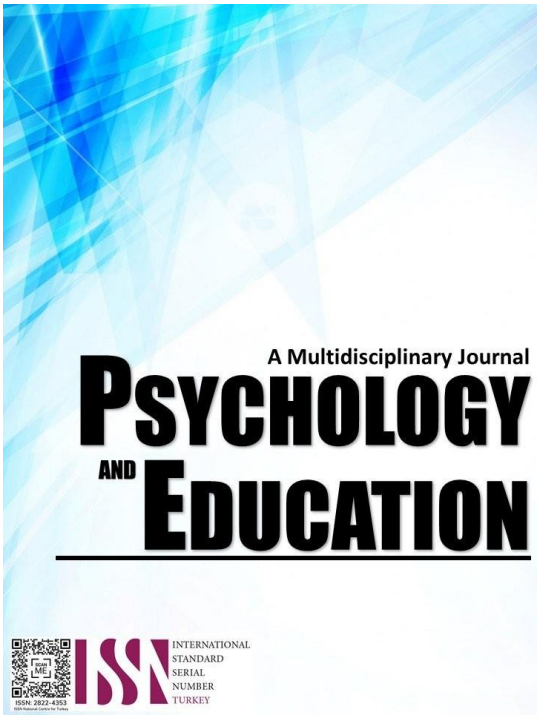
STOCK MARKET TRENDS AND ECONOMIC GROWTH: UNRAVELING THE NEXUS IN THE PHILIPPINES



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Research Article

Stock Market Trends and Economic Growth: Unraveling the Nexus in the Philippines

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Abstract

Investors are using the stock market to invest their money for capital appreciation. Recent advancements in the information system have made stock market investments accessible to various investors. This study aims to examine the relationship between the stock price index and Gross Domestic Product (GDP) using empirical data, focusing on the short-term or long-term relationship, as well as the impact of available information on stock prices. The research is supported by theories such as the efficient market hypothesis, stock valuation theory, the balance sheet model, and Tobin's q theory. Secondary data from 1995-2022 were utilized, with quarterly data obtained from the Philippines Statistics Authority (PSA) and the Macrotrend.Net. Diagnostic tests were conducted to ensure there were no violations of normality, homoscedasticity, and serial correlation. Econometric tests were utilized to test the historical data, including the Augmented Dickey-Fuller (ADF) test for stationarity, the lag length test, the Johansen cointegration test, and the Granger causality test. The results indicate a positive long-term relationship between the stock price index and GDP. The Vector Error Correction Model (VECM) supports this finding, revealing that a 1.02% increase in the stock price index corresponds to a GDP increase. These findings support the balance sheet theory, indicating that well-performing companies attract investment, leading to higher investment income and subsequent positive economic impacts. Additionally, the availability of information plays a role in stock prices, emphasizing the importance of information security for companies. Future research could explore the effects of specific stock classes on GDP, conduct comparative studies among different countries, or examine other economic indicators' influence on stock prices and the economy. Moreover, investigating the impact of information system advancements on stock prices and the overall economy presents an interesting avenue for further exploration.

Keywords: *granger causality test, augmented dickey-fuller test, stock price index*

Introduction

The stock market is a popular avenue for investors to save their extra funds for capital appreciation. It happens if the prices of stocks increase investors can sell them or just keep their investment for the possibility of further increase, or the share in the dividends of the company (Investor, nd).

However, the relationship between the stock price index and economic growth is not straightforward, and it has been a subject of much debate in academic literature. Some researchers argue that stock prices are a leading indicator of economic growth, others suggest that economic growth is the driving force behind the stock market performance, while some argue that there is no correlation between the two.

According to the study conducted by European Central Bank (ECB, 2023), there is evidence that supports a positive correlation between stock prices and economic growth, although the relationship is not always clear. Another study conducted by Quandt (2020) also found that the relationship between the stock price index and some of the macroeconomic indicators such as GDP, inflation, and unemployment is not always a reliable indicator of the economy.

