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Stock Market and Economic Growth in Malaysia: Causality Test

Har Wai Mun
Faculty of Accountancy and Management
Universiti Tunku Abdul Rahman
Bandar Sungai Long
43000 Selangor, MALAYSIA.
E-mail: harwm@mail.utar.edu.my
Ee Chun Siong
Faculty of Accountancy and Management
Universiti Tunku Abdul Rahman
Bandar Sungai Long
43000 Selangor, MALAYSIA.
Tan Chai Thing
Faculty of Accountancy and Management
Universiti Tunku Abdul Rahman
Bandar Sungai Long
43000 Selangor, MALAYSIA.

Abstract

Stock market has been associated with economic growth through its role as source for new private capital. On the other hand, economic growth may be the catalyst for stock market growth. Thus, the purpose of this paper was to explore causal relationships between stock market and the economy using formal tests of causality developed by C. J. Granger and yearly Malaysia data for the period 1977-2006. Results show that stock market Granger-caused economic activity with no reverse causality observed. The longest significant lag length observed from the results was two years.

Keywords: Growth, Stock market, Stock market and growth relationship, Malaysia's economy

1. Introduction

One of the most debatable issues in economics was whether the stock market can be served an important indicator for the prediction of future economic growth or vice versa. Many believe that large decrease in stock prices were reflective of future recession, whereas large increase in stock prices may reflect the expectation towards future economic growth. However, there were controversy issues to doubt the stock market's predictive ability such as the 1987 stock market crashed followed by world recession and 1997 Asian financial crisis.

In addition, we find that related researches done in the past three decades mostly focused on the role of financial development in stimulating economic growth, without taking account to the stock market development. In emerging economies, the evolution of stock market has great impact on the operation of banking institutions (Levine and Zervos, 1998). Beside that, Paudel (2005) stated that stock market, due to their liquidity, enable firms to acquire much needed capital quickly, hence facilitating capital allocation, investment and growth. Thus, domestic stock market is expected to have significant relationship with the economic growth. There were several possible arguments have been discussed as equity market may led economic growth such as (i) There was evidence that a more developed equity market may provide liquidity that lowers the cost of the foreign capital essential for development, thus, nation with greater development of equity market tends to generate more domestic savings for economic growth (Benchivenga et al., 1996; Neusser and Kugler, 1998). (ii) The role of equity market provided incentive for managers to make investment decisions that may affect firm value in the long run (Dow and Gorton, 1997). (iii) The ability of equity markets to generate information about the innovative activity of entrepreneurs (King and Levine, 1993) or the aggregate state of technology (Greenwood and Jovanovic, 1990). (iv) The importance of stock market in providing portfolio

diversification and enabling individual firms to engage in specialized production with efficiency gain (Acemoglu and Zilibotti, 1997). Therefore, given those debatable issues whether stock market can be served as a vital determinant for economic growth, it seems relevant to further research this topic.

There were theoretical reasons for stock prices may predict economic growths which were the traditional valuation model of stock prices and the "wealth effect" (Comincioli and Wesleyan, 1996). The traditional valuation model of stock price explained that stock prices reflected the expectation of public towards the future economy activities. Beside that, concept of "wealth effect" suggested that changes in stock prices cause the variation in the real economy. Additionally, less developed countries' capital markets were able to mobilize domestic savings and allocated funds more efficiently (Pardy, 1992). Thus, stock market can play a role to promote economic growth in less-developed countries as assume Malaysia in this case. Therefore, the objectives of this paper were to evaluate does the stock market led to economic growth in Malaysia case or vice versa by testing with Granger causality test. This paper will explore (a) does the stock market "Granger-cause" the real economy, in which past values of stock prices able to improve the prediction of future economic growths? (b) Does the real economy "Granger-cause" the stock market, in the sense that the lagged values of economic activities advance the prediction of the stock market?

