The Macroeconomic Determinants of Stock Market Development: Evidence from Malaysia

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Abstract

This study examines the macroeconomic determinants of stock market development in Malaysia during the period 1981-2015. Specifically, it examines the impact of banking sector development, economic performance, inflation rate, foreign direct investment and trade openness on the development of Malaysian stock market. Currently, while theoretical and empirical literature presents diverse views on the relationship between each macroeconomic determinant and stock market development, no studies have been conducted with particular reference to the Malaysian stock market. Given the significant role the Malaysian stock market plays among the ASEAN 5, there is a need for more understanding of the impacts of macroeconomic factors on its development. This paper contributes to the existing literature by investigating the macroeconomic determinants of stock market development in Malaysia using the ARDL bounds testing procedure. The results find that economic performance and trade openness have positive long-run impacts, whereas banking sector development has a negative long-run impact on stock market development. In the short run, the results find that the previous period of banking sector development, and the current and previous periods of trade openness have positive impacts on stock market development, whereas inflation rate exerts a negative impact. These findings carry important policy implications.

JEL Codes: *C22; E44; G23*
Keywords: *Macroeconomic determinants; Stock market development; Malaysia; ARDL bounds testing*

1. Introduction

What are the key determinants of stock market development? Existing theoretical literature has shown the role of stock market in promoting economic growth. It demonstrates how stock market can enhance stock market liquidity, reduce the cost of mobilising savings, strengthen corporate governance, and facilitate international risk-sharing, thereby promoting economic growth (see Jensen and Murphy 1990, Levine 1991, Deveruex and Smith 1994, Bencivenga et al. 1996, Greenwood and Smith 1997). In the case of Malaysia, empirical studies have shown that stock market development is a crucial factor in promoting economic growth (see Choong et al. 2003, Har et al. 2008). Due to the importance of stock market to economic development, there is an increasing number of theoretical studies trying to answer the question by identifying the factors leading to the growth of stock market. These factors can broadly be classified as: (i) factors under the micro-based asset pricing models (see, for example, Sharpe 1964, Fama 1965, Lintner 1965, Merton 1973, Ross 1976, among others); (ii) macroeconomic factors (see, for

example, Dornbusch and Fisher 1980, Boyd et al. 2001, Greenwood and Smith 1997, Levine 1997, Jeffus 2004, Niroomand et al. 2014, among others); and (iii) and institutional factors (see Pagano 1993a, b, La Porta et al. 1997, 1998, 2000, Shleifer and Vishny, 1997, among others)

While theories analysing micro-based factors and institutional factors have reached general consensus on how these factors influencing stock market development, theories on macroeconomic factors are far from conclusive. Against this highly debatable theoretical background, there are empirical studies attempting to identify the determinants of stock market development (see, for example, Garcia and Liu 1999, El-Wassal 2005, Ben Naceur et al. 2007; Billmeier and Massa 2009, Yartey 2007, 2010). However, the existing studies that investigate this question have employed panel data analysis, under which country-specific information may be lost due to the lumping of countries (see Hsiao, 2005). To resolve this problem, time-series techniques may be very useful to capture the country-specific information. In addition, most of the existing studies solely examine the long-run relationships between the stock market development and its determinants, with no attention paid on the short-run relationships between them. Furthermore, among the existing time-series studies on Malaysia, the focus of these studies is on the determinants of stock prices only, which fails to provide a complete picture of the development of stock market (see Ibrahim and Aziz 2003, Rahman et al 2009, Hussin et al. 2012). To contribute to the existing literature, our study aims to empirically examine both the short and long-run relationships between the stock market development and its determinants in the context of Malaysia. This country is chosen because it has had the largest stock market among the ASEAN 5 in terms of the number of listed companies and the market capitalization ratio during the past three decades (see World Development Indicators, 2017). In particular, the number of listed companies has increased remarkably from 282 in 1990 to 902 in 2015 (WDI 2017). In terms of market capitalization ratio, the country has experienced growth from 109 in 1990 to 129 in 2015 (WDI 2017). Despite the fasting growing of Malaysian stock market among the ASEAN 5, there is no similar study examining the determinants of stock market development in the country. Therefore, in this paper, we aim at identifying the factors affecting the stock market development of Malaysia during the period 1981-2015.

