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**Article**

## Revisiting stock market development and economic growth nexus: The moderating role of foreign capital inflows and exchange rates

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## FINANCIAL ECONOMICS | RESEARCH ARTICLE

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## FINANCIAL ECONOMICS | RESEARCH ARTICLE

# Revisiting stock market development and economic growth nexus: The moderating role of foreign capital inflows and exchange rates

Mohammad Enamul Hoque<sup>1\*</sup> and Noor Azuddin Yakob<sup>1</sup>

**Abstract:** This study re-examines the stock market development and economic growth nexus. Also, examine the moderating role of foreign capital inflows and exchange rate on the relationship between stock market development and economic growth of Malaysia during 1981–2016. This study applies Granger test, ARDL (with bound testing) approach, and multivariate regression approach to examine extent and direction of the relationships among variables, empirically. Granger causality test suggests that there are unidirectional effects of stock market development to Malaysian economic growth. Using the bound test for co-integration, this study finds there is a long run association between stock market development and economic growth. However, ARDL model reports that, in the short run and long run, stock market promotes the economic growth of Malaysia which is consistent with Granger causality test. Additionally, foreign capital inflows and exchange rate has significant positive and negative moderating effects, respectively, on the relationship between stock market development and economic growth. Nevertheless, when both foreign capital inflows and exchange rate interact with each other, there is a joint positive effect on the relationship between stock market development and economic

### ABOUT THE AUTHOR

Mohammad Enamul Hoque was born in Bangladesh. He received BBA with Honours majoring Finance and Banking in 2012. After completion of BBA, he moves to abroad for pursuing MBA at the Swinburne University of Technology, Australia. In 2015, he also achieved a professional management accounting qualification. Currently, he is pursuing Doctor of Business Administration with majoring Finance. His research interest in stock market, asset pricing, energy finance, development economics, and financial consumer behavior.



Mohammad Enamul Hoque

### PUBLIC INTEREST STATEMENT

This study investigates the stock market development and economic growth nexus, along with the moderating roles of foreign capital inflows and exchange rate. This study finds a long-run linkage between stock market development and economic growth. However, stock market promotes the economic growth of Malaysia. Furthermore, this study records that foreign capital inflows has significant positive and exchange rate has significant negative interaction effects on the relationship between stock market development and economic growth. However, once both foreign capital inflows and exchange rate interact with each other, they have joint positive effect on the relationship between stock market development and economic growth. Therefore, Malaysian policy-makers should consider both foreign capital inflows and exchange rate in formulating the economic policy. Moreover, the government should give special attention to the external debt, which is a considerable proportion of foreign capital inflows. At the same time, foreign direct investments with flexible exchange rate should be encouraged to foster both stock market and economic growth.

growth. Therefore, Malaysian policy-makers should consider both foreign capital inflows and exchange rate in formulating the economic policy. Moreover, special attention should be given on the external debt, which constitutes a significant proportion of foreign capital inflows, because of its negative impact on economic growth. At the same time, foreign direct investments with flexible exchange rate should be encouraged to foster both stock market and economic growth.

**Subjects: Economics; Macroeconomics; Econometrics; Development Economics; Investment & Securities**

**Keywords: economic growth; foreign capital inflows; stock market development; moderation; Malaysia; ARDL approach**

**JEL classifications: C10; F31; F43; F63; F10**

### 1. Introduction

Foreign capital inflows (FCI), in any economy, have been considered as the fortune for both stock market development and economic growth. It brings additional financial resources for the investment toward developing and emerging economies (Adams, 2009; Baharumshah, Slesman, & Devadason, 2015; Kiong & Jomo, 2005). The additional investment brings technology advancement and managerial know-how that contributes to economic growth and stock market development (Adam & Tweneboah, 2009; Adams, 2009). Therefore, emerging and developing countries have been trying to encourage foreign inflows by means of foreign direct investment and remittance as well as external debt for infrastructure development, which can facilitate the long-term economic visions (Raza & Jawaid, 2014).

However, many researchers debate that FCI components may have negative effects on domestic savings and economic prospects (Boone, 1994; Chenery & Eckstein, 1970; Kolawole, 2013; among others). Specifically, a large amount of external debt (ED) creates problems for policy-makers as it has negative repercussions on the economy (Waheed, 2004). At the same time, in general, FCI gives support to stock market development and economic growth (Alam & Shah, 2013; Cambazoglu & Karaalp, 2014; Freckleton, Wright, & Craigwell, 2012). The conflicting findings trigger the interest of researcher to examine the issue empirically further that how FCI has been stimulating economic growth and stock market development, as well as how it is affecting the relationship between economic growth and stock market.

With a different view, FCI not only depends on a well-functioning stock market and economic growth of the economy, but also some other factors such as exchange rate, trade openness, investment freedom, and economic freedom. These factors are linked to foreign investment, and growth-finance nexus. While, inward capital (a large proportion of debts) in any economy tends to pursue currency appreciation, therefore, the over-valuation of exchange rate is a leading factor for slow growth, even that may create macroeconomic instability (Fischer, 1993; Gala, 2007). For instance, when external capital flows into an economy, initially investors obtain local currency because of increased demand for local currency. Thus, the currency appreciates which might have negative impacts for the developing and emerging countries (Klein & Olivei, 2008; Laureti & Postiglione, 2005; Rodrik & Velasco, 1999; Soto, 2003). The facts could be, firstly, foreign direct investment in projects and stock market portfolio may be the result of higher investment in terms of dollars but not actual stock market development. Secondly, if the economy is export oriented, then the export revenue will decrease due to exchange rate appreciation. As the revenue of firms decrease, which also reduce the net profits, may have trigger poor performances of stock. Hence, the poor stock performances will keep away the investors to investing in stock market. Therefore, it hints that there could be a three-way interaction among FCI, exchange rate, and stock market. Thus, this study is motivated to investigate three-way interaction among FCI, exchange rate, and stock market on economic growth.

