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IS THE STOCK MARKET IN THE PHILIPPINES A LEADING INDICATOR OF ECONOMIC ACTIVITY?*

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ABSTRACT

The conventional models for stock pricing are anchored on the assumption that current stock prices are forward looking as they reflect the estimated future earnings of firms. Since expectations of future earnings are influenced directly by the expected level of economic activity, then fluctuations in stock prices today may predict the future growth and direction of the economy. The purpose of this study is to empirically investigate whether the theoretical proposition that stock prices are a leading indicator of economic activity applies to a small open economy like the Philippines. The nexus between stock prices and the real economy is explored using the Granger causality technique based on the vector error correction model (VECM) using quarterly data from 1995 to 2017. The findings indicate the existence of a statistically significant positive long run relationship between real stock price and real economic growth. The econometric tests further demonstrate that in the short run, real stock price Granger causes real gross domestic product (RGDP). This provides evidence that changes in current stock prices may predict changes in future economic activity lending support to the leading indicator role of the stock market in the Philippines in the short run. However, in the long run, a unidirectional causality from RGDP to real stock price is likewise detected suggesting that economic growth contributes to the development of the country's stock market over the long term.

Keywords: *Stock Prices, Economic Growth, Granger Causality, Vector Error Correction Model*

JEL Codes: *C22, G10*

1. INTRODUCTION

It is a widely held view among economists and policymakers that the stock market plays a pivotal role in the economic growth of both developed and developing countries. Owning stocks is a major form of savings and of accumulating wealth. Conversely, selling shares of stocks is an important means by which firms can raise external funds to finance various investment projects. Stocks then are a key vehicle

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of direct finance in the economy – transferring resources directly from people with surplus funds to investors that have profitable investment opportunities but lack the resources to finance them. In this way, a well-functioning stock market improves economic efficiency and stimulates economic growth.

Stock prices are likewise believed to contain crucial information about the future course of the economy that may guide businesses and households in their investment and consumption decisions as well as governments in policy-making. This relates to the role of stock prices as a predictor or a leading indicator of future economic activity (Pierce, 1983; Mahdavi and Sorahbian, 1991; Croux and Reusens, 2013). If stock prices can be relied upon to accurately predict the real economy, then firms and households can use the information provided by stock prices to better time their purchases and policy makers can depend on the same information in formulating timely measures to stabilize the economy.

The stock market's predictive ability is based on the premise that current stock prices are determined by the future profitability or earnings potential of firms. Since expected earnings are influenced directly by the expected level of economic activity, then fluctuations in stock prices today may predict the future course or direction of the economy. Based on this notion, large increases in current equity prices may signal an acceleration of economic growth, while sharp declines in share prices may portend an impending slowdown or even a recession.

The objective of this paper is to investigate whether stock prices are a leading indicator of economic activity in a small open economy like the Philippines. Utilizing the Granger causality technique based on the vector error correction model (VECM), the cause and effect relationship between stock prices and real economic activity is analyzed based on quarterly data from 1995 to 2017.

The last several years since 2010 have witnessed significant strides in the real economy and the stock market in the Philippines. From only a 4.4% annual growth rate from 2000-2009, real GDP growth jumped to an average annual rate of 6.4% from 2010 to 2017 (Table 1). During the same period, the Philippine stock market exhibited equally robust growth of around 10.3% yearly in real terms from a 1.3% decline in the preceding decade. The expansion was propelled in part by a more vibrant economy and in part by structural and regulatory reforms that were put in place during the period. These reforms included the unification of the exchanges, demutualization of the stock exchange, and enactment of the Securities Regulation Code (Ho and Odhiambo, 2014/15).

Table 1. Average Annual Growth Rate of Real GDP and Real Stock Price Index*

Years	Real GDP	Real Stock Price
1995 – 1999	3.617%	-11.465%
2000 – 2009	4.444%	-1.267%
2010 – 2007	6.350%	10.308%

*Computed using data from the Philippine Statistics Authority.