The rest of the paper is organised as follows. Section 2 provides an overview of the theoretical and empirical literature on the determinants of stock market development. Section 3 outlines the methodology and data. Section 4 presents the empirical results. Section 5 concludes the paper.

2. Literature Review

The importance role of stock market played in an economy has attracted numerous studies investigating the factors leading to the development of stock market. These factors include: (i) the micro-based theories under the asset pricing theories; (ii) macroeconomic factors; and (iii) institutional factors. In terms of the micro-based asset pricing theories, literature shows various asset pricing theories trying to determine the fundamental value of an asset, including stock. The determination of fundamental value of stock, hence affecting the stock price, is important to stock market development. Under these asset pricing theories[1], we find that there are two broad types of factors influencing the fundamental value of a stock. The first type is market-related factors such as the stock market volatility (or market risk), stock market liquidity, economic growth, foreign exchange rate, interest rate, industrial production, and factors affecting current and future consumption (see Sharpe 1964, Lintner 1965, Merton 1973, Breeden 1979, Stulz 1981a, b, Cochrane 1991). The second type is portfolio-related factors, such as the rate of stock return, the variance of stock return, book to market ratios, dividends or earnings, and the company size (see Fama 1965, Malkiel and Fama, 1970, Ross 1976).

Apart from the asset-pricing models which solely focus on determining the fundamental value of stock, there are numerous studies examining the impact of macroeconomic factors on the development of stock market in general. The macroeconomic factors being studied include: banking sector development, economic development, inflation rate, exchange rate, foreign direct investment, and trade openness. On the relationship between the development of banking sector and stock market, theoretical literature suggests diverse views. In view of the substitutability between banking sector and stock market, various studies show that banking sector performs better than the stock market in providing financial functions, such as information acquisition

[1] The asset pricing theories discussed in our study include: Efficient Market Hypothesis (Fama 1965), Capital Asset Pricing Model (CAPM) (Sharpe 1964, Lintner 1965), Arbitrage Pricing Theory (Ross 1976), Intertermporal CAPM (Merton 1973), Consumption-based CAPM (Breeden 1979), International CAPM (Stulz 1981a, b), and Producation-based Asset Pricing Model (Cochrane 1991).

about firms, corporate governance, and intertemporal risk sharing, to the economy (see Grossman and Hart 1980, DeAngelo and Rice 1983, Stiglitz 1985, Bhide 1993). However, other studies argue that the focus should be on the importance of the overall financial market rather than the relative importance of bank-based versus market-based financial system (see Merton and Bodie 1995, 2004; Levine 1997). Furthermore, Levine (2005) argues that banking sector and stock market are complements when they provide financial service to the economy. Despite these inclusive results on theoretical ground, empirical studies show consensus that banking sector and stock market are complementary in nature. These studies include Garcia and Liu (1999), Ben Naceur *et al.* (2007), and Yartey (2007, 2010), among others.

On the relationship between the economic development and stock market development, theories suggest that economic development reflected by the real income level and real income growth have positive impacts on stock market development. These models show that there is significant fixed cost associated with the formation of financial market, including the stock market. When the economy develops, the relative importance of this fixed cost reduces, thereby increasing the number of participatants in the stock market (see Greenwood and Jovanovic 1990, Greenwood and Smith 1997, Boyd and Smith 1998). The empirical studies also support the positive relationship between economic development and stock market development. They include Atje and Jovanovic (1993), Levine and Zervos (1998b), Garcia and Liu (1999), Beck and Levine (2004), Adjasi and Biekpe (2006), Yartey (2007; 2010), Ho and Iyke (2016), among others.