In other words, the study seeks to inspect the moderated moderating role of FCI on the relationship between stock market development and economic growth.

The purpose of this study is to re-examine at stock market and economic growth nexus. Also, inspects the moderated moderating role of foreign capital inflows on the relationship between stock market development and economic growth. Therefore, Malaysia has been selected as an empirical case study. The premise of Malaysia makes it as the best choice for the investigations. With empirical evidence, Kiong and Jomo (2005) and Lee (2009) claimed that Malaysia has been relying heavily on capital inflows, either through FDI or external debts for its economic development. Furthermore, a newspaper article published on 11 March 2015, reported that “Malaysia to see volatile capital flows,” so, this statement catch attention to investigate empirically what are happening (Star Online, 2015). Also, according to UNCTAD (World Investment Report) (2008, 2016), Malaysia is one of the highest FDI stock-receiving countries along with China, Hong Kong, India, and Singapore among the Asian countries. However, studies covering the stock market and economic growth nexus did not look from the angel of three-way interaction effects (Ang & McKibbin, 2007; Choong, Yusop, Law, & Liew, 2005; Masoud & Hardaker, 2012; Mun, Siong, & Thing, 2008). Thus, up to the best knowledge, this study is the first practices to show a three-way interaction effects on the economic growth of Malaysia. Therefore, this investigation is especially very important for the policy makers to facilitate to realize the combined effect of the three selected variables (i.e. FCI, exchange rate, and stock market development) on economic growth. Hence, it will be helpful for them to produce policies on capital inflows and exchange rate.

This study has a threefold contributions. First, up to the best knowledge, this study would be the first study to contribute in existing literature through the three-way interaction on economic growth. Second, up to the knowledge, this study demonstrates how Bursa Malaysia development, FCI, and exchange interact with each other. Also, it shows how the interactions among variables affect the stock market development and economic growth nexus, in the Malaysian economic context. Third, this study is important to the policy-makers because it offers the collective effect of the three selected variables on economic growth.

Henceforth, the study is structured as follows: Section 2 presents the literature review and hypotheses development, Section 3 discusses the details of the data and methods employed in this study, Section 4 presents the empirical results and analysis, and Section 5 discusses the implications of the research and concludes the study.

## **2. Literature review and hypothesis development**

### **2.1. Stock market development and economic Growth**

Theoretically and practically, it has been considered that growth is the soul of macroeconomics, and capital market is the pulse of an economy. Stock market serves as a platform for companies to raise equity capital for investment and capital expenditure (Levine & Zervos, 1998). It also plays a significant role in industrial and economic growth. Furthermore, a well-functioning stock market makes macroeconomy more efficient (Engle, Ghysels, & Sohn, 2013). Certainly, from the opposite direction, macroeconomic variables also enhance stock market performance (Seetanah, 2008). Additionally, macroeconomic policy and financial market liberalization make the stock market better functioning and efficient.

Market liberalization opens trade channels and allows cross-border listing of multinational companies which translates foreign capital investment (Levine, 2005). Thus, local firms are willing to list their shares in the stock market that will create more opportunities to raise capital for investment and CAPEX (Bencivenga & Smith, 1991). The stock market provides a common platform to the buyers and the sellers for trading stocks (Gurusamy, 2009). The trading conveniences enable individual investors to earn profits and helps institutional investors to invest substantial amounts of capital



(Enisan & Olufisayo, 2009). The stock market eases in increasing money flow in the economy. It also brings liquidity to the market and creates an environment for public offerings and entrepreneurship.

Empirical studies on stock market and growth have not offered a clear-cut picture on the relationships. Thus, the debates are still ongoing, whether stock market development causes economic growth or vice versa. Based on earlier studies, stock market and economic growth relationship have been described with four hypotheses, which are supply-leading, demand-leading, feedback, and no relationship hypotheses.<sup>1</sup>

The supply-leading hypothesis proposes the existence of unidirectional effects from stock market toward economic growth<sup>2</sup> (Bencivenga & Smith, 1991; Greenwood & Jovanovic, 1990). The demand-leading hypothesis suggests the prevalence of unidirectional effects from economic advancement to stock market development<sup>3</sup> (Demetriades & Hussein, 1996; Ireland, 1994). Feedback hypothesis claims the existence of bidirectional effects between stock market development and economic growth (Demetriades & Hussein, 1996; Greenwood & Smith, 1997). The connotation is that stock market development stimulates economic growth or vice versa.<sup>4</sup> There is also a hypothesis that proposes no-relationship between finance (stock market) and economic growth<sup>5</sup> (Lucas, 1988; Yousif, 2002).

In the Malaysian context, Choong et al. (2005) used Granger causality test and found stock market promotes economic growth that is subject to the adopted monetary policies. Similarly, using the same approach for the period of 1977–2006, Mun et al. (2008) found that in the short run, stock market performance affects the economic growth. Using a VAR framework for the period of 1960–2001, Ang and McKibbin (2007) tested whether Malaysian economic growth is finance lead or not. They found that in the long run the financial development stimulates economic growth of Malaysia, but in the short term, the economic growth promotes finance (stock market).

