $\Delta$  of peso-dollar today by the value depending on what is concluded in Equation 31.2, also a per unit increase in the correction of error decreases  $\Delta$  of peso-dollar today by 0.0033605. Equation 31.3 also includes an intercept of 0.0170399.

When the dependent variable is the change in the PSEi then the independent variables include all statistically significant coefficients of  $\Delta$  in lagged

values of both the PSEi and the peso-dollar exchange rate. Variables included as dependent variables are L1D of the peso-dollar exchange rate (p-value of  $0.020 < 0.05$ ), L2D of the peso-dollar exchange rate (p-value of  $0.030 < 0.05$ ), L1D of the PSEi (p-value of  $0.000 < 0.05$ ), and L2D of the PSEi (p-value of  $0.013 < 0.05$ ), L3D of the PSEi (p-value of  $0.015 < 0.05$ ), and L4D of the PSEi (p-value of  $0.001 < 0.05$ ). Since both the coefficient of the intercept (p-value of  $0.096 > 0.05$ ) and the correction of error (p-value of  $.476 > 0.05$ ) is insignificant, hence it is not included in the statistically significant regression equation.

$$\begin{aligned} D\_psei_t = & er_t + 0.1012512psei_{t-1} - 0.0611063psei_{t-2} \\ & - 0.0601833psei_{t-3} - 0.0808456psei_{t-4} \\ & + \mu \end{aligned} \quad (32.1)$$

$$\begin{aligned} er_t = & -18.33957er_{t-1} - 17.33494er_{t-2} \\ & + \mu \end{aligned} \quad (32.2)$$

$$\begin{aligned} D\_psei_t \\ = & (-18.33957er_{t-1} - 17.33494er_{t-2}) + 0.1012512psei_{t-1} \\ & - 0.0611063psei_{t-2} - 0.0601833psei_{t-3} - 0.0808456psei_{t-4} \\ & + \mu \end{aligned} \quad (32.3)$$

As seen in Equation 32.1, a per unit increase in the  $\Delta$  of the PSEi yesterday would increase the  $\Delta$  of PSEi today by 0.1012512. Also, a per unit increase in the  $\Delta$  of the PSEi two days prior would decrease the  $\Delta$  of PSEi today by 0.0611063. Moreover, a per unit increase in the  $\Delta$  of the PSEi three days prior would decrease the  $\Delta$  of PSEi today by 0.0601833 and that a per unit increase in the  $\Delta$  of the PSEi four days prior would decrease the  $\Delta$  of PSEi today by 0.0808456. The change of sign from decrease to increase of the effects towards the  $\Delta$  of PSEi today is due to the randomness of the stock market. As seen in Equation 32.2, a per unit increase in the  $\Delta$  of the peso-dollar exchange rate yesterday would decrease the  $\Delta$  of peso-dollar exchange rate today by 18.33957, and that a per unit increase in the  $\Delta$  of the peso-dollar exchange rate two days prior would decrease the  $\Delta$  of peso-dollar exchange rate today by 17.33494. Thus, we can combine all these by saying a per unit increase in the  $\Delta$  of peso-dollar today will decrease the  $\Delta$  of PSEi today by the value depending on what is concluded in Equation 32.2 also, a per unit increase in the  $\Delta$  of the PSEi yesterday, two days prior, three days prior and four days prior would increase the  $\Delta$  of PSEi today by 0.1012512, decrease the  $\Delta$  of PSEi today by 0.0611063, decrease the  $\Delta$  of PSEi today by 0.0601833, decrease the  $\Delta$  of PSEi today by 0.0808456 respectively.

In comparing the VAR vis-a-vis the VECM, it is believed that the latter will provide a more accurate assumption of the regression, in view of the fact that it includes a variable, correction of error which by its name itself corrects the error in the equation. However, in order to answer the main objective of this research a Granger's Causality test must be employed, which can only be constructed if done simultaneously with the VAR model.

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Granger's Causality				
Equation	Excluded	Chi2	df	Prob>chi2
Der	Dpsei	347.31	4	0.000
Der	All	347.31	4	0.000
Dpsei	Der	15.024	4	0.005
Dpsei	All	15.024	4	0.005

---

Note: The results of causality between the two variables, whether the dependent variable is the peso-dollar exchange rate or the PSEi and the independent variable as the PSEi or the peso-dollar exchange rate respectively.