Regarding the impact of inflation rate on stock market development, theories argue that the relationship is negative, which implies that higher inflation rates are associated with smaller and less liquid stock market. In addition, they demonstrate that there exists a non-linear relationship between the inflation rate and financial market development, including the stock market development (see Azariadas and Smith 1996; Choi *et al.* 1996; Huybens and Smith 1998, 1999; Boyd *et al.* 2001). These models in general argue that an increase in inflation rate reduces the real rate of return on money and other assets, thereby reducing the agent's incentive to lend. As a result, fewer loans are made in the financial sector, which adversely affect the capital formation. Therefore, the stock market development is negatively affected due to the decline in capital formation. In addition, the existing theoretical studies also stress that informational frictions

become crucial in the financial system only when inflation exceeds critical rates. In other word, the relationship between inflation and stock market development is non-linear. On the empirical front, the argument of negative and non-linear relationship between inflation rate and the stock market development is found in studies such as Boyd et *al.* (1996, 2001), and Ben Naceur *et al.* (2007).

On the relationship between the foreign direct investment (FDI) and the stock market development, existing theoretical studies find opposing views. Hausmann and Fernández-Arias (2000a, b) observe that FDI tends to flows into countries which are less financially developed with weak institution. Therefore, FDI becomes a substitute to underdeveloped financial market for both debt and equity financing. In this case, FDI negatively affects the stock market development in host country. On the contrary, Claessens *et al.* (2001) argue that FDI flows more into countries with sound institutions and economic fundamentals, thereby fostering their financial systems, including stock market. In particular, FDI promotes the development of stock market by improving the firms' participation in capital markets due to the fact that some foreign investors may want to finance their investment projects with external capital. In addition, FDI may enhance the liquidity of domestic stock market through the purchase and sales of existing equities by foreign investors. These opposing views are also found in the empirical studies. For example, Jeffus (2004) and Malik and Amjad (2013) find that FDI and stock market development are positively correlated, whereas Rhee and Wang (2009) find negative association between FDI and stock market liquidity.

In terms of the exchange rate, economic theories demonstrate a strong association between exchange rate behaviour and stock market performance. They argue currency appreciation (or depreciation) can have a negative (or positive) impact on stock prices (see Dornbusch and Fisher 1980; Jorion 1991). These models argue that currency movements affect international competiveness and balance of trade position of an economy. As a result, the aggregate output is affected, which in turn affects the stock prices. On the other hand, Gavin (1989) indicating the relationship between exchange rate and stock prices can be positive or negative under different conditions. On the empirical front, studies also find inconclusive results. For example, Ma and Kao (1990) find that currency appreciation positively affects the stock market in an import-

oriented economy, while it adversely affects the stock market in an export-oriented economy. Wu (2000) shows that Singapore's currency appreciation against the U.S. dollar and Malaysian ringgit lead to a long-run increase in stock prices, whereas its depreciation against Japanese yen and Indonesian rupiah also lead to a long-run increase in stock prices. On the contrary, Phylaktis and Ravazzolo (2005) show that stock prices and exchange rates are positively related.

On the impact of trade openness on stock market development, literature suggests that trade openness benefits stock market development in two different ways (see Niroomand et al. 2014). First, trade openness fosters stock market development by increasing the demand on financial products and services. The increase in demand is due to the increase in risks and income volatility associated with trade openness (see Newbery and Stiglitz 1984, Svaleryd and Vlachos 2002, Vazakidis and Adamopoulos 2009). Second, trade openness is beneficial to the stock market development through the improvement of the supply side of the stock market (see Rajan and Zingales 2003, Braun and Raddatz 2005). Despite the importance of trade openness in stock market development, empirical study on it is scant. Only El-Wassal (2005) examines the impact of trade openness on stock market development and finds it is a favourable driver of stock markets in selected emerging market economies.

Apart from the macroeconomic factors, there are many studies linking stock market development to institutional factors. These institutional factors are the legal origin, legal protection on investors, corporate governance, financial market liberalisation, and stock market integration. Theories illustrate how favourable institutional factors, such as common law systems, better legal protection of the interests of shareholders and creditors, effective corporate governance system, more liberalized financial market, and more integrated stock market can foster the stock market development (see Pagano 1993a, b, La Porta et al. 1997, 1998, 2000, Shleifer and Vishny 1997, Levine and Zervos 1998a, Bekaert and Harvey 2000, Henry 2000a, b, Mishkin 2001, Svaleryd and Vlachos 2002). These arguments are also well supported by the empirical studies such as La Porta *et al,* (1997, 1998), Pistor *et al.,* (2000), Buchanan and English (2007), Yartey (2007, 2010), and Billmeier and Massa (2009).