2. Literature Review

The link between stock markets and economic growth provided ambiguous result on a major strand of finance-growth hypothesis (Schumpeter, 1932; McKinnon, 1973) with an insight into how financial intermediation facilitates economic growth. Spears (1991) reported that in the early stages of development, financial intermediation stimulated economic growth in Sub-Saharan Africa. On the other hand, Atje and Jovanic (1993) using cross-sectional regressions conclude that stock markets have long-run impacts on economic growth and it was also found that stock markets influence growth through a number of channels which were liquidity, risk diversifications, acquisition of information about firms, corporate governance and savings mobilization (Levine and Zervos, 1996). Demetriades and Hussain (1996) found very little evidence that financial market is a leading sector in the process of economic growth in a sample of 10 countries. While Luintel and Khan (1999) studied 10 developing economies and find bi-directional causality between financial development and economic growth in all sample countries. Instead of this, Levine and Zervos (1998) have measured stock market development along various dimensions; first, aggregate stock market capitalization to GDP and the number of listed firms (size). Second, domestic turnover and value traded (liquidity). Third, integration with world capital markets, and lastly, the standard deviation of monthly stock returns (volatility). The results suggested a strong and statistically significant relationship between initial stock market development and subsequent economic growth. In addition, Mauro (2000) exhibited that stock market was a stable predetermining factor of economic growth in emerging economies. Empirical works continue to show largely some degree of positive relationship between stock markets and growth.

We address issues of causality in the framework introduced by Granger (1969). Granger causality tests have been widely used in studies of financial markets as well as several studies of the determinants of economic growth including savings (Carroll and Weil, 1994); exports (Rahman and Mustafa, 1997; Jin and Yu, 1995); government expenditures (Conte and Darrat, 1988); money supply (Hess and Porter, 1993); and price stability (Darrat and Lopez, 1989). A limited number of previous studies have used Granger causality to examine the link between financial markets and growth. Thornton (1995) analyzed 22 developing economies with mixed results although for some countries there was evidence that financial deepening promoted growth. Subsequently, Ahmed and Ansari (1998) reported similar results for three major South-Asian economies. On other hand, Neusser and Kugler (1998) reported that financial sector GDP Granger-caused manufacturing sector GDP in a sample of thirteen OECD countries. Nevertheless, a study using Granger causality techniques to examine the link between financial markets and growth, Rousseau and Wachtel (2000) analyzed 47 economies and report that greater financial sector development leads to increased economic activity. Adajaski and Biekpe (2005) found that positive influence of stock market development on economic growth is significant for countries classified as upper middle income economies from the study of 14 African countries. Similarly, Siliverstovs and Duong (2006) revealed that even when accounting for expectations, represented by the economic sentiment indicator, the stock market has certain predictive content for the real economic activity. All past literature reviews have been contributed an idea to this paper that the present development of stock market development and economic growth. In summary, previous empirical research has suggested a possible connection between stock market and economic growth, but is far from ambiguous. Although the relationship claimed is a causal one, most empirical studies have addressed causality indirectly, if at all. Moreover, most studies have not adequately deal with the fact that efficient markets should incorporate expected future growth into current period prices. Hence, the subsequent of this paper will discuss the methodology, as well as results and interpretations.

3. Methodology

3.1 Stationarity

The VAR is modeled in stationary variables so that the test statistics have standard distributions. Since a causality test holds only for stationary variables, unit roots tests have to be performed on all the variables involves. In order to avoid

spurious regression, determine the stationarity of the series enable to ensure the validity of the usual test statistics (t-statistics and F-statistics, and R^2). Stationarity could be achieved by appropriate differencing and this appropriate number of differencing is called order of integration. The Augmented Dickey Fuller (ADF) [Dickey and Fuller 1979] tests of stationarity are used in the study.