Here, we hypothesize that:

H1: There is a unidirectional relationship between stock market development and economic growth in Malaysia

According to market-based theory, stock market development of a well-functioning market promotes economic advancements (Levine, 2002). This theory proposes that big and well-functioning stock market stimulates growth, improves corporate governances, helps in risk diversifications as well as in risk management (Levine, 2005). On the other hand, financial services theory advocates that stock market and financial institution offer a platform for business and industrial expansion (Levine, 1997, 2002, 2005; Rousseau, 2003). Hence, it fosters economic growth (Loayza & Ranciere, 2006). Furthermore, the work of Gurley and Shaw (1955) also states that well-developed financial markets can enhance capital accumulation by providing necessary funds to investors, by improving their financial capacity and by enhancing the efficiency of trade which ultimately contributes to economic growth.

Empirically, Choong et al. (2005) studied the relationship between stock market development and economic growth in Malaysia. They reported that stock market development significantly affects economic growth of Malaysia. Their finding also indicates that stock market development Granger-caused economic growth. Similarly, Masoud and Hardaker (2012) found that stock market development has a significant effect on economic growth for 42 emerging markets. Thus, we hypothesize that,

H1a: Stock market development has positive effects on Malaysian economic growth

## **2.2. FCI, exchange rates, and stock market development and economic growth**

Many researchers opined that components of FCI, such as FDI, remittance, and external debts bring positive changes in both stock market and economic growth (Baharumshah et al., 2015; Waheed,

2004). Contrary, others have different views on foreign capital inflows. They assert that FCI may have different effects on macroeconomic outcomes and it may hurt rather than improve, particularly for developing and emerging markets (Klein & Olivei, 2008; Laureti & Postiglione, 2005; Rodrik & Velasco, 1999; Soto, 2003). Even in developed economies, large inflows into the economy could cause the financial crisis, for example, the financial crisis of Mexico in 1994.<sup>6</sup>

Capital inflows in the economy may cause inflation in host countries with low investment opportunities, as well as may threaten the competitiveness of exports of the country (Kim & Singal, 2000). Considering investments in the stock market, during the inflationary period, banks offer a higher interest rate on savings (Dornbusch & Reynoso, 1989). Thus, local and foreign investors may not be willing to invest in the stock market due to the uncertainty of return, as well as higher returns from alternative sources which influence the economy in several ways (Pindyck, 1984). Therefore, the proportion of foreign inflows may not contribute to stock market development as expected. Moreover, FCI in the economy increases the money supply to the market where investors may choose to invest in highly risked projects rather than in the stock market. Hence, the existing relationship between stock market development and economic growth will be affected. Therefore, we hypothesize that,

H2: FCI negatively moderates the relationship between stock market development and economic growth

Exchange rate, foreign investment, and growth are closely related. According to Rodrik (2008), devalued exchange rate stimulates economic growth in developing countries. On the other hand, over-valuation of the exchange rate is regularly related to slow growth. In fact, most accounts link it to macroeconomic instability (Fischer, 1993; Gala, 2007). Inward capital (a large proportion of debts) in any economy tends to pursue currency appreciation. For instance, when flows of capital come to an economy initially investors obtain local currency that increases demand for local currency. As a result, the currency appreciates. Impacts of currency appreciation seem negative for developing and emerging countries. The reasons behind the foreign direct investment in projects and stock market portfolio may be the result of higher investment regarding dollars but not for stock market development. Furthermore, if the economy is export oriented, the export revenue will decrease that could cause poor firm and stock market performance. Therefore, the existing relationship between stock market development and economic growth will be affected. Therefore, we hypothesize that:

H3: There is a moderated (exchange rate) moderation effect of FCI on the relationship of stock market development and economic growth

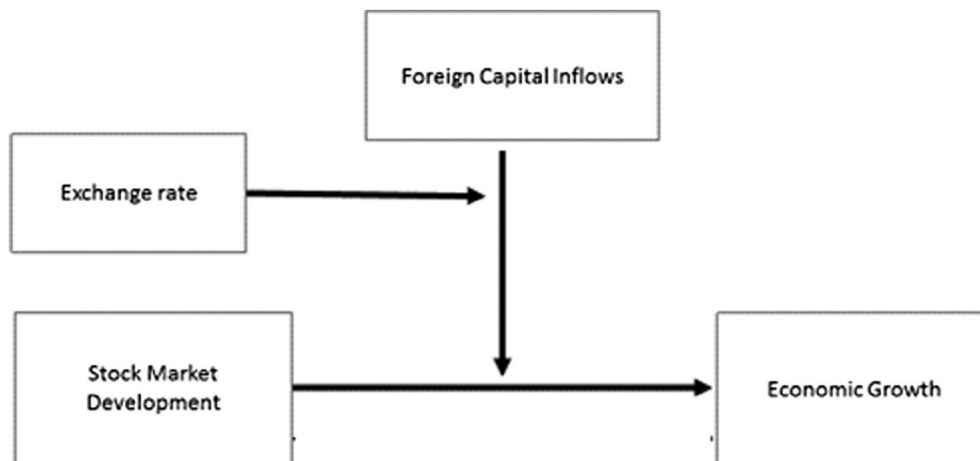
### 2.3. Research framework

Based on the extensive literature review and hypothesis the research model has been drawn. Figure 1 presents a research model which guided to conduct the entire research.