Given these developments, it is timely to reexamine whether stock prices in the Philippines can be considered a leading economic indicator by employing formal econometric techniques. It is should be noted that although the country's stock price index already forms part of its Leading Economic Indicators System (LEIS), there appears to be few empirical studies that test the hypothesis that stock prices do indeed lead economic activity in the country. Interestingly, a research conducted by Atmadja (2005) that covered five ASEAN countries found no evidence of causality between stock prices and macroeconomic variables in the Philippines. The present study contributes to the literature by way of an additional empirical analysis that delves on the Philippine situation.

The succeeding parts of this paper proceed as follows. section 2 summarizes the theories and some of the empirical literature on this topic; section 3 discusses the data requirements and research methodology; section 4 presents and analyzes the empirical results; and, the last section concludes the paper.

2. THEORETICAL AND EMPIRICAL LITERATURE

2.1. Theoretical Literature

The main theories that support the notion that stock prices may provide advance information about the future health of the economy are the traditional stock valuation model, Tobin's q theory, balance sheet channel, and the wealth effect.

According to the traditional stock valuation model, the price of a stock today is determined by the present discounted value of future dividend streams that the stock may generate for its owner. More formally, the link between stock prices and economic activity is embodied in a generalized stock pricing model such as the Gordon growth model (1959), which states that the price of a stock today, Po, is determined by the most recent dividend paid on the security, D1, the required return on equity investment, ke, and the expected growth rate of dividends, g:

$$P_0 = \frac{D_1}{k_e - g} \quad (1)$$

From the above formula, g is directly affected by the expected state of the overall economy as represented by the gross domestic product (GDP). Thus, changes in stock prices today should reflect changes in expected GDP. This indicates the forward looking property of the stock market and suggests that stock prices could perform well as a leading indicator of economic activity.

On the other hand, Tobin's q theory describes the linkage between stock prices and economic activity by the effect of share prices on investment spending. Developed by James Tobin (1969), q is defined as the market value of firms divided by the replacement cost of capital. When stock prices rise, q rises as well since the market value of firms has grown relative to the replacement cost of capital, indicating that these goods have become cheaper compared to the increased capitalization of firms. Companies then need only issue a small number of stocks to be able to purchase new plant and

equipment. This stimulates investment spending and causes GDP to grow. By contrast, when q is low, capital goods become expensive as the market value of firms falls vis-à-vis the cost of acquiring new capital goods. Hence, firms cut their spending on these goods, which restrains GDP growth.

An alternative way by which stock prices may impact investment spending arises from the effect of changes in share prices on the real net worth of firms (Bernanke et al., 1996). This is known as the balance sheet channel or financial accelerator channel. An increase in share prices that raises firms' net worth expands the resources available to businesses for the purchase of new plant and equipment. Moreover, since net worth also serves as a collateral, higher stock prices increase the credit worthiness of firms and reduce their borrowing cost. This enables firms that choose to finance their capital goods acquisition by borrowing to be able to borrow more, resulting to higher investment spending and aggregate output.

Another theory that explains how stock prices may lead economic activity is the wealth effect. The theory is based on the life-cycle hypothesis of consumption pioneered by Ando and Modigliani (1963) which states that consumption of individuals is determined not just by their current income but by their lifetime resources or by their financial wealth. Given that people hold a portion of their wealth in stocks, a rise in stock prices increases people's wealth and hence their consumption expenditure. This leads to higher GDP. On the other hand, when stock prices fall, households are less wealthy and so they reduce their consumption, which results to slower economic growth.