3.2 Augmented Dickey Fuller (ADF) Test

The ADF test is based on the estimate of the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon_t$$

where Y_t is our variable of interest = {$RGDP_t$, $KLCI_t$}, is the differencing operator, t is the time trend and ε is the white noise residual of zero mean and constant variance. $\{\beta_1, \beta_2, \delta, \alpha_{1,\ldots}, \alpha_2\}$ is a set of parameters to be estimated. Both of the null and alternative hypotheses in unit root tests are:

$H_0 : \delta = 0$ (Y_t is unit root)

$H_1 : \delta \neq 0$ (Y_t is stationary)

The unit root hypothesis of the Dickey-Fuller can be rejected if the t-test statistic from these tests is negatively less than the critical value tabulated. In other words, by the Augmented Dickey Fuller (ADF) test, a unit root exists in the series Y_t (implies nonstationary); the null hypothesis of δ equals zero is not rejected (Gujarati 1995: 719-720).

3.3 Lag Length Selection

A critical element in the specification of VAR models is the determination of the lag length of the VAR. There are several alternative criteria for finding the most appropriate model, which take into account certain tradeoffs between better fit, smaller residuals, and loss of degrees of freedom due to number of estimated parameters. The appropriate lag length is established by Akaike Information Criterion (AIC). The best fitting model is the one that minimizes the information criterion function in essence, the overall sum of squared residuals. To help to ensure the appropriateness of the estimated VAR, the use of various diagnostic tests is common in studies that is Breusch-Godfrey serial correlation LM test and in the Jarque-Bera (JB) test for normality.

3.4 Granger causality test

According to the Granger (1969) causality approach, a variable y, say economic growth, is caused by x, say stock market growth, if y can predicted better from past values of y and x than from past values of y alone. For a simple bivariate model, we can test the causality between stock market growth and economic growth. The hypotheses are tested in the context of VAR of the following form:

$$RGDP_t = \sum_{i-1}^{n} \alpha_i KLCI_{t-1} + \sum_{j=1}^{n} \beta_j RGDP_{t-j} + u_{1t} \quad (1)$$

$$KLCI_t = \sum_{i-1}^{n} \lambda_i KLCI_{t-1} + \sum_{j=1}^{n} \delta_j RGDP_{t-j} + u_{2t} \quad (2)$$

where, RGDP is economic growth denotes the changes of real GDP and KLCI is stock market growth is the changes of KLCI. Both variables denotes into logarithm form. It is assumed that the distribution of u_{1t} and u_{2t} are uncorrelated. Equation (1) postulates that current RGDP is related to past values of itself as well as that of KLCI, and equation (2) postulates a similar behaviour for KLCI. Based on the estimates OLS coefficients for the equations (1) and (2) four different hypotheses about the relationship between RGDP and KLCI can be formulated:

1. Unidirectional Granger-causality from KLCI to RGDP. In this case stock market growth increases the prediction of the economy but not vice versa. Thus $\sum_{i=1}^{n} \alpha_i \neq 0$ and $\sum_{j=1}^{n} \delta_j = 0$.

2. Unidirectional Granger-causality from RGDP to KLCI. In this case the growth rate of the economy increases the prediction of the stock market growth but not vice versa. Thus $\sum_{i=1}^{n} \alpha_i = 0$ and $\sum_{j=1}^{n} \delta_j \neq 0$.

3. Bidirectional (or feedback) causality. In this case $\sum_{i=1}^{n} \alpha_i \neq 0$ and $\sum_{j=1}^{n} \delta_j \neq 0$, so in this case the growth rate of the economy increases the prediction of the stock market growth and vice versa.

4. Independence between RGDP and KLCI. In this case there is no Granger causality in any direction, thus $\sum_{i=1}^{n}\alpha_i = 0$ and $\sum_{j=1}^{n}\delta_j = 0$.

Hence by obtaining one of these results it seems possible to detect the causality relationship between stock market growth and the economic growth of a country. To test the hypotheses, the restricted F-test is applied, which is given by:

$$F = \frac{[(RSS_R - RSS_{UR})/m}{[RSS_{UR}/(n-k)} \quad (3)$$

where, m is number of lagged terms and k is the number of parameters. RSS_R and RSS_{UR} are residual sum of squares of restricted and unrestricted models respectively. If the F value exceeds the critical F value at the chosen level of significance, we reject the null hypothesis, in which case the lagged RGDP terms belong in the regression. This is another way of saying that RGDP cause KLCI.