3. Methodology and Data

3.1 Data

3.1.1 Data Sources

The data is annual which covers the period of 1981 to 2015. The period covered is solely based on data availability. The data have been obtained from the World Development Indicators (WDI 2017) compiled by the World Bank, which is the most reliable and easily accessible data source.

3.1.2 Definitions of Variables

(i) Stock Market Development (SMD)

Stock market development is a multifaceted concept that can be measured by its size, liquidity, volatility, and the degree of international integration (see Demirgüç-Kunt and Levine 1996, Levine and Zervos 1996, 1998b). In this study, we use market capitalization ratio (MCR), which measure the relative size of stock market, to indicate the level of development in stock market. MCR is defined as the value of listed domestic shares on the domestic exchange divided by GDP. This proxy is used in the study due to the following considerations. First, the level of market capitalization, which measures the size of the stock market, is a good indicator reflecting the ability of the stock market in mobilizing capital and diversifying risk (see Demirgüç-Kunt and Levine, 1996). Second, this indicator has been widely used in other studies such as Levine and Zervos (1996, 1998a), Boyd et al. (2001), Ben Naceur et al. (2007), Kim and Wu (2008), Billmeier and Massa (2009), Yartey (2007, 2010), among others. Third, despite the fact that there are various indicators of stock market development, Demirgüç-Kunt and Levine (1996) show that all of these stock market indicators are significantly correlated.

(ii) Banking Sector Development (BNK)

To measure banking sector development, we use the domestic credit to GDP as the proxy. It is defined as the private credit made by deposit money banks and other financial institutions as a ratio to GDP. This proxy is preferred to other proxies as it reflects the ability of the financial system to channel savings into investment opportunities by excluding the credit to the public sector (Levine and Zervos 1998b). This proxy has been used in other studies such as Levine et al. (2000), Boyd et al. (2001), and Beck et al. (2007)

(iii) Foreign Direct Investment (FDI)

We use the net inflows of foreign direct investment (percentage of GDP) to measure foreign direct investment. FDI captures the sum of equity capital, reinvestment of earnings, and other short and long-term capital as shown in the balance of payments. Studies such as Alfaro et al. (2004), Herzer (2008), and Takumah and Iyke (2017) have used this proxy.

(iv) Economic Performance (GDP)

Economic growth is the continuous increase in the total amount of goods and services per person in economy overtime. To measure economic growth, we use GDP per capita (constant 2010 US$), so that changes in it reflect the rate of economic growth. The proxy is defined as the value of all goods and services produced in a given year expressed in the base year prices divided by the mid-year population of the country. Studies such as Arestis and Demetriades (1997), Shan et al. (2001), Temple and Wöβmann (2006) Hartwig (2012) have also used this proxy.

(v) Inflation Rate (INF)

We use the annual percentage change of the consumer price index to measure inflation rate. This proxy reflects the annual percentage change in the cost to an average consumer of purchasing a basket of goods and services. Studies using this proxy include Shan et al. (2001), Boyd et al. (2001), Marques et al. (2013), among others.

(vi) Trade Openness (TRADE)

We use the sum of exports and imports of goods and services as a share of GDP to measure trade openness. This proxy has been used in other studies such as Rajan and Zingales (2003) and Niroomand et al. (2014), among others.