The study conducted by Morgan Stanley Capital International (MSCI) also found that there is no clear relationship between GDP growth and return on equity. The result suggests that the stock prices are already factored in predicted economic development, hence GDP has no further impact on stock prices (Barra, 2010). The article by the Economics Observatory (n.d) emphasizes that even though there is no clear evidence of the relationship between the stock market and the economy in the short run, there is evidence that suggests that the stock market can be a predictor of future economic growth. One of the theoretical arguments regarding investment is that a high investment rate will result in an increase in the prices of stocks and can lead to higher economic growth rates (Sarel, 1996).

The Philippine economy is considered to be one of the most promising economies in East Asia and the Pacific region and has grown rapidly in recent years (Worldbank, 2023). The Philippine stock market has also performed well during this period, with the Philippine Stock Exchange (PSE) index increasing by an average of 10% per year over the same period. However, despite this apparent correlation between the stock market and GDP, it is important to conduct a rigorous empirical study to explore the nature of the link between these two variables.

Research Questions

The objective of this research is to investigate the relationship between the stock price index and the GDP using empirical data. Specifically, it aims to determine whether there is a short-term or long-term relationship between the stock market and GDP, if any. It will also determine if the relationship is positive or negative.

Methodology

To determine the relationship between the stock price index and the gross domestic product (GDP), secondary data were used covering the periods 1995-2022. The historical data for Gross Domestic Product and the Philippine stock index were taken from Macrotrends.net and the Philippine Statistics Authority (PSA) website, respectively. The annual data were converted into quarterly data using EViews to increase the sample size. To ensure the uniformity of the data, the growth rate was calculated using the following formula:

$$\frac{Y2-Y1}{Y1}$$

1. Descriptive statistics
2. Stationarity testing using the Augmented Dickey-Fuller (ADF) test to check for stationarity.
3. Cointegration tests (Johansen cointegration test) to check for long-term relationships.
4. Regression analysis to view the regression output to examine coefficients, statistical significance and diagnostic tests.
5. Granger Causality test – to assess the direction of causality between the stock price index and the GDP.
6. Model validation – check residuals for autocorrelation and heteroskedasticity
7. Forecasting (optional) to project future values based on the estimated model
8. Interpretation and reporting

Diagnostic tests were performed on the data collected, to ensure that there were no violations of the assumptions on normality, homoscedasticity, and serial correlation.

The Jarque-Bera (JB) was used to assess whether the data's skewness and kurtosis were consistent with the normal distribution. If p-value is >0.05, fail to reject the null hypothesis indicating normality.

Breusch-Pagan-Godfrey was used for the homoscedasticity of the data series. If p-value is >0.05, we fail to reject the null hypothesis, suggesting homoskedasticity.

Durbin-Watson test was used to assess the presence of first-order serial correlation in the residuals. A value around 3 suggests no first-order serial correlation.

To determine the nexus between the stock price index and the GDP, the following econometric techniques were applied.

Firstly, both the GDP and stock price index were tested for unit roots which means that this historical data were stationary. the unit roots of the data series are tested using the Augmented Dickey-fuller (ADF) Test. If the p-value is <0.05, reject the null hypothesis of the unit root suggesting stationarity of the data.

Secondly, after determining that the variables are stationary, the data were tested for the presence of cointegration using the Johansen cointegration test. This test was employed to check if the stationary variables are cointegrated and therefore have a long-run relationship. Look for the trace and maximum eigenvalue statistics. If refers to critical values to determine the number of cointegrating vectors. If the statistics exceed the critical values, reject the null hypothesis of no cointegration.

Thirdly, a causality test was employed to analyze the relationship between the stock price index and the GDP, using the Granger causality test. In analysing the results, look for the F-static and p-values. If the p-value <0.05, reject the null hypothesis, suggesting Granger Causality.

Augmented Dickey-Fuller Test (ADF). This statistical test was developed in 1979 by Dickey and Fuller and is used to determine the stationarity of a given data series. This test investigates the presence of a unit root in a data series. The null hypothesis in this test is that there is a unit root in the autoregression model (Abduljalil & Rao, 2019). If the null hypothesis is rejected, it means that the data series is stationary, while failure to reject the null hypothesis would mean the existence of a unit root, hence data is non-stationary. In interpreting the ADF, it is important to look at the output of the test which includes the t-statistic, the critical values, and the p-value. The t-statistic is then compared to the critical values. If the t-statistic value is greater than the critical value, then the null hypothesis is not rejected.