3.5 Data

The data analyzed in this paper consists of economic and financial time series of Malaysia there are real gross domestic product (RGDP) and Kuala Lumpur Composite index (KLCI). The data for Kuala Lumpur Composite index was obtained from Bursa Malaysia and GDP data was collected from International Financial Statistics, published by International Financial Statistics (IMF). The data set of the study consists of 30 annual observations covering the period from 1977 to 2006.

4. Results and interpretations

4.1 Testing for Stationarity

Augmented Dickey-Fuller (ADF) unit root tests are employed to test for the stationarity of the macroeconomic series at level and then first difference of each series. The results of the ADF at level are reported in Table 1, by taking into consideration of trend variable and without trend variable in the regression. Based on Table 1 (Panel A), the t-statistics for all series from ADF tests are statistically insignificant to reject the null hypothesis of non-stationary at 0.05 significance level. This indicates that these series are non-stationary at their level form. Therefore, these variables contain a unit root process. When the ADF test is conducted at first difference of each variable, the null hypothesis of non-stationary is rejected at 0.05 significance level as shown in Table 1 (Panel B). This is consistent with some previous studies that have been demonstrated the most of the macroeconomics and financial series expected to contain unit root and thus are integrated of order one, I (1). The number of lag included is to solve the problem of autocorrelation; to ensure the error terms are uncorrelated and enhance the robustness of the results.

Since the variables are stationary, then we can proceed to check the number of lags input into the model. The study uses the AIC to determine the number of lags in the model. To ensure the appropriateness of the estimated VAR, the use of various diagnostic tests is common in studies. The results show that the optimal lag lengths are equal to two, based on the AIC criterion.

4.2 Testing for Granger causality test

The procedure used in the study for testing statistical causality between the stock market and the economy is the "Granger-causality" test (Granger, 1969). The Granger causality tests determine the predictive content of one variable beyond that inherent in the explanatory variable itself. The variables to be used in the Granger Causality test are assumed to be stationary. In the case of the study's data set, test statistics for unit root have already been reported in Table 1, with the conclusion that the time series are I(1) or stationary. The Wald test is then used to test the above Granger causality hypothesis.

Based on the results of the lag length and the integration order determination, we proceed with testing for Granger causality. The results of Granger causality for equations (1) and (2) are represented in Table 2. As represented in Table 2, the Wald F-statistic is 4.1184 and the p-value is 0.0303. This implies that the null hypothesis that KLCI does not Granger cause RGDP is decisively rejected. However, the hypothesis that RGDP does not Granger cause KLCI can not rejected at the usual significant levels. Thus, there exists the uni-directional Granger causality from the KLCI to the RGDP. However, there is no reverse causation from RGDP to KLCI.

One possible explanation for why stock prices predict the economy is that stock prices actually cause what happens to the economy. This would be consistent with the wealth effect. According to this argument, fluctuations in stock prices raise and lower wealth, which in turn, raises and lowers aggregate consumption. As a result, economic activity is affected or "caused" by fluctuations in the stock market. Another possible explanation for why stock prices "Granger cause" economic activity is that the stock market is forward-looking. If investors are truly forward-looking, then stock prices reflect expectations about future economic activity. If a recession is anticipated, for example, then stock prices

reflect this by decreasing in value. Since the results indicate that the stock market improves the prediction of economic activity, and if we assume that the stock market is forward-looking, then investors' expectations about the future economy are fairly accurate. Furthermore, since the economy does not predict stock prices, expectations about the future economy are not being formed by simple looking at past values of GDP, which is suggested by the adaptive expectations model. For the adaptive expectations model to hold true, past values of GDP would have to 'granger cause' stock prices.