2.2. Empirical Literature

Despite the theoretical underpinnings that support the leading indicator role of stock prices, the empirical literature has generated mixed results regarding the direction of causality between stock prices and real economic activity. Many studies point to a causal relationship that runs from stock prices to economic growth (Fama, 1981; Huang and Kracaw, 1984; Comincioli, 1996; Mauro, 2003; Foresti, 2007; Enisan and Olufisayo, 2009). Other studies, however, determined a one way causality in the opposite direction, moving from aggregate output to stock prices (Gan et al., 2006; Hsieh, 2013; Goktas and Hepsag, 2011). Still other researches obtained either a mutual or bi-directional causality between the variables (Mao and Wu, 2007; Tursoy and Faisal, 2016) or found no significant causal relationship between them (Pilinkus and Boguslauskas, 2008; Ibrahim and Musa, 2014).

Not surprisingly, researchers have noted that most leading indicator studies have dealt with advanced economies with relatively fewer studies being devoted to emerging or developing economies. According to Ikoku (2010), this is because stock prices tend to be a stronger predictor of economic activity in advanced countries that have more developed financial markets than in emerging economies with smaller markets. Among the latter, stock prices are expected to become a more important leading indicator as their economies grow and financial markets become more mature. The following literature summarizes the findings of some leading indicator studies in emerging market economies.

Kaplan (2008) conducted an empirical analysis on the relationship between stock market performance and real economic activity in Turkey by implementing a Granger causality test within a VAR framework and utilizing impulse response function (IRF). The study revealed a significant one way causality from stock prices to real economic activity indicating that stock prices lead the overall economy in Turkey. Furthermore, the IRF analysis showed that a unitary stock price shock exerts an influence on real GDP by up to four quarters.

Mun, Shiong and Thing (2009) analyzed the causal relationship between stock prices and economic activity in Malaysia from 1977 to 2006. The results showed that the Malaysian stock market led economic activity with the longest significant lag of two years.

Adam (2015) employed a univariate LVAR model to examine the causality between stock prices and economic growth in Indonesia from the first quarter of 2004 to the fourth quarter of 2013. The empirical estimations suggested a short-run causation from stock price to economic growth with a lag of two quarters.

Krchniva (2016) investigated the impact of the stock market on real economic activity in a cross-country study that covered seven countries, including Poland, Hungary, and the Czech Republic. Results of the Granger causality tests applied to various VAR models supported the proposition that the stock market is a significant predictor of economic activity in the sample countries with a lag of one quarter.

Employing the auto regressive distributed lag (ARDL) model for the period 1980 to 2004, a study by Enison and Olufisayo (2009) looked into the long term causal relationship between the stock market and economic growth in Egypt and South Africa and determined that the stock market has a positive impact on economic growth in these two countries.

Ikoku (2010) analyzed the long run relationship among stock prices, real GDP and the industrial production index in Nigeria using quarterly data from 1984 to 2008. Utilizing Granger causality test and ARIMA models, the study concluded that the Nigerian stock price index was a leading indicator of real GDP and that a bi-directional causality existed between stock price and real GDP. However, the study found no evidence of causality between stock prices and the index of industrial production in either direction. The ARIMA results also showed that stock prices contained important information that can be used to improve GDP forecasting.

Tursoy and Faisal (2016), also working on the Turkish economy, employed an ARDL bounds testing approach and error correction model (ECM) to investigate the long run equilibrium and causal relationship between stock prices and real GDP. The evidence manifested that in Turkey a two-way causality existed in which stock prices Granger caused real GDP and real GDP Granger caused stock prices in the long run. However, in the short run, only a unidirectional causality from GDP to stock prices was observed.

Still in Turkey, Senturk, Ozkan and Akbas applied the Bootstrapped Toda-Yamamoto and Frequency Domain causality tests to examine the link between stock returns and economic growth from 1998 to 2014. The Frequency Domain causality test determined that stock return caused economic growth in the short term, while economic growth caused stock returns in the medium term. However, the Bootstrapped Toda-Yamamoto test failed to establish any causal relationship between the variables.