### 3. Data-set and methods description

Most of the studies test the relationship of economic growth with stock market using GDP growth rate as a measurement of economic growth and market capitalization for stock market development (Caporale et al., 2004; Enisan & Olufisayo, 2009; Shahbaz et al., 2015; Wongbangpo & Sharma, 2004). Therefore, GDP growth rate has been employed as a proxy for economic growth of Malaysia. Annual stock market capitalization ratio to GDP has also been used as a proxy for stock market development (Massa, 2009). Foreign capital inflows are the proportion of GDP, which is consist of foreign direct investment and external debts. Malaysian ringgit per US dollar was used as the basis of an exchange rate. Selected macroeconomic variables' data covered the period from 1981 to 2016 and data were also compiled from World Bank Development Indicator and DataStream. The time series data were the annual frequency data and it has been transformed into natural logarithmic terms.

**Figure 1. Research model for stock market and economic growth.**



### 3.1. Econometric methodology

#### 3.1.1. ARDL model specifications and bound testing procedures

For investigating the long-run and dynamic relationships between stock market development and economic growth, this study adopts bound testing (ARDL) approach of Pesaran, Shin, and Smith (2001). The co-integration test with ARDL approach has some advantages. First, this approach is simpler opposed to other available co-integration approach. This autoregressive distributed lag co-integration procedure facilitates, once the lag order is identified, to examine the relationship through OLS method. Second, unlike other approaches for the co-integration test, the autoregressive distributed lag co-integration procedures do not need the pre-testing such as unit root test. Third, the important is that ARDL approach is efficient than other approaches when the span of the sample period is smaller. Following the study of Pesaran et al. (2001), this study expresses the ARDL models as follows:

$$D(\ln(\text{Econ. Growth}_t)) = C_{01} + \beta_{11}(\ln(\text{Econ. Growth}_{t-1})) + \beta_{21}(\ln(\text{MKT CAP}_{t-1})) + \sum_{i=1}^p C_{1i}D(\ln(\text{Econ. Growth}_{t-i})) + \sum_{i=1}^p C_{2i}D(\ln(\text{MKT CAP}_{t-i})) + \varepsilon_{1t} \quad (1)$$

$$D(\ln(\text{MKT CAP}_t)) = C_{02} + \beta_{12}(\ln(\text{MKT CAP}_{t-1})) + \beta_{22}(\ln(\text{Econ. Growth}_{t-1})) + \sum_{i=1}^p C_{1i}D(\ln(\text{MKT CAP}_{t-i})) + \sum_{i=1}^p C_{2i}D(\ln(\text{Econ. Growth}_{t-i})) + \varepsilon_{2t} \quad (2)$$

where  $\text{Econ. Growth}_t$  stands for the economic growth for  $t$  period.  $\text{MKT CAP}_t$  denotes the stock market capitalization (development) for  $t$  period.  $D$  stands for the first different operators.  $\varepsilon_t$  presents error terms for  $t$  period.

After model specification and estimating Equations (1) and (2), the next step is to find the existence of long run association between variables using Wald test approach ( $F$ -test for significant coefficient for lagged variables). Once  $F$ -statistic is found significant, then compare with the critical value<sup>7</sup> of two asymptotic bound facilities whether co-integration exist or not. If  $F$ -statistic is found above the upper bound value that means co-integration exists between variables, and if  $F$ -statistic is found below the lower bound value that means no co-integration exists between variables. Contrary, if  $F$ -statistic is positioned in lower and upper bound value, then co-integration test supposed to be inconclusive.



In next step, once co-integration is proven then it need to estimate long coefficients and error-correction model for estimating short-run dynamics to long-run equilibrium for adjustment. With the error-correction model, it can predict short-run effects with significant *F* statistic of Wald test, it can be said that there is a short-run effect.

### 3.1.2. Procedures for interaction effects testing

The study adopts multiple regression approaches for inspecting the interaction (moderations) effects on the relationship between stock market development and economic growth. For testing moderating effects, the following models have been developed.

$$\ln \text{Econ. Growth}_t = \alpha + \beta_1 \ln \text{MKTCAP}_t + \varepsilon_t \tag{3}$$

$$\ln \text{Econ. Growth}_t = \alpha + \beta_1 \ln \text{MKTCAP}_t + \beta_2 \ln \text{FCI}_t + \beta_3 (\ln \text{MKTCAP}_t * \ln \text{FCI}_t) + \varepsilon_t \tag{4}$$

$$\ln \text{Econ. Growth}_t = \alpha + \beta_1 \ln \text{MKTCAP}_t + \beta_2 \ln \text{ER}_t + \beta_3 (\ln \text{MKTCAP}_t * \ln \text{ER}_t) + \varepsilon_t \tag{5}$$

$$\begin{aligned} \ln \text{Econ. Growth}_t = & \alpha + \beta_1 \ln \text{MKTCAP}_t + \beta_2 \ln \text{FCI}_t + \beta_3 (\ln \text{MKTCAP}_t * \ln \text{FCI}_t) \\ & + \beta_4 \text{ER}_t + \beta_5 (\ln \text{MKTCAP}_t * \ln \text{ER}_t) + \beta_6 (\ln \text{FCI}_t * \ln \text{ER}_t) \\ & + \beta_7 (\ln \text{MKTCAP}_t * \ln \text{FCI}_t * \ln \text{ER}_t) + \varepsilon_t \end{aligned} \tag{6}$$

where Econ. Growth<sub>*t*</sub> stands for the economic growth for *t* period. MKTCAP<sub>*t*</sub> denotes the stock market capitalization (development) for *t* period. FCI<sub>*t*</sub> represents the foreign capital inflows for *t* period. ER<sub>*t*</sub> symbolizes the exchange rate for *t* period. ε<sub>*t*</sub> presents the error terms for *t* period.

## 4. Empirical analysis and discussion

### 4.1. Descriptive statistics and correlation matrix

Table 1 shows result of descriptive statistics with normality test. In this table, the focus is on the normality test because of OLS assumptions. It is observed that all the series fulfill the normality of hypothesis to run OLS regression.