5. Conclusion

The purpose of this paper was to evaluate the stock market as a leading economic indicator and explore causal relationships between stock market and the economy. This empirical study used formal tests of causality developed by C. J. Granger and yearly Malaysia data for the period 1977-2006. Our results indicated a "causal" relationship between the stock market and the economy. We found that while stock market Granger-caused economic activity, no reverse causality was observed. Furthermore, we found that statistically significant lag lengths between fluctuations in the stock market and changes in the real economy are relatively short. The longest significant lag length observed from the results was two years.

One issue that needs further exploration is the actual reason for the causality relationship between the stock market and economic activity. Is the causality relationship more consistent with the wealth effect or with the forward-looking nature of the stock market? The results from this paper are consistent with both the wealth effect and the forward-looking nature of the stock market, but do not prove either. Our results reveal that expectations for future economic activity are not simply formed by looking at the past trend in the economy as the adaptive expectations model would suggest. However, it showed that the stock market growth Granger cause the economic growth. Hence, for policy implication purposes, we can be suggested that Malaysia government should promote the stock market in order to promote economic growth of nation as the stock market can be served as a leading indicator for economic growth.

In order to promote the stock market, there was several suggestions to be discuss as following: (1) Government could be liberalized stock market regulation towards the foreign direct investment (FDI) involve in the domestic equity market. By doing so, it was help to attract greater volume of FDI flow into Malaysia and providing portfolio diversification and enabling individual firms to engage in specialized production with efficiency gain. (2) Malaysia government has to develop the domestic equity market as there were evidences showed that a more developed equity market may provide liquidity that lowers the cost of the foreign capital essential for development, thus, nation with greater development of equity market tends to generate more domestic savings for economic growth. For example, in order to boost the confidence of foreigner to invest in Malaysia, we have to make sure that all public information which provided by all those public listed companies must be accurate and transparent. For recently cases of Transmile Group Bhd and Megan Media Bhd as its provided faulty company statement to the public, securities commission of Malaysia has been tighten the regulation such as Capital Markets and Services Act 2007 (CMSA) to avoid this scenario exist again. Hence, this was best to protect the interest of public by creating a fair and transparent condition for domestic equity market to rebuild the confident of foreigner as well as domestic investors. Beside that, more developed stock market does provide incentive for managers to make investment decisions that may affect firm value in the long run. (3) Lastly, government has to improve the liquidity of stock market by providing more capital market services such as derivative markets, thus, it enable firms to acquire much needed capital quickly to facilitate capital allocation for greater investment and lastly lead to economic growth. Those markets provided a platform for foreign portfolio investors as well as domestic portfolio investors to diversify their portfolio in domestic equity market.

In conclusion, the results of this paper revealed that the stock market does help predict the future economy. Although it may not be surprising to find that fluctuations in economic activity may be preceded by changes in stock prices, our finding that changes in GDP are "Granger-caused" by changes in stock prices is important in that it provides additional support for the leading economic role of the stock market. Our findings suggest that the evolution of financial sector in particular the stock market tends to be more likely to stimulate and promote economic growth when monetary authorities adopt liberalised investment and openness policies, and improve the size and the regulations of the stock market and macroeconomic stability.

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Table 1. Results for the Augmented Dickey-Fuller unit root tests for RGDP and KLCI

Panel A: Level			
	Constant		Constant
Variable	with trend		without trend
RGDP	-2.6979(1)		-0.4813(0)
KLCI	-2.8151(0)		-2.2411(0)
Panel B : First difference			
	Constant		Constant
Variable	with trend		without trend
RGDP	-4.8474(1)*		-4.3405(0)*
KLCI	-5.5444(0)*		-5.5884(0)*

Notes: The null hypothesis is that the series is non-stationary, or contains a unit root for the ADF. The rejection of null hypothesis for ADF tests based on the Mackinnin critical values.

* indicates the rejection of the null hypothesis of non-stationary at 5% significance level.

Table 2. Results of Granger-causality Tests

	Independent variable	
Dependent variable	RGDP	KLCI
RGDP	-	4.1184* (0.0303)
KLCI	0.5488 (0.5354)	-

* indicates statistical significant at 0.05 level.