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Understanding the results of the Granger's Causality, when Prob>chi2 is less than the significant level (i.e 0.05) then the null hypothesis that indicates no relationship exist is rejected. As seen in Table 13, the Prob>chi2, 0.000 is less than the significant level 0.05 therefore the first difference ( $\Delta$ ) of the peso-dollar exchange rate affects the first difference ( $\Delta$ ) of the PSEi; on the other hand, the  $\Delta$  of the PSEi also affects  $\Delta$  of the peso-dollar exchange rate, given that it's Prob>chi2, 0.005 is less than the significant level 0.05. With this, the null hypothesis ( $H_{03}$ ) that there is no bilateral relationship between the stock index, PSEi and the peso-dollar exchange rate is rejected. In a nutshell, a bilateral relationship exists between the two variables, albeit the switching of the dependent and independent variables; where a change in value of the first difference of the peso-dollar exchange rate influences the volatility in the value of the first difference of the PSEi.. Likewise, a change in value of the first difference of the PSEi sways the fluctuations of the first differenced value of the peso-dollar exchange rate.

Having established that a bilateral relationship is present between the two markets, a correlation test will be used to uncover a deeper understanding of the nexus between the two variables. As stated by Gulati and Kakhani (2012), the correlation coefficients in the correlation method range from -1 to +1. A correlation coefficient of +1 is known as a perfect positive correlation while a correlation coefficient of -1 is a perfect negative correlation. A perfect positive correlation indicates that if one variable moves, the other variable will move in the same direction whether it is up or down. A perfect negative correlation however will cause the other variable to move the opposite direction if one variable moves up or down. Furthermore, if the correlation coefficient is 0, it is apparent that there is no correlation between the movements of the variables indicating that they do not affect each other. Understanding further, the correlation coefficient is considered weak or low if it is less than or equal to 0.35 while a correlation coefficient is deemed moderate if it is more than 0.35 but is less than or equal to 0.67 and it is regard as high if the correlation coefficient is more than 0.67 but is less than or equal to 1.0 (Taylor, 1990).

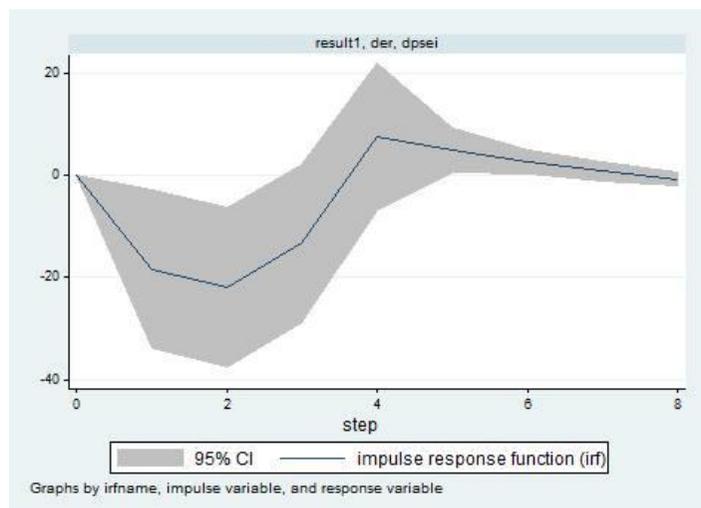
## Correlation Test

	der	dpsei
der	1.000	
dpesi	-0.1114	1.000

Note: the results of the correlation test whether the dependent variable is the peso-dollar exchange rate or the PSEi and when the independent variable is the PSEi or the peso-dollar exchange rate respectively.