3.2 Empirical Specification

We employ the autoregressive distributed lag (ARDL) bounds testing procedure suggested by Pesaran et al. (2001) to examine the long-run relationships between the development of stock market and its macroeconomic determinants. This procedure is preferred to other procedures because: (i) it does not impose the restrictive assumption that all the variables in the model must

be integrated of the same order; and (ii) it does well even when the sample size is small. In this study, the ARDL specification of Eq. (1) will be of the following form:

$$\begin{aligned}\Delta lnSMD_t = \gamma_0 &+ \sum_{i=1}^{n} \gamma_{1i}\, \Delta lnSMD_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta lnBNK_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta lnFDI_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\, \Delta lnGDP_{t-i} \\ &+ \sum_{i=0}^{n} \gamma_{5i}\, \Delta lnINF_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\, \Delta lnTRADE_{t-i} + \delta_1 lnSMD_{t-1} + \delta_2 lnBNK_{t-1} \\ &+ \delta_3 lnFDI_{t-1} + \delta_4 lnGDP_{t-1} + \delta_5 lnINF_{t-1} + \delta_6 lnTRADE_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (1)$$

where ε, γ, and δ are the white-noise error term, the short-run coefficients, and the long-run coefficients of the model respectively; and Δ is the first difference operator. *t* denotes time period; *n* is the maximum number of lags in the model. The variables, namely: $lnSMD$, $lnBNK$, $lnFDI$, $lnGDP$, $lnINF$, and $lnTRADE$ are the natural logarithm of the market capitalization ratio, domestic credit to GDP, net FDI inflows to GDP; real GDP per capita, inflation rate, and trade to GDP, respectively. In this study, the maximum number of lags in the model is chosen based on the Schwarz Criterion (SC).

The reliability of the estimates of Eq. (1) are contingent on the joint significance of the coefficients δ_1, δ_2, δ_3, δ_4, δ_5 and δ_6. In other words, the variables in Eq. (1) should be cointegrated in order to ensure that the coefficients are efficiently estimated. We can verify the existence of cointegration by testing the null hypothesis of no cointegration relationship among the variables in the form of H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$. The variables are said to be cointegrated if we can reject the null hypothesis. To make a decision, we compare the calculated *F*-statistic to a set of critical values compiled by Pesaran *et al.* (2001) under this null hypothesis. If the *F*-statistic falls below the first set of critical values, then we fail to reject the null hypothesis of no cointegration. In contrast, we reject the null hypothesis of no cointegration when the calculated *F*-statistic is greater than the second set of critical values. When the *F*-statistic falls between both sets of critical values, the test is inconclusive.

If the variables are cointegrated, we then proceed to estimate the long-run equation of Eq. (1), and the following short-run equation (i.e. an error correction model) in the following form:

$$\Delta lnSMD_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\, \Delta lnSMD_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta lnBNK_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta lnFDI_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\, \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \gamma_{5i}\, \Delta lnINF_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\, \Delta lnTRADE_{t-i} + \delta ECM_{t-1} + \varepsilon_t \quad (2)$$

where δ is the coefficient of the error-correction term, ECM_{t-1}. δ is expected to have a negative sign. It implies that the variables revert to their equilibrium levels if they deviate from their equilibrium levels in the short run.

4. Empirical Results

4.1 Descriptive Statistics

This section reports the descriptive statistics of stock market development and its determinants. These statistics are the mean, median, minimum, maximum, standard deviation, kurtosis, skewness, sum, sum squared deviation and number of observations. Table 1 shows these statistics.

Table 1: Descriptive statistics of the variables

	lnSMD	***lnBNK***	***lnFDI***	***lnGDP***	***lnINF***	***lnTRADE***
Mean	4.790	4.640	1.176	8.730	0.847	5.056
Median	4.862	4.685	1.396	8.803	1.010	5.062
Maximum	5.771	5.043	2.170	9.295	2.272	5.395
Minimum	3.947	4.056	-2.870	8.147	-1.238	4.655
Std. Dev.	0.469	0.241	0.874	0.364	0.762	0.240
Skewness	-0.041	-0.666	-3.074	-0.211	-1.013	-0.324
Kurtosis	2.646	2.934	14.505	1.728	4.009	1.830
Jarque-Bera	0.192	2.594	248.125	2.619	7.471	2.610
Probability	0.908	0.273	0.000	0.270	0.024	0.271
Sum	167.642	162.416	41.165	305.551	29.634	176.953
Sum Sq. Dev.	7.494	1.983	25.984	4.501	19.761	1.951

Observations	35	35	35	35	35	35

Notes: Std. Dev. and Sum Sq. Dev. denote, respectively, standard deviation and sum of squared deviations. *ln* denotes the natural log operator.