Husain and Mahmood (2001) using ECM studied the relationship between stock prices and macroeconomic variables such as consumption spending, investments, and real GDP in Pakistan from 1959-1999. They found no evidence that stock prices lead economic activity in Pakistan; on the contrary, the results showed a unidirectional causality from the macro variables to stock prices. This outcome contravened the findings of Nishat and Saghir (2001) that stock prices Granger caused consumption expenditure in Pakistan but was in line with the research of Nishat and Shaheen (2004) also for Pakistan that reported that macroeconomic variables (except industrial production) influenced stock prices.

Pilinkus and Boguslauskas (2008) in investigating whether stock prices lead real GDP in Lithuania from 2000-2007 discovered no such causality existed for the period under study. A similar result of no causality between stock prices and macroeconomic variables in both directions was obtained by Ibrahim and Musah (2014) in Ghana.

The above discussion highlights the wide spectrum of results generated by various studies that explored the causal linkage between stock prices and economic activity. Variations in findings among countries have been attributed to differences in the maturity of financial markets and in the level of economic development of each country. Differing time periods and empirical methodologies used are likewise contributory factors. Moreover, where the results found that stock prices do lead the economy, the significant lag period is relatively short ranging from one to four quarters, with the longest time lag being two years. This finding underscores the notion that the stock market's predictive ability is useful primarily for short run forecasting of economic growth.

3. RESEARCH METHODOLOGY

To analyze whether movements in stock prices can predict the direction of economic activity, this study employs the Granger causality technique based on the VECM.

According to Granger (1969), X causes Y if the past values of X can be used to predict Y more accurately than by simply using the past values of Y. This means that if X can statistically improve the prediction of Y after taking into account the past values of Y, then X Granger causes Y. The Granger causality technique also allows testing the possibility of a reverse causation that Y may Granger cause X. Applying this framework to the current study, if stock prices Granger cause real GDP, then fluctuations in stock prices can be used to forecast changes in real economic activity more accurately than by simply using historical data of RGDP. This implies that stock prices lead the economy.

This study covers the period from 1995 to 2017 based on quarterly time series data. The variable used to measure gyrations in stock prices is the quarterly levels of the Philippine Stock Exchange Index (PSEI), while changes in economic growth are proxied by the real gross domestic product (RGDP). The Philippine Statistics Authority and Bangko Sentral ng Pilipinas are the sources of the GDP and stock price information, respectively. All data are deflated at constant 2000 prices and their natural logarithms are obtained and employed in the analysis.

The relationship between real stock price and real GDP is based on the neo-classical growth theory and takes the following form:

$$\text{RGDP} = \text{f (RSTOCK)} \tag{2}$$

The empirical model in logarithmic form is represented by the following equation:

$$LNRGDP_t = \alpha_0 + \alpha_1 LNRSTOCK + \varepsilon_t \tag{3}$$

where $LNRGDP_t$ and $LNRSTOCK_t$ denote the natural logarithms of real gross domestic product and real stock price index, respectively. ε_t represents the white noise with zero mean and a constant variance.

Four econometric tests are employed. First, unit root tests are conducted to check if the variables have no unit roots, that is, if real stock price and real GDP are stationary. Second, the Johansen (1988) cointegration test is performed to find out if the stationary variables are cointegrated or have a long run relationship. Third, the Granger causality technique is undertaken to analyze the causal relationship between real GDP and real stock price, and hence, to verify the predictive ability of stock prices. Finally, the impulse response function is used to illustrate the dynamic effect of a unitary stock price shock on real economic activity over time.

To improve the robustness of the stationarity test results, both the Augmented Dickey Fuller test (Dickey and Fuller, 1979) and Phillips Perron test (Phillips and Perron, 1988) are performed. If both tests generate the same results then there is greater certainty about the order of integration of the series. This is important since a necessary condition for the cointegration test is that each of the variables be integrated of the same order.