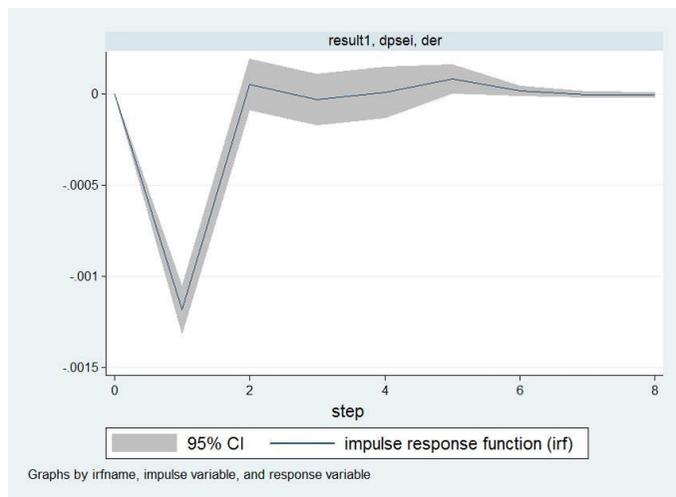
As exhibited in the table, the test indicates that the two variables are negatively correlated with each other, which rejects the null hypothesis ( $H_{04}$ ) that states that PSEi has no significant correlation with the peso-dollar exchange rate. The findings imply an inverse relationship where when the first differenced value of the peso-dollar exchange rate increases or domestic currency depreciation occurs, the first differenced value of the stock index decreases, whereas, when the first differenced value of the peso-dollar exchange rate decreases or domestic currency appreciation occurs, the first differenced value of stock index increases. Given that the correlation coefficient of first differenced value of the peso-dollar exchange rate and first differenced value of the PSEi is -0.1114, the correlation coefficient is considered weak. The idea of a weak or a very less degree of correlation between the two markets was also concluded by Gulati and Kakhani (2012) in their study. This indicates that the relationship between the PSEi and the peso-dollar exchange rate is far from linear but both variables does affect each other negatively. With the two variables having a very less degree of negative correlation between each other, it is evident that a bilateral relationship exists between the PSEi and the peso-dollar exchange rate.

To ascertain the reaction of the dependent variable to different shocks in the equation, an impulse response function was constructed. The below figure exhibits the impulse response function graph where the blue line represents the impulse response function and the grey area is the 95% confidence interval for the IRF when the peso-dollar exchange rate is the dependent variable and PSEi is the independent variable.



As seen in the above figure, the first differenced value of the peso-dollar exchange rate will initially decrease, but will increase eventually and converge itself to zero. Given that the first differences is calculated as the value today minus the value of yesterday, then having a zero difference implies that the value today of the peso-dollar exchange rate is identical to its value yesterday. This would mean that the first differenced values of the peso-dollar exchange rate would stabilize in the long run. The grey area or the 95% confidence interval on the other hand, shows the range of the first differenced values of the peso-dollar exchange rate.

The next figure exhibits the impulse response function graph where the blue line represents the impulse response function and the grey area is the 95% confidence interval for the IRF when the PSEi is the dependent variable and the peso-dollar exchange rate is the independent variable.



The first differenced value of the PSEi will primarily experience a downfall, but sooner or later increase and fluctuates itself to converge at zero. Given that the first differences is calculated as the value today minus the value of yesterday, then having a zero difference implies that the value today of the PSEi is identical to its value yesterday. This indicates that in the long run, the first differenced values of the PSEi would stabilize. The grey area or the 95% confidence interval on the other hand, shows the range of the first differenced values of the PSEi.

As shown in the table below, the null hypotheses stating that the stock index, PSEi does not cause the change in peso-dollar exchange rate and the peso-dollar exchange rate does not cause the change in the stock index, PSEi are accepted, while the null hypotheses stating that there is no bilateral relationship between the stock index, PSEi and the peso-dollar exchange rate and PSEi has no significant correlation with the peso-dollar exchange rate are rejected.

Hypothesis	Results
Ho <sub>1</sub> : Stock index, PSEi does not cause the change in peso-dollar exchange rate.	REJECT
Ha <sub>1</sub> : Stock index, PSEi causes the change in peso-dollar exchange rate.	ACCEPT
Ho <sub>2</sub> : The peso-dollar exchange rate does not cause the change in the stock index, PSEi.	REJECT
Ha <sub>2</sub> : The peso-dollar exchange rate causes the change in the stock index, PSEi.	ACCEPT
Ho <sub>3</sub> : There is no bilateral relationship between the stock index, PSEi and the foreign exchange rate.	REJECT
Ha <sub>3</sub> : A bilateral relationship exists between the stock index, PSEi and the foreign exchange rate.	ACCEPT
Ho <sub>4</sub> : PSEi has no significant correlation with the peso-dollar exchange rate.	REJECT
Ha <sub>4</sub> : PSEi has significant correlation with the peso-dollar exchange rate.	ACCEPT