4.2 Results of Stationarity Tests

As a preliminary analysis, we examine the stationary properties of the variables employed in this paper. These variables include: *lnSMD, lnBNK, lnFDI, lnGDP, lnINF* and *lnTRADE*. To examine their stationary properties, we use two unit roots tests: (i) the Dickey-Fuller Generalized Least Squares (DF-GLS) test; and (ii) the Ng-Perron test. Table 2 reports the results of unit roots tests of the variables in levels and at the first differences. It shows that variables such as *lnFDI* and *lnINF* are stationary in levels while others such as *lnSMD, lnBNK, lnGDP and lnTRADE* are stationary at the first differences.

Table 2: Results of unit roots tests of the variables in levels and at the first differences

Dickey-Fuller Generalized Least Squares (DF-GLS) Test

Variable	**Stationarity of all variables in levels**				**Stationarity of all variables at first differences**			
	Without trend	**Lag**	**With trend**	**Lag**	**Without trend**	**Lag**	**With trend**	**Lag**
lnSMD	-2.134**	0	-2.729	0	-7.746***	0	-8.172***	0
lnBNK	-1.179	0	-1.927	0	-5.272***	0	-4.974***	1
lnFDI	-4.869***	0	-5.110***	0	NA	NA	NA	NA
lnGDP	0.473	1	-1.856	0	-4.890***	0	-4.893***	0
lnINF	-3.132***	0	-3.782***	0	NA	NA	NA	NA
lnTRADE	-1.186	1	-0.948	1	-3.420***	0	-4.031***	0

Ng-Perron Test

Variable	**Stationarity of all variables in levels**				**Stationarity of all variables at first differences**			
	Without trend	**Lag**	**With trend**	**Lag**	**Without trend**	**Lag**	**With trend**	**Lag**
lnSMD	-1.808*	0	-2.223	0	-2.732***	0	-2.680*	0
lnBNK	-0.746	0	-1.551	0	-2.860***	0	-3.739***	1
lnFDI	-2.871***	0	-2.888*	0	NA	NA	NA	NA
lnGDP	0.710	1	-1.702	0	-2.842***	0	-2.842*	0
lnINF	-2.350**	0	-2.908*	2	NA	NA	NA	NA
lnTRADE	-1.065	1	-1.112	1	-2.536**	0	-2.687*	0

Notes: *, ** and *** denote significance at 10%, 5% and 1%, respectively. NA denotes non-applicable.

4.3 Main Results of ARDL Bounds Testing Approach

Having established that the variables are integrated of either order zero or one, we then proceed to test the long-run relationships between the stock market development and its determinants employing the ARDL bounds testing approach. The results show that the calculated *F*-statistic is 4.498, which is higher than the critical value reported by Pesaran et al. (2001) in Table CI (iii) Case III at the significance level of 5%. It means that the variables in the model are cointegrated. Table 3 reports the result of ARDL bounds testing for cointegration, and Table 4 the critical values of ARDL bounds test respectively. Having established that *lnSMD, lnBNK, lnFDI, lnGDP, lnINF,* and *lnTRADE* are cointegrated, we proceed to estimate the model using the ARDL bounds test approach. We use the Schwarz Criterion (SC) to determine the optimal lag length for the model. The optimal lag length selected based on SC is ARDL(1, 2, 0, 0, 0, 2). Table 5 reports both the long and short-run results of the selected model.

Table 3: Bounds test *F*-test for cointegration

Dependent Variable	**Function**	***F*-statistic**	**Cointegration Status**
SMD	F(SMD|BNK, FDI, GDP, INF, TRADE)	4.498**	Cointegrated

Note: ** denote significance level at 5%.