If the unit root tests find the variables to be integrated of order zero or I (0), a standard Granger causality test will be carried out using a VAR model. On the other hand, if the variables are integrated of order one or I (1), and are found to be cointegrated, Granger causality test will proceed using VECM.

It should be noted that Granger causality based on the VECM captures both the short run and long run causalities, and hence, has an advantage over the standard Granger test. The Wald or F-test of the independent variables indicates the short run causal effect, while the significant and negative error correction term identifies the long run causal effect.

The equations of the VECM model are given by the following:

$$\Delta lnRGDP_t = \gamma_1 + \sum_{j=1}^{n} \alpha_{1j} \Delta lnRGDP_{t-1} + \sum_{j=1}^{n} \beta_{1j} \Delta lnRSTOCK_{t-j} + \tau_1 EC_{t-1} + u_{1t} \quad (4)$$

$$\Delta lnRSTOCK_t = \gamma_2 + \sum_{j=1}^{n} \alpha_{2j} \Delta lnRGDP_{t-1} + \sum_{j=1}^{n} \beta_{2j} \Delta lnRSTOCK_{t-j} + \tau_2 EC_{t-1} + u_{2t} \quad (5)$$

where Δ is the difference operator; n is the number of lags; α_{1j} ….$\alpha_{kj}$and β_{1j}……β_{kj} are slope coefficients; EC_{t-1} is the one-period lagged value of the error correction term; $\tau_1$and τ_2 are slope coefficients of the EC term; and u_{1t} is the stochastic error term with zero mean value with constant variance.

4. EMPIRICAL RESULTS AND ANALYSIS

This section presents the results of the econometric tests regarding the cause and effect relationship between real stock price index and real GDP in the Philippines for the period 1995 to 2017.

4.1. Unit Root Test

Thomas (1996) postulates that the conduct of classical regression analysis in the presence of unit roots or nonstationary variables which are common in most macroeconomic time series data, may be invalid. Thus, as a first step in the analysis, the Augmented Dickey Fuller (ADF) and Philips Perron (PP) tests are run to examine the existence of unit roots as well as to determine the order of integration in the series. The null hypothesis is that the variables – real stock price index and real GDP – have unit roots or are nonstationary, while the alternative is that the variables have no unit roots or are stationary. The results of both the ADF and PP tests are reported in Table 2.

Table 2. Unit Root Test

	ADF		Philips Perron	
	Levels	First Difference	Levels	First Difference
LNRGDP	2.7266	-3.6600***	0.5964	-53.4636***
LNRSTOCK	-1.3062	-9.0694***	-1.3795	-9.0727***

*, **, and *** indicate significance level at 10%, 5% and 1% respectively.

The value of the ADF statistic for each variable and its significance indicate that the null hypothesis of the presence of unit roots could not be rejected at their level values, but could be rejected at first difference. This outcome means that real stock price and real GDP are both integrated of order one, I (1). The results of the PP test confirm the ADF finding that the variables are stationary at first difference.

4.2. Lag Length Test

With the variables found to be integrated of the same order, they can now be tested for cointegration. Since cointegration test is sensitive to the choice of lag length, the appropriate lag length must first be established. Table 3 presents the lag length selection criteria that will be used in the analysis. These are the final prediction error (FPE), Akaike information criterion (AIC), and Hannan-Quinn information criterion (HQ).

Table 3. Lag Length Selection Test

Lag	Final prediction error (FPE)	Akaike information criterion (AIC)	Hannan-Quinn information criterion (HQ)
0	0.0084	0.9017	0.9251
1	0.0001	-3.3713	-3.3011
2	4.26e-05	-4.3887	-4.2716
3	4.56e-05	-4.3216	-4.1577
4	5.40e-06	-6.4556	-6.2449
5	2.91e-06	-7.0753	-6.8177
6	2.74e-06*	-7.1363*	-6.8319*
7	2.90e-06	-7.0846	-6.7334

* indicates lag order selected by the criterion

All three lag length criteria above point to six lags as the optimal lag length that minimizes the value of the information criteria. Thus, the empirical results of the Johanssen cointegration and Granger causality tests will be estimated based on this lag length.