If the result of the unit root test shows that the variables are integrated of order I(0), then the Granger causality test will be performed using the Vector Autoregressive (VAR) model. However, if variables are integrated of order I(1) and are cointegrated, then the Granger causality test will be performed using the Vector Error Correction Model (VECM).

Johansen Cointegration Test. This test was used to determine whether the two non-stationary data are cointegrated or have a long-run relationship. This test involves estimating the Vector Error Correction Model (VECM). The null hypothesis under this test is that there is no cointegration in the time series data. If the t-statistics are less than the critical values, then the null hypothesis is rejected, hence the data are assumed to be cointegrated. The p-values are also used to determine whether the test is statistically significant. If the p-value is less than 0.05 significance level, then the null hypothesis is rejected. It is important to perform this test to determine if there is

a long-term relationship among the variables.

Granger Causality Test – This test was used to determine the causality among the variables. The result of this test will show whether "y causes x" or "x causes y". This test examines whether changes in variable x will also affect variable b. Under this test, the null hypothesis is that xt does not cause yt . The decision rule is that if the p-value is less than 0.05 significance level, then the null hypothesis is rejected, otherwise it cannot be rejected.

Results and Discussion

This section presents the results of the econometric tests in exploring the link between the stock price index and the GDP.

Unit Root Test

When conducting the regression analysis, it is important to ensure that the data series are nonstationary, or the data are analyzed in terms of the unit root. The first step in analyzing the data is through the use of the Augment Dickey-Fuller Test (ADF). This test is used to determine the presence of unit roots and determine the order of cointegration in the series. Under the ADF test, the null hypothesis is that the stock price index and the GDP have unit roots or are non-stationary.

Table 1. *Unit Root Test*

	Levels		*First difference*	
	ADF	*5% level*	*ADF*	*5% level*
LNSPI	-1.938506	-2.899115	-8.451168	-2.901779
LNGDP	-1.200059	-2.943427	-11.46252	-2.943427

The above values show that the ADF statistic for SPI and GDP is not significant at their levels value, therefore we fail to reject the null hypothesis that the variables have unit roots. However, the first difference values indicate significant values at 5% significance level, therefore we reject the null hypothesis that the variables have unit roots. Hence, the stock price index and the GDP are both integrated or order one I(1), and the variables are stationary at first difference.

Lag Length Test

The variables were tested for cointegration, by establishing the appropriate lag length. In economics, the response of one variable over another variable depends on the lapse of time called the lags. In using the lags, it is important to practice caution because too many lags will decrease the degree of freedom, or might cause serial correlation, and multicollinearity, among others. To decide the number of lags, to be used, econometrics is employed by selecting the criterion such as the Akaike information criterion, Schwarz information criterion, or the Hannan-Quinn information criterion. The rule is to choose the lower value.

Table 2. *Lag Length Test*

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-57.01719	NA	0.468810	4.918099	5.016270	4.944144
1	-27.82457	51.08708	0.057590	2.818714	3.113228	2.896849
2	-26.42598	2.214444	0.072232	3.035498	3.526354	3.165722
3	-23.18625	4.589607	0.078707	3.098855	3.786053	3.281168
4	-0.488977	28.37160	0.017282	1.540748	2.424288	1.775152
5	19.62640	21.79166	0.004842	0.197800	1.277682	0.484293
6	20.87421	1.143825	0.006811	0.427149	1.703374	0.765732
7	23.38300	1.881590	0.009171	0.551417	2.023984	0.942089
8	46.06070	13.22866*	0.002532*	-1.005058*	0.663851*	-0.562296*

** indicates lag order selected by the criterion*
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Results of the lag length test show that eight lags as the optimal lag length to be used to minimize the value of information criteria. Therefore, eight lags will be used when estimating Johansen cointegration and Granger causality tests.