Table 4: The critical values of ARDL bounds test

Pesaran et al. (2001)		
Level of significance (%)	**Lower bound**	**Upper bound**
1	3.41	4.68
5	2.62	3.79
10	2.26	3.35

Table 5: The long-run and short-run results of the selected model

Long-run results
Dependent variable is *lnSMD*

Regressor	**Co-efficient**	**Standard Error**	**T-ratio**	**Probability**
lnBNK	-1.335**	0.639	-2.089	0.049
lnFDI	-0.025	0.052	-0.485	0.632
lnGDP	1.214***	0.330	3.679	0.001
lnINF	-0.106	0.088	-1.206	0.241

lnTRADE	1.541***	0.446	3.453	0.002

Short-run results
Dependent variable is Δ*lnSMD*

Regressor	**Co-efficient**	**Standard Error**	**T-ratio**	**Probability**
Δ*lnBNK*	0.623	0.420	1.483	0.152
Δ*lnBNK(-1)*	2.101***	0.521	4.030	0.001
Δ*lnFDI*	-0.019	0.049	-0.390	0.701
Δ*lnGDP*	2.638	1.554	1.698	0.104
Δ*lnINF*	-0.154**	0.063	-2.449	0.023
Δ*lnTRADE*	3.685***	1.095	3.364	0.003
Δ*lnTRADE(-1)*	2.434**	0.941	2.587	0.017
C	-6.331***	1.162	-5.451	0.000
ECM(-1)	-0.847***	0.154	-5.499	0.000

Notes: ** and *** denotes 5% and 1% significant levels respectively. Δ denotes first difference operator.

The long-run regression results show that banking sector development has significant and negative impact on stock market development in Malaysia, while economic performance and trade openness have significant and positive impact on it. In addition, both the foreign direct investment and inflation rate show negative impact on stock market development, despite the fact that their coefficients are not significant. Contrary to the findings of other studies such as Garcia and Liu (1999), Ben Naceur et al. (2007), Yartey (2007, 2010) which show that banking sector and stock market are complements, we find that banking sector and stock market are substitutes in nature. On the economic growth, the long-run results show that the coefficient of economic growth is positive and statistically significant. The positive relationship between economic development and stock market development is also found in other studies such as Atje and Jovanovic (1993), Levine and Zervos (1998b), Adjasi and Biekpe (2006), Akinlo and Akinlo (2009). On the trade openness, the long-run results show that the coefficient of trade openness is positive and statistically significant. Such positive relationship is supported in the literature (see Newbery and Stiglitz 1984, Svaleryd and Vlachos 2002, Rajan and Zingales 2003, Braun and Raddatz 2005, Niroomand et al. 2014).

Similar to the long-run results, the short-run regression results find the current period and the previous period of trade openness to have significant and positive impacts on stock market development, whereas inflation rate exerts a negative impact on stock market development. In

addition, the result shows that the coefficient of the error correction term is negative and statistically significant. In terms of banking sector development, contrary to the long-run results, both the current period and previous period of banking sector development exert positive impact on stock market growth in the short run.

Overall, the selected ARDL model fits well as indicated by the R-squared of approximately 58%. From the diagnostic tests reported in Table 6, the model does not has the problems of serial correlation, heteroscedasticity, functional misspecification. Figure A.1 and A.2 in the appendix show the plot of cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) of the model, respectively. It shows that the model is weakly stable as it fails the CUSUMQ stability test.

Table 6: Results of diagnostic tests

Test	**Statistic**	***P*-value**
Serial Correlation: CHSQ(1)	1.867	0.172
Functional Form: F(1,21)	0.013	0.910
Normality: CHSQ (2)	0.907	0.635
Heteroscedasticity: CHSQ (1)	0.564	0.453