4.3. Johansen Cointegration Test

After determining the optimal lag length, the Johansen cointegration test is performed to analyze the long run movement of the variables. The cointegration procedure can likewise be used as a pretest to avoid spurious regression (Granger 1986). Inspection of the cointegration results found in Table 4 below indicates that the first null hypothesis of no cointegrating equation can be rejected at the 5% level with p value of .03 for the trace test, but the second null hypothesis of at most one cointegrating equation could not be rejected.

Table 4. Johansen Cointegration Test (Trace Test)

Hypothesized No. of CE(s)	Maximum Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.1488	16.9132	15.4947	0.0304
At most 1	0.0349	3.0545	3.8415	0.0805

* denotes rejection of the hypothesis at the 5% significance level

Hence, we conclude the presence of one cointegrating equation which suggests that in the Philippines real stock price and real GDP are cointegrated. This means that, although the variables are

not stationary at levels, in the long run, they move closely with each other. In other words, a long run relationship exists between real stock price and real GDP.

4.4. Vector Error Correction Model

Long Run Coefficients

Following the Johanssen Cointegration test, the VECM is implemented to determine the impact of real stock price on output as well as their causalities in the long run and short run. The estimated long run coefficients of the variables are found in Table 5 below.

Table 5. Long-run Cointegration Model

Dependent Variable	Independent Variable	
	Real Stock Price	***Constant***
LNRGDP	0.3906 (2.35541**)	10.9031

Notes: *t*-statistic is in parenthesis.

*, **, and *** indicate significance level at 10%, 5%, and 1% respectively.

The results reveal that real stock price has a positive and statistically significant long run relationship with real GDP implying that a rise in real stock prices contributes to the growth of output. Specifically, a one percent increase in the real stock price index would increase real GDP by 0.39%. This outcome is consistent with the theoretical expectation that a surge in stock prices which incentivizes greater inflow of funds in the stock market expands the resources available for productive investments. This causes the economy to advance. The positive impact of stock prices on output is confirmed by the studies of Fama (1981), Choi et al. (1999), Beck and Levine (2004), Cole et al, (2008) and Kaplan (2008), to mention a few.

Granger Causality Based on VECM

Having detected a positive long run relationship between real stock price and real GDP, the Granger causality test is employed to ascertain the direction of causality between the variables – that is, whether a change in real stock price causes a change in real GDP or whether a change in real GDP causes a change in real stock price. This procedure is key in addressing the question of whether the stock market in the Philippines is a leading economic indicator or not.

Table 6 depicts the long run causality between real stock price index and real output which is identified as the error correction term (ECT) for each variable. The decision rule to establish long run causality is that the ECT must be negative and statistically significant.

Table 6. Granger Causality Test Based on VECM

Dependent Variable	Independent Variables Chi-square Value (Wald test)		t-statistic Error Correction Term
	Real GDP	***Real Stock Price***	
LNRGDP		25.7059 (0.0003)***	0.0088 (0.1139)
LNRSTOCK	7.9271 (0.2435)		-0.0685 (0.0038)***

Notes: p-values are in parenthesis.
*, **, and *** indicate significance level at 10%, 5%, and 1% respectively.

Given the positive sign and high p-value of the ECT for real GDP, the result manifests the absence of a statistically significant long run causality from real stock price to economic growth. However, long run causality is observed from RGDP to real stock price, which is significant at the 1% level. These results are in line with the studies of Hussain and Mahmood (2001) in Pakistan, Gan et al. (2006) in New Zealand, and Goktas and Hepzag (2011) in Turkey.

The ECT coefficient for real stock price index of -0.068 which reflects the speed of adjustment towards the long run equilibrium implies that, following a shock to the stock market, real stock price will adjust back toward the equilibrium level at the rate of 6.8% per period.