Table 2 exhibits results of pair-wise correlation of variables. Interestingly, the stock market development and economic growth have the highest (*r* = 0.497) correlation among all pair, which is quite acceptable as the well-functioning stock market nurtures economic growth. However, the foreign capital inflows and exchange rate have negative impact on economic growth.

### 4.2. Unit root tests

At first, to confirm the stationary of time series data, a different version of the unit root test was applied. Before figuring out the integration among variables, it is a requisite to test for the stationarity of time series data. Otherwise, non-stationary data in regression may present inconsistent results that may occur problem for null regression. For empirical research, Dickey and Fuller (1979, 1981),

**Table 1. Descriptive statistics**

	ln(Econ. Growth)	ln(MKTCAP)	ln(FCI)	ln(ER)
Mean	1.7861	4.7985	4.1128	1.1172
Minimum	-0.6539	3.9468	3.450672	0.8329
Maximum	5.7714	2.3025	5.304215	1.4929
SD	0.5980	0.4785	0.546198	0.1966
Skewness	-0.7421	-0.1079	0.815802	0.2211
Kurtosis	2.2687	2.5961	2.494501	1.7151
Jarque-Bera	4.0036	0.2083	4.171596	2.9198
Probability	0.2002	0.9010	0.232257	0.2323

**Table 2. Results of correlation among variables**

	Correlation matrix			
	ln(Econ. Growth)	ln(MKTCAP)	ln(FCI)	ln(ER)
ln(Econ. Growth)	1			
ln(MKTCAP)	0.4970	1		
ln(FCI)	-0.0552	-0.4728	1	
ln(ER)	-0.3098	0.3171	-0.4255	1

Elliott, Rothenberg, and Stock (1996), Phillips and Perron (1988), Kwiatkowski, Phillips, Schmidt, and Shin (1992), and Zivot and Andrews test (2002) proposed different version of unit root tests in order to verify the unit root in the data series. This study also adopts DF-GLS method for examining the unit root in the variables. The reason for the choosing DF-GLS test is that it has the best overall performances and “it has substantially improved power when an unknown mean or trend is present” (ERS, p. 813). Also, DF-GLS test regression allows to include both constant and trend at log-level unit root test along with differences of variables with no trends. Besides, the DF-GLS test, this study also adopts Zivot and Andrews (2002) test for checking structural breaks.

Table 3 presents DF-GLS, and Zivot–Andrews unit root test results and lag selection. The results of DF-GLS unit test indicate that all the variables are stationary at first difference, meaning that all variables are stationary at the same order of difference. It also shows that all variables are I(1). The optimum lag using Akaike information criteria (AIC) was also determined. The lag 2 was the optimum lag length for all variables. Furthermore, the results of Zivot–Andrews unit root test indicated that statistic of data series was smaller than critical values. So, these results prove that variables are not I(2). All findings from unit root tests confirm that these variables fulfill all assumptions of ARDL model. Therefore, the ARDL approach of Pesaran et al. (2001) for the co-integration test can be applied for testing co-integration between stock market development and economic growth.

**4.3. Granger causality test between economic growth and stock market development**

Table 4 represents result of Granger causality (1969) test. The findings from this table indicate that small changes in stock market development can affect economic growth, while economic growth does not affect stock development at all. This is the sign of unidirectional causality from stock market development to economic growth, which supports the hypothesis 1(a). Therefore, Granger causality test results imply an increase in stock market development may also increase the economic growth of Malaysia. The results strongly oppose the findings of Ang and McKibbin (2007) but it is like the findings of Choong et al. (2005) and Mun et al. (2008) for Malaysian economic growth. However, these findings will be further tested with ARDL model for the long-run relationship between economic growth and stock market development as well as short-run dynamics to long-run equilibrium adjustment.

**Table 3. Unit root test results**

	Log level		First differences			Z-Break test	
	AIC lag	DFGLS stat	AIC lag	DFGLS stat	I (d)	AIC	Z stat
ln(Econ. Growth)	1	-1.896	1	-7.265**	I(1)	1	-4.307
ln(MKTCAP)	1	-1.501	1	-4.848**	I(1)	0	-4.583
ln(FCI)	2	-0.996	0	-4.465**	1(1)	0	-3.103
ln(ER)	2	-0.374	0	-4.712*	I(1)	1	-4.1655

Notes: All variables are in logs in the series. The DF-GLS statistic is compared to the critical values from the simulated MacKinnon table in Elliott (1996, Table 1, p. 825).

Results obtain from EViews 9.5.

\*Rejection of the null at 5% significance level.

\*\*Rejection of the null at 1% significance level.

**Table 4. Granger causality between economic growth and stock market development**

Null hypothesis	F-statistic	p-value
Stock market development does not Granger cause economic growth	13.20845	0.0000
Economic growth does not Granger cause stock market development	0.17231	0.8430

Notes: Period 1981–2016, lag length 2 (according to AIC).  
 The null hypothesis is rejected at the 5% significance level.

**4.4. Bounds testing for co-integration**

Model A of Table 5 presents estimated F-statistics for bounds test with the critical values for the upper and lower bounds provided by Pesaran and Pesaran (2009). The estimated F-statistics is 10.06 that is also the greater upper bound value at the level of 1% significance; so, the null hypothesis for co-integration should be rejected. Therefore, the results conjecture that there is a long-run relationship between Malaysian economic growth and stock market development.