### CONCLUSION

It is believed that a bilateral relationship between the stock market and the foreign exchange in the Philippines is uncommon. Many studies have concluded that a bilateral relationship does exist between the two markets with regards to their respective country. To name a few, it includes: "Integration between Forex and Capital Markets in India: An Empirical Exploration" by Nath & Samantha (2003), "Analysis of the Relationship between the Share Market Performance and Exchange Rates in New Zealand: A Cointegrating Var Approach" by Obben and Shakur (2006), "The Correlation between FX Rate Volatility and Stock Exchange Returns Volatility: An Emerging Markets Overview." By Karoui (2006), "Volatility Spillover between Stock and Foreign Exchange Markets: Indian Evidence." by Mishra, Swain & Malhorta (2007), "Market Integration and Contagion: Evidence from Asian Emerging Stock and Foreign Exchange Markets." Tai (2007), "Integration and Efficiency of Stock and Foreign Exchange Markets in India." by Mishra & Paul (2008), "The Relationship between foreign exchange rates and Stock Prices: The Case of Mexico." by Kutty (2010), "Effects of Foreign Exchange Rate Volatility on the Stock Market: A Case Study of South Africa." By Mlambo & Sibanda (2013), "Integration of Financial Markets in India: An Empirical Analysis" by Jena, Murty & Narasimhan (2012) and "Stock Prices and Exchange Rates Dynamics: Evidence from Emerging Markets" by Rjoub (2012).

The negative correlation coefficient between the two markets is also found in the following studies "Integration of Financial Markets in India: An Empirical Analysis" by Jena, Murty & Narasimhan (2012) and "Stock Prices and Exchange Rates Dynamics: Evidence from Emerging Markets" by Rjoub (2012). The studies by Jena, Murty & Narasimhan (2012) and Rjoub (2012) also concluded a bilateral relationship between the stock market and the foreign exchange market. However, this was contradicting to the results concluded by Gulati and Kakhani (2012) stating a very less degree of positive relationship exists between the two markets in India. A potential cause of disparity is that the studies were done in different countries.

To expand on this further, there are many ways to analyze the influence of stock prices on the exchange rate of a country. One way to analyze this is the portfolio balance approach (Bahmani-Oskooee and Sohrabian, 1992). This approach believes that "if the impact of an external parameter influences the stock market to go up, the domestic investor's wealth increases, raising the demand for the currency according to the investment portfolio equilibrium theory," (Tsai, 2012). The increased money demand then pushes the interest rates to rise, which absorbs the inflow of foreign capital and then finally, causes the domestic currency to appreciate. Investors become more optimistic regarding the stock market of a country which attracts foreign capital investors to increase their investment in the country's stock market due to the speculative demand of the public, which indirectly causes the appreciation of the country's currency (Tsai, 2012).

There is another theory believed by Aggarwal (1981) that opposes the portfolio balance approach and claims that the International Trading Effect should in fact, create a positive relationship between the two markets. He claims that a change in a country's exchange rate does not only affect the stock prices of multinational and export orient firms; it can also affect domestic firms. The profitability of a multinational firm is continuously affected by the changes in the exchange rate as the value of its foreign operations increases or decreases, depending on the change of exchange rate (Tsai, 2012). So when the exchange rate depreciates, which corresponds to an increase in domestic currency, the competitiveness of exports will increase as more international firms will be enticed to purchase domestic products with the increased power of the foreign currency and the input cost of imports will increase as well (Joseph, 2002). This in turn will generally cause a positive effect for export firms and then an increase in stock prices and a negative effect for import firms that will eventually cause a decrease in stock prices.

It is understood that the stock prices are expected to react to changes in exchange rates. With the effect of exchange rates on the balance sheets of multinational companies, depreciation could cause a rise or downfall on the value of a company depending on whether the company mainly imports or export, whether it owns foreign units and whether it hedges against exchange rate fluctuation. Heavy importers, such as the Philippines, will suffer from higher costs due to the currency depreciation and will have their earnings decreased, thus causing share prices to decrease (Dimitrova, 2005).

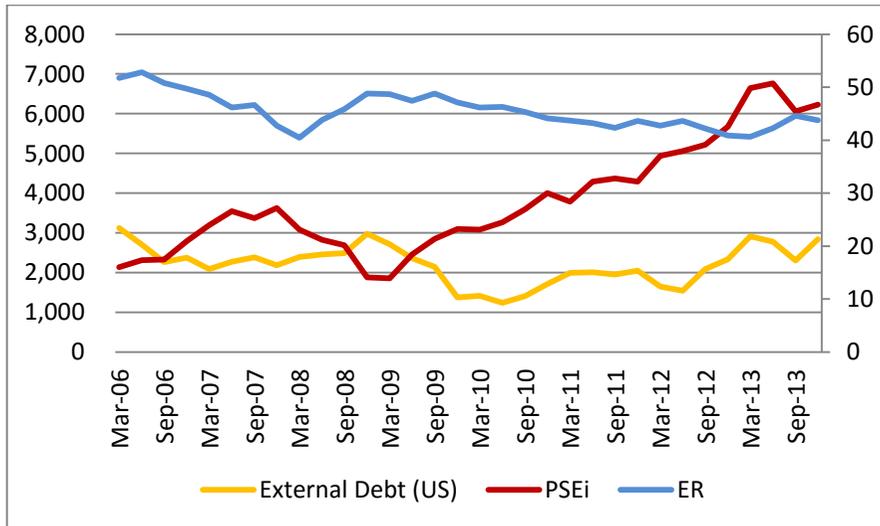
In the case of the Philippines, according to Aurelio Montinola III in an interview with the Oxford Business Group in 2010, has not been as heavily dependent on exports as the rest of Asia. Domestic production and employment rely more on local demand than external markets (Oxford Business Group, 2010). Asian Development Bank also stated in their study, "Outlook 2013: Asia's Energy Challenge" that the Philippines will remain heavily dependent on energy imports, especially oil (Olchondra, 2013). With this being said, it makes more sense that the Philippines follows the portfolio balance approach more than the international trading effect to explain the relationship between the two markets.