Taken together, these findings indicate that in the long run stock prices may not be a significant predictor of the real economy, but real GDP could be a good predictor of stock price movements. A possible reason for this is that the stock market in a small open economy like the Philippines may not be that well developed to have a discernable long run causal effect on output. A similar conclusion was reached by Hussain and Mahmood (2001) in Pakistan and Gan et al. (2006) in New Zealand.

On the other hand, the direction of causality likewise suggests that economic growth contributes to the long term development of the stock market. This outcome bolsters the notion that stock prices in the Philippines are driven, in part, by the growth of output and profitability of firms – hence by economic fundamentals. Faster economic growth boosts firms' sales and earnings, which in turn buoy stock prices. In addition, as real incomes accelerate demand for assets including stocks rises, which pushes share prices higher.

Table 6 above also reports the short run causality as measured by the Wald test. In contrast to the long-run outcome, the chi-square statistic and its p-value point to a significant one way causal relationship that runs from stock price to economic growth. In other words, in the short run, real stock price Granger causes real GDP, with no significant reverse causation being detected. This result demonstrates that in the short run, variations in current stock prices may predict the future pace of economic growth, providing evidence of the leading indicator role of stock prices in the economy.

The finding is supported by studies conducted by Comincioli (1996) in the United States, Adam (2015) in Indonesia, Senturk, Ozkan and Akbas (2014) in Turkey, and Krchniva (2016) in Japan, the

United States, and five countries in Europe.

The short run nature by which stock prices may lead the economy is further illustrated in Table 7 which presents the per period short run Granger causality results of real stock price to real GDP.

Table 7. Short-run Granger Causality of Real Stock Price Index to RGDP Per Period

Independent Variable:	Dependent Variable: *D(LRGDP)*		
	Relationship		Causality
D(LRSTOCK)	**Coefficient**	**t – statistic**	**f – statistic**
CointAEq1	0.0088	1.6003	
Lag 1	0.0215	2.0671**	4.2729**
Lag 2	0.0289	2.7847***	7.7546***
Lag 3	0.0202	1.8717*	3.5033*
Lag 4	0.0342	3.1146***	9.7005***
Lag 5	-0.0017	-0.1454	0.0211
Lag 6	0.0135	1.1919	1.4207
C	0.0231	4.8664	

Notes: All variables are in terms of the first difference of their natural logarithmic form.

*, **, and *** indicate the significance level at 10%, 5%, and 1% respectively

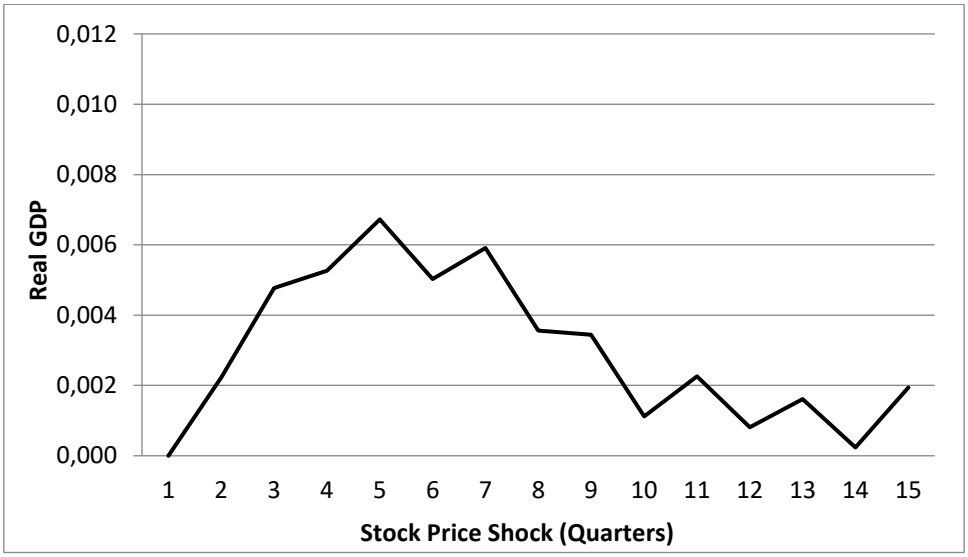
The estimates in Table 7 support the findings in Table 6 of the existence of a statistically significant unidirectional causality from real stock price to real GDP in the short run. The first difference lagged values of the stock price coefficients in the first four lagged quarters are positive and significant. Moreover, the f-statistic for real stock price lagged one to four quarters before are likewise significant at all acceptable levels, indicating that stock prices do Granger cause economic activity when lagged orders one to four are used. This implies that past values of real stock price up to four quarters before can significantly improve the estimate of current real GDP even after taking into account past values of RGDP. Alternatively, changes in the current stock price index may be useful in predicting RGDP growth by up to four quarters ahead.