Model A of Table 6 exhibits the estimated coefficients of long run. We observe that Malaysian stock market development has significant positive effects on Malaysian economic growth. The finding implies that 1% increase in stock market capitalization will foster 0.29% Malaysian economic growth. Moreover, the result is consistent with some previous empirical studies such as the study of Choong et al. (2005) and Mun et al. (2008).

Model A of Table 7 presents the results of error-correction model that exhibits the short-run dynamic of Malaysian economic growth to its long-run adjustments. The coefficient of one-lagged error terms, ECM (-1), has expected sign and significant at 5% significance level. The coefficient ECM (-1) indicates that, after shocks, high speed of adjustment to long-run equilibrium. Also, the Wald test coefficient shows that D(ln(MKTCAP (-1))) affects Malaysian economic growth. These results imply in short-run Malaysian stock market development to help Malaysian economy to grow. Furthermore, the estimated coefficients of goodness indicate the model is fit with reasonable robustness, where the estimates of LM test shows no serial correlation exit and the plot of CUSUM test shows this regression is stable within 5% critical bounded area (see in Appendix Figure A3).

**Table 5. Results from bounds tests on Equations (1) and (2)**

Dep. var.	AIC lags	F-statistic	p-value	Outcome
Econ. Growth	1	13.0566	0.0020	Co-integration
MKTCAP	1	0.2762	0.7624	No-co-integration

Notes: Asymptotic critical value bounds are obtained from Table C(I) of Pesaran and Pesaran (2009). Case: Unrestricted intercept and no trend for  $k = 1$  (Pesaran & Pesaran, 2009). The lower and upper bounds for the F-test statistic at the 10, 5, and 1% significance levels are [4.04, 4.78], [4.94, 5.73], and [6.84, 7.84], respectively. Model selection summary presented with Appendices A–C.

**Table 6. Estimated long-run coefficients using the ARDL approach**

Variables	Model A		Model B	
	ln(Econ. Growth)	t-statistic	ln(MKTCAP)	t-statistic
Constant	0.3744	0.3586	4.46301	16.871***
ln(Econ. Growth)			0.191223	1.584
ln(MKTCAP)	0.2938	1.9889**		
R <sup>2</sup>	0.2218		0.18741	
F-statistic	3.9912***		2.1945**	

\*p-value at 10%.  
 \*\*p-value at 5%.  
 \*\*\*p-value at 1%.

**Table 7. Error-correction representation for the selected ARDL model**

Variable	Model A		Model B	
	D(ln(EconGrowth))	t-statistic	D(ln(MKTCAP))	t-statistic
C	0.0679	0.958	0.3247	0.749
D(ln(Econ. Growth (-1)))	-0.1584	-1.691	-0.0459	0.964
D(ln(MKTCAP (-1)))	0.2050	-2.016**	-1.0836	0.292
ECM (-1)	-0.6404	-3.60***	-0.043	-1.1345
R <sup>2</sup>	0.8143			
Akaike info criterion	0.4385			
Schwarz criterion	0.7369			
Durbin-Watson stat	2.176767		2.0810	
Log likelihood	-22.86083		-6.4823	
F-statistic	13.1635		1.7250	
Prob. (F-statistic)	0.0005		0.1798	
Wald test (F-statistic)	3.276**		0.9432	
LM test (F-statistic)	1.313087		0.2561	

\*p-value at 10%.

\*\*p-value at 5%.

\*\*\*p-value at 1%.

After analyzing the co-integration and causal relationship, we find that in the short run and long run, stock market development leads the economic growth. This finding is also in line with the assertion of Levine (2002). It was claimed that well-functioning stock market stimulates economic growth. In other words, this finding is consistent with the supply-leading hypothesis.

#### 4.4.1. Additional analysis for ARDL model robustness

To check the consistency of our first model, we revise the model (see Equation (2)). If we find any co-integration and significant estimates, then we need to consider simultaneous equation model. Model B of Tables 5–7 show all estimates of co-integration approach, where we employ Equation (2) and VECM focusing stock market development. We observe no co-integration and non-significant ECM (-1) and Wald test coefficient from VECM model. So, the results confirm that no simultaneous equation is needed for ARDL approach that means a single-equation model is appropriate for analysis.

#### 4.5. Regression results of interaction effects

Table 8 presents the result of the regression analysis for moderation testing. Model 1 was constructed based on the result of Granger causality test, which indicates that stock market development is instrumental in explaining the economic growth of Malaysia. Results from Model 1 also suggest that stock market development causes economic growth as evident by the significant positive effect on economic growth. The stock market development also explains 22.1% of the variances of economic growth.

Model 2 confirms that FCI has significant negative impacts on economic growth of Malaysia. This finding confirms the statements of some researchers who opined that FCI might have the negative effects on emerging and developing economies (e.g. Klein & Olivei, 2008; Laureti & Postiglione, 2005; Rodrik & Velasco, 1999; Soto, 2003). It could be due to poor policy-making and implementation. FCI moderates the relationship between stock market and economic growth. The result suggests that when stock market and FCI interact together, they contribute to economic growth in Malaysia due to the interaction R<sup>2</sup> changes by 9.1%, at the 1% significance level. Similarly, the stock market development, FCI and the interaction term of this two variables explain 37.88% of the variance in

**Table 8. Regression-based moderating test results**

	Model 1	Model 2	Model 3	Model 4
Constant	0.3750	0.2512	0.3011	-0.3051
ln(MKTCAP)	0.293**	0.331**	0.321**	0.416**
ln(FCI)		-0.0724*		-0.1471***
ln(MKTCAP)* ln(FCI)		0.0026**		0.0052**
ln(ER)			-2.698*	-3.4418
ln(MKTCAP)* ln(ER)			0.0014	-0.3021**
ln(FCI)*ER				0.5365**
ln(MKTCAP)* ln(FCI)* ln(ER)				0.0189**
R <sup>2</sup>	0.2218	0.3788	0.4112	0.5321
R <sup>2</sup> increase due to interaction		0.0912***	0.0093	0.0755**
Critical value (F)	3.991**	7.016***	5.891***	7.9212***

Notes: Economic growth as the dependent variable for all models. Equations (3)–(6) employed for Models 1–4, respectively.