It was also noticed by Hookway and Larano (2009) that the Philippines was less affected by the global financial crisis but is also less able to recover when the economic situation around the globe improves – all this because the Philippines does not depend heavily on foreign trade. As stated by Luz Lorenzo, a regional economist with ATR-Kim Eng Securities Ltd. in Manila, "The Philippines is less sensitive to changes in foreign demand. That could mean problems persist here when the situation is beginning to turn around elsewhere." (Hookway and Larano, 2009). To emphasize the lack of export dependence of the Philippines, it was ranked 58th on the hierarchy of exporters around the world by a government website (i.e Central Intelligence Agency), while India was in the 19th place. Taking this into consideration, the positive relationship concluded by Gulati and Kakhani (2012) in India can potentially be caused by the International Trading Effect.

The negative bilateral relationship between the two markets can also be explained by investor's confidence that pertains to products Filipinos are willing to invest in, whether it is in the foreign exchange (FOREX) or stocks. Dimitrova (2005) explained that in the event of an expected depreciation in domestic currency, causing the increase of numerical value of the peso as against to the US dollar (eg. 40PHP/USD to 50PHP/USD), investors and portfolio managers will be more skeptical with the future performance of companies and lean on investing in the FOREX market, since this assures them a profit of 10PHP/USD, taken from the example. The investor's choice to invest in FOREX causes the fall of demand towards the stock market and therefore leads to the decrease of the stock index. Another fragment of investor's confidence is concern with investor's preference with regards to geography. In a study conducted by Manulife (2014), it was concluded that Philippine investors prefer to invest in developed economies such as Japan, Singapore, Australia and North America over emerging Asian economies. Taking an economic standpoint, the instant Filipinos invest in foreign countries or economies; the Philippine economy diminishes and would therefore cause the decline of stock prices and as a result, the domestic currency depreciates. However, in the event that Filipino investors choose to invest more in the Philippines then this will boost the Philippine economy that would increase stock prices and cause the appreciation of peso accordingly.

Another reason involves the understanding of Philippine's foreign debts. The moment domestic currency depreciates, the debt becomes more expensive to pay and therefore pilot its way to decrease the Philippine's economy and therefore causes the decline of the stock index. On the other hand, appreciation of domestic currency causes a boom in the economy of the Philippines and therefore causes the increase in the stock index. In layman's term, when currency

depreciates that is 40PHP/USD becomes 50PHP/USD, foreign debt increases that pilot the domestic economy to a downfall and therefore leads to a decrease of the stock index. The figure below shows evidence that the external debt of the Philippines moves directly with the peso-dollar exchange rate, but indirectly with the PSEi throughout the period of our study.



The above figure exhibits the movement of external debt of the Philippines to the United States (US), the PSEi and the peso-dollar exchange rate from 2006 to 2013. The axis on the left is for the external debt and PSEi, while the axis on the right is for the exchange rate. Source: Bangko Sentral ng Pilipinas (BSP)

It is important to study the relationship between these two financial markets especially in the Philippines as they are still under developed. This can improve the decision making of the different stakeholders, which are corporations, stock market investors and foreign investors, financial institutions, government officials, importers, exporters and the general public. Understanding this relationship would help predict future movements in each market which would allow authorities to better manage the economy, as well working toward the establishment of an efficient financial market in the Philippines. According to Timmermann (2004), having an efficient market would eliminate risk-free opportunities and unfair advantages in generating large profits. With this, any information made public reflects all relevant information and is already being enacted upon by the market.

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