Johansen Cointegration Test

The Johansen cointegration test is a statistical tool that is used to determine the correlation between two or more variables that are non-stationary. The number of lags used when estimating the Johansen cointegration test was eight lags as indicated above.

Results show the presence of cointegration at a 0.05 significance level. The Trace and the maximum Eigenvalue show p-values of less than 0.05 significance level. Additionally, the Trace Statistic and the maximum Eigenvalue are greater than the 0.05 critical values. Both Trace test and the Max-eigen value test indicates two (2) cointegration equations. Results also show that there is a long-run

relationship between the stock price index and the GDP. In this case, both the short-run and the long-run models were estimated using the VAR and the VECM.

Table 3. *Johansen Cointegration Test*

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.996710	203.1236	15.49471	0.0000
At most 1 *	0.970287	77.35572	3.841465	0.0000

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.996710	125.7679	14.26460	0.0000
At most 1 *	0.970287	77.35572	3.841465	0.0000

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Vector Error Correction Model (VECM)

This model restricts the long-run behavior of the endogenous variable to converge to their cointegrating relationships while allowing short-run adjustments. It is a restricted VAR designed for use with nonstationary series that are known to be cointegrated. The error correction term (ECM) is the cointegrating term because the deviation is corrected gradually through a series of partial short-run adjustments.

Table 4. *Long-run Cointegration Model*

Dependent variable	*Independent variable*
LNGDP	LNSPI
1.000000	-1.016601
	(1.04747)

The results show that the stock price index has a positive and significant long-term relationship with LNGDP which means that the increase in the log of the stock price index will result in an increase of 1.02% in the GDP.

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 05/27/23 Time: 06:20
Sample: 1996Q1 2022Q4
Included observations: 106
Dependent variable: LNGDP

Excluded	Chi-sq	df	Prob.
LNSPI	9.736672	2	0.0077
All	9.736672	2	0.0077

Dependent variable: LNSPI

Excluded	Chi-sq	df	Prob.
LNGDP	16.97529	2	0.0002
All	16.97529	2	0.0002

Pairwise Granger Causality Tests
Date: 05/27/23 Time: 07:44
Sample: 1 109
Lags: 8

Null Hypothesis:	Obs	F-Statistic	Prob.
LNSPI does not Granger Cause LNGDP	24	1.26992	0.3828
LNGDP does not Granger Cause LNSPI		1.06546	0.4732

For the VAR Granger Causality Test, the p-value is lower than 0.05 level of significance therefore the null hypothesis is rejected. On the other hand, there is a failure to reject the null hypothesis under the pairwise Granger Causality Tests, the LNSPI does not cause

GDP or GDP does not cause SPI since their p-value is more than 0.05 level of significance.

Conclusions

This research tries to determine the link between the stock price index and the GDP by utilizing different econometric techniques. Based on the empirical analysis, the result of the Johansen cointegration test shows the presence of a positive long-run relationship between the stock price index and the GDP. These suggest that the economic growth in the Philippines can be predicted by the stock price index.

The VECM was used to determine the short-run adjustments and capture a dynamic relationship between the stock market and the economy. also supports these findings.

Considering that the stock price index is a significant indicator of the GDP, close monitoring of the stock market can provide insights into the overall financial health and prospects of the economy. It is also a challenge on the part of the Security and Exchange Commission (SEC) to ensure the robust implementation of their reporting requirements among publicly listed companies to keep the people informed of their performance.

It is also important to encourage investment in the stock market. Educate young individuals on how to grow their money in the stock market. Thanks to the advancement of information technology. Everyone now can access the different online brokers where they can invest their money. Both financial and educational institutions have a major role to play in educating investors, especially young professionals, to actively participate in the stock market.

Future studies can also be conducted on the impact of blue-chip companies' stocks on the economy. A similar study can also be done by comparing the impact of the stock price index on the GDP of emerging economies, developing economies and developed economies and critically evaluating the common and unique features of each type of economy that might contribute to the similarities/differences.

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