\*p-value at 10%.

\*\*p-value at 5%.

\*\*\*p-value at 1%.

Malaysian economic growth. The results imply that even though FCI increases regarding stock portfolio, it tends to have positive impacts on economic growth.

Model 3 indicates that exchange rate has a significant effect on the economy. However, the interactional effect of the two variables does not affect the economic growth in Malaysia. The meaning is that the exchange rate alone does not moderate the relationship between stock market development and economic growth of Malaysia.

Therefore, Model 4 was constructed to investigate the moderated moderation effect of FCI on the relationship between stock market and economic growth of Malaysia. As expected, the three-way interaction effects of stock market, FCI, and exchange rate was found to have affect on the economic growth. The results demonstrate a significant moderation effect of FCI and exchange rate on the relationship between stock market development and economic growth. The variables and their interactions in Model 4 explain 53.21% of the variations in economic growth at 1% level of significance. This result indicates that the presence of FCI with favorable exchange rate helps stock market development to contribute to economic growth. Although, individually, FCI and exchange rate both have negative impacts on economic growth; but, whenever they interact with the stock market, that leads to positive effects.

### 5. Concluding remarks and policy implications

Malaysia is considered as a favorable place for both the local and foreign investors. The stock market offers them promising investment opportunities for making profits and incentive gains. The government is playing a vital role in economic growth by ensuring excellent economic climate and trade openness. This role of government attracts investors to invest in the stock market, thus encourages stock market depth that promotes growth. Acknowledging the importance of stock market development and FCI in Malaysia, the prominent role of the stock market, FCI, and exchange rates on Malaysian economic growth has been examined.

First, this study investigates the causality between stock market development and economic growth. Granger causality test reveals stock market development boosts economic growth in Malaysia. This finding supports supply-leading hypothesis. These results are also justified with the ARDL model, where a long-run relationship between stock market development and economic



growth has been observed. The error-correction model exhibits that short-run dynamics of economic growth trend to long-run equilibrium with high speed for adjustments, after a shock in Malaysia stock market.

Next, this study investigates the influences of stock market development on economic growth as well as on the moderating role of FCI and exchange rate. Regression-based test results reveal that stock market development has a significant positive effect on economic growth. Whereas, FCI has an adverse impact on economic growth, but it has a moderating effect on the relationship between stock market development and economic growth. Similarly, the exchange rate has a negative influence on the economic growth. However, the three-way interaction (stock market, FCI, and ER) effect has a positive impact on growth. This implies the presence of the moderated moderating effect of FCI on the relationship between stock market development and economic growth.

However, FCI, particularly in the form of external debts, does not have the favorable impact on the Malaysian economic growth. The country's over-reliance on foreign debts may not contribute positively toward the economic growth. So, the government should start looking at other ways to attract FCI, particularly the FDI. For future studies, the moderating role of trade openness and economic freedom should also be investigated to understand their effects on the economic growth and development widely.

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#### Notes

1. See Nyasha and Odhiambo (2015) for more literature.
2. See these studies: Enisan and Olufisayo (2009) for sub-Saharan African countries, Tsouma (2009) for emerging and developed economies; Brambila-Macias and Massa (2011) for Egypt; Hassan, Sanchez, and Yu (2011) for East Asia-Pacific and sub-Saharan; Kolapo and Adaramola (2012) for Nigeria; Bristy (2014); Madsen and Ang (2016) for 21 OECD countries; Shahbaz, Rehman, and Muzaffar (2015) for Bangladesh, and Sehwat and Giri (2015) for India; they find stock market development improves economy.
3. Studies find economic growth develops stock market: Liang and Teng (2006) for China; Odhiambo (2008) for Kenya (1969–2005); Panopoulou (2009) for five countries (1995–2007) and Kar, Nazlıoğlu, and Ağır (2011) for MENA countries (1980–2007).
4. Studies find bidirectional causality between stock market and growth: Huang, Yang, and Hu (2000) for the United States, Japan, and China (1992–1997); Wong-bangpo and Sharma (2004) for ASEAN countries (1985–1996); Liu and Shu (2002) for China; Alam and Hasan (2003) for US; Caporale, Howells, and Soliman (2004) for Argentina, Chile, Greece, Korea, Malaysia, the Philippines, and Portugal (1977–1998); Darrat, Elkhail, and McCallum (2006) for emerging markets (1970–2003); and Phiri

(2015) for South Africa, (Omri, Daly, Rault, and Chaibi (2015) for MENA countries (1990–2011).

5. Study did not find relationship: Atindéhou, Gueyie, and Amenounve (2005) for some west African countries.
6. See, Singh and Weisse (1998): They explained how FCI in Mexico turned good to bad for Mexican economy.
7. Two sets of critical values for a given significance level can be determined (Pesaran et al., 2001).

#### Cover image

Source: Author.