The lag of four quarters estimated in this study between changes in stock prices and changes in real GDP growth is relatively short and within the range of significant lags determined in previous studies such as that of Krchniva (2016) and Nishat and Shaheen (2004) of one quarter, Adam (2016) of two quarters, (Mahdavi and Sohrabian (1991) and Comincioli (1996) of up to three quarters, and Mauro (2003) of up to four quarters.

4.5. Impulse Response Function

To explore the dynamic effect of the impact of a shock in stock price on real GDP over time, the impulse response function on real GDP is calculated. In Figure 1, the IRF traces the transmission of a one standard deviation price shock to real GDP over 15 quarters.

Figure 1. Response of Real GDP to Stock Price Shock



The IRF analysis demonstrates that following a positive stock price shock, real GDP sharply increases from the first until the fifth quarter. Following this, its effect on real GDP gradually declines until it approaches almost zero in the 14th quarter, after which it rises slightly and then falls again and becomes consistently negative after 20 quarters. Extending the IRF period to longer quarters does not alter the trend of RGDP response to the price shock. Thus, the IRF analysis accentuates the short term nature by which fluctuations in stock prices affect real economic activity in the Philippines.

5. CONCLUSION

This paper examines the issue of whether the stock market is a leading indicator of economic growth in a small open economy by exploring the causal relationship between stock prices and real economic activity with the Philippines as a test case.

The findings of the Johansen cointegration test and the VECM point to the existence of a positive and statistically significant long run relationship between stock prices and economic growth. The Granger causality test based on the VECM likewise detected a significant long run unidirectional causality from real GDP to real stock price, and also a significant short run asymmetric causality in the opposite direction – from real stock price to real GDP.

A key implication from these findings is that economic growth contributes to the long term development of the stock market in the Philippines. This may bode well about the stability of the local stock market because it implies that stock price movements are driven, at least in part, by economic fundamentals.

Another important implication is that in the short run, stock prices may predict the future pace of economic growth in the country by a lag of up to four quarters, proving the validity of the leading indicator role of the stock market but highlighting as well its short term nature. This is important because this means that the local stock market can still provide vital information that can

improve the accuracy of GDP forecast in the short run. Such information could be beneficial to businesses and households enabling them to better time their spending decisions and to government in crafting timely stabilization measures.

In the light of the apparent dearth of leading indicator studies in the Philippines, future researches should empirically examine alternative leading economic indicators for the country. A good starting point would be some of the other component indicators of the LEIS (such as the CPI, exchange rate, money supply, and terms of trade) so as to provide a more rigorous empirical grounding for the choice of these variables. Likewise, investigation of other possible leading indicators not in the LEIS such as the Treasury bond yield curve is suggested as the latter has been found to be a better predictor of economic downturns in the U.S. than other macroeconomic variables (Estrella and Mishkin, 1996) and is being considered as a potential leading economic indicator in some countries.

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