#### References

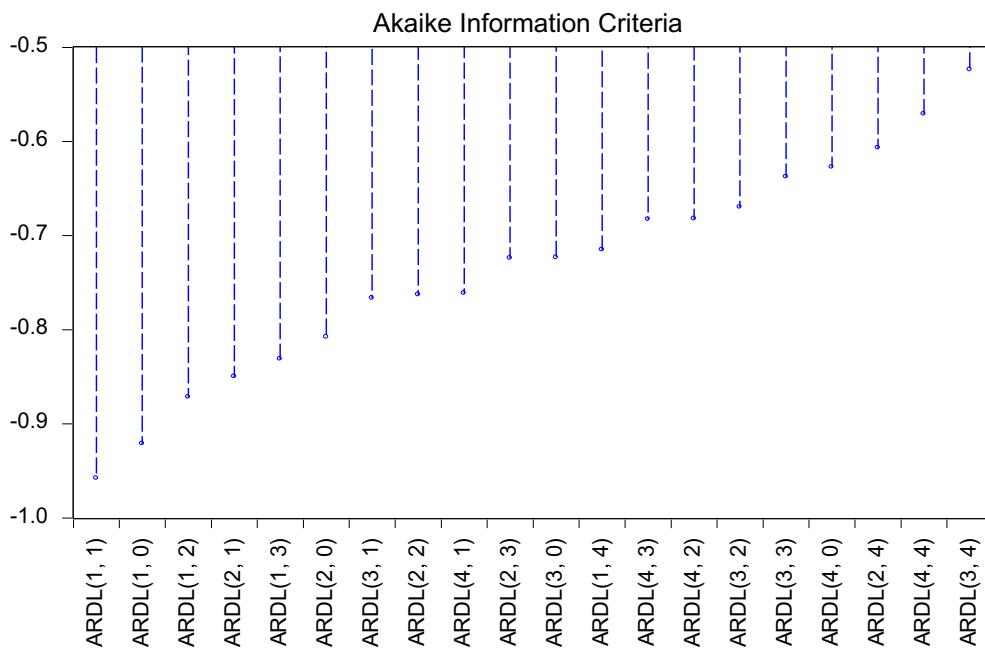
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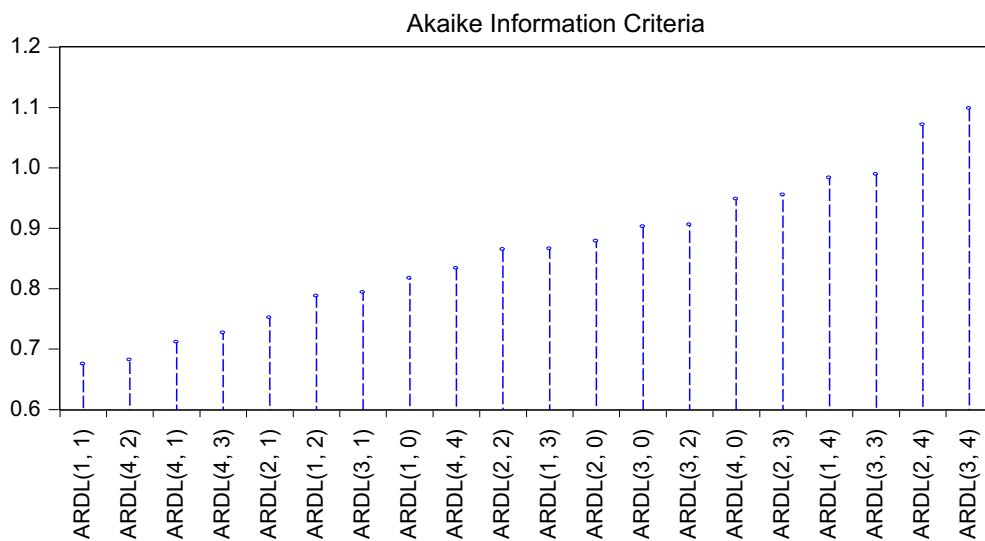
### Appendix A

Figure A1. ARDL model selection for Model A.



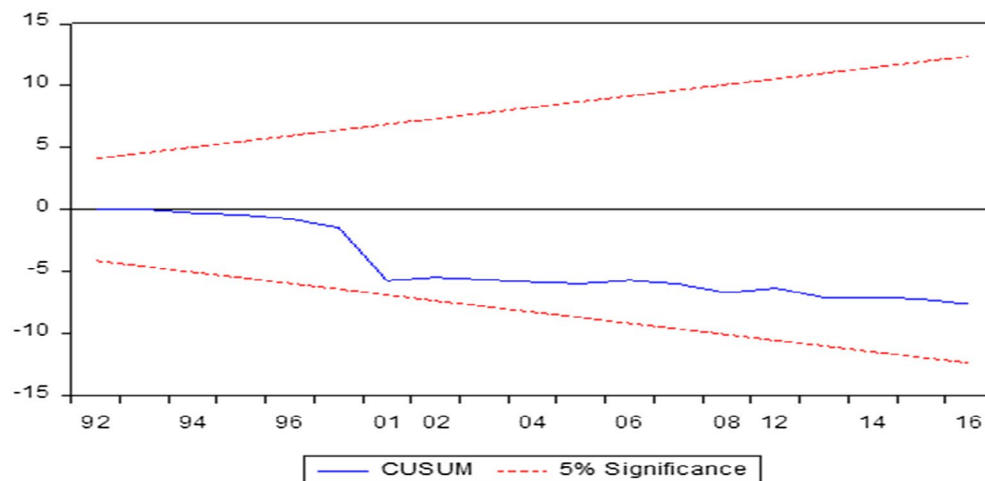
### Appendix B

Figure A2. ARDL model selection for Model B.



### Appendix C

Figure A3. CUSUM test for regression stability (Model A).



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