4.4 Sensitivity Analysis

Are the above results robust to the choice of optimal lags for each variable? We attempt to verify this question in this section. Instead of using Schwarz Criterion, we use Akaike information criterion (AIC) to select the optimal lags. The results are reported in Table 7. The preferred model is AIC [ARDL (1, 2, 0, 1, 1, 2)], which differs from the one using the SC [ARDL(1, 2, 0, 0, 0, 2)]. It is obvious that the information criterion matters when determining the optimal lags for each variable in the model. Similar to the main results, the long-run results suggest that economic development and trade openness exert positive impact on stock market development. The banking sector development and foreign direct investment has a negative impact on it. The only difference is the impact of inflation on stock market. Here we find the relationship to be

positive, whereas the main results suggest that it is negative. Nonetheless, the coefficients of inflation in both results are not significant. The short-run results show that banking sector development, economic development, trade openness have positive impacts on stock market development, whereas foreign direct investment and inflation have negative impact on stock market. These findings are consistent with our main results. In addition, the diagnostic tests reported in Table 8 show that the model is weakly structurally stable, no heteroskedasticity, and no functional misspecification. However, it fails the test of serial correlation. Figure A.3 and A.4 in the appendix show the plot of cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) of the model, respectively. Similar to the main results, it shows that the model is weakly stable as it fails the CUSUMQ stability test.

Table 7: Bounds test *F*-test for cointegration

Long-run results
Dependent variable is *lnSMD*

Regressor	Co-efficient	Standard Error	T-ratio	Probability
lnBNK	-0.701	0.554	-1.266	0.220
lnFDI	-0.060	0.064	-0.940	0.359
lnGDP	0.955***	0.310	3.078	0.006
lnINF	0.014	0.110	0.125	0.901
lnTRADE	1.216***	0.320	3.798	0.001

Short-run results
Dependent variable is Δ*lnSMD*

Regressor	Co-efficient	Standard Error	T-ratio	Probability
Δ*lnBNK*	0.790*	0.413	1.914	0.070
Δ*lnBNK(-1)*	1.885***	0.479	3.938	0.001
Δ*lnFDI*	-0.039	0.048	-0.802	0.432
Δ*lnGDP*	3.465**	1.564	2.216	0.038
Δ*lnINF*	-0.095	0.061	-1.562	0.134
Δ*lnTRADE*	3.382***	1.023	3.307	0.004
Δ*lnTRADE(-1)*	2.105**	0.899	2.343	0.030
C	-6.256***	1.082	-5.781	0.000
ECM(-1)	-0.952***	0.163	-5.834	0.000

Notes: *, ** and *** denotes 10%, 5% and 1% significant levels respectively. Δ denotes first difference operator.

Table 8: Results of diagnostic tests

Test	**Statistic**	***P*-value**
Serial Correlation: CHSQ(2)	6.146	0.046
Functional Form: F(1,19)	0.270	0.609
Normality: CHSQ (2)	2.835	0.242
Heteroscedasticity: CHSQ (1)	1.533	0.216

5. Conclusion

This paper set out to examine the macroeconomic determinants of stock market development in Malaysia during the period of 1981 to 2015, using the ARDL bounds testing procedure. In the main results, we found that in the long run, economic development and trade openness had significant and positive impacts, whereas banking sector development had significant and negative impact on the Malaysian stock market development. Although FDI and inflation also showed a negative impact on stock market development, the coefficient was not significant. Similar to the long-run results, the short-run regression results found that the previous period of banking sector development, and the current and previous periods of trade openness have positive impacts on stock market development, whereas inflation rate exerts a negative impact. To verify the robustness of our main results to the choice of optimal lags for each variable, we also used Akaike information criterion (AIC) to select the optimal lags instead of Schwarz Criterion used in the main results. These finding were consistent with our main results. As informed by the empirical findings, policymakers should consider pursuing policies that promote economic growth to foster long term development of the stock market. This will achieve a "win-win" situation in a sense that stock market development will further promote economic growth as informed by the existing empirical studies of the country. In addition, trade openness should be further encouraged to enhance the long term growth of stock market. Given Malaysia is known to have pursued a trade-led approach to stimulate its economy (see Rahman et al. 2009), policies to further increase trade openness will directly benefit to the development of stock market and its overall economy. Furthermore, the banking sector development was found to have positive

impact in the short run but negative impact in the long run, policymakers should strive to diversify the Malaysian financial system in the long run. Such policy will not only promote the long term development of the stock market, but also avoid the over-burdening of the banking system in the long run.

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Appendix

Figure A.1: The plot of cumulative sum of recursive residuals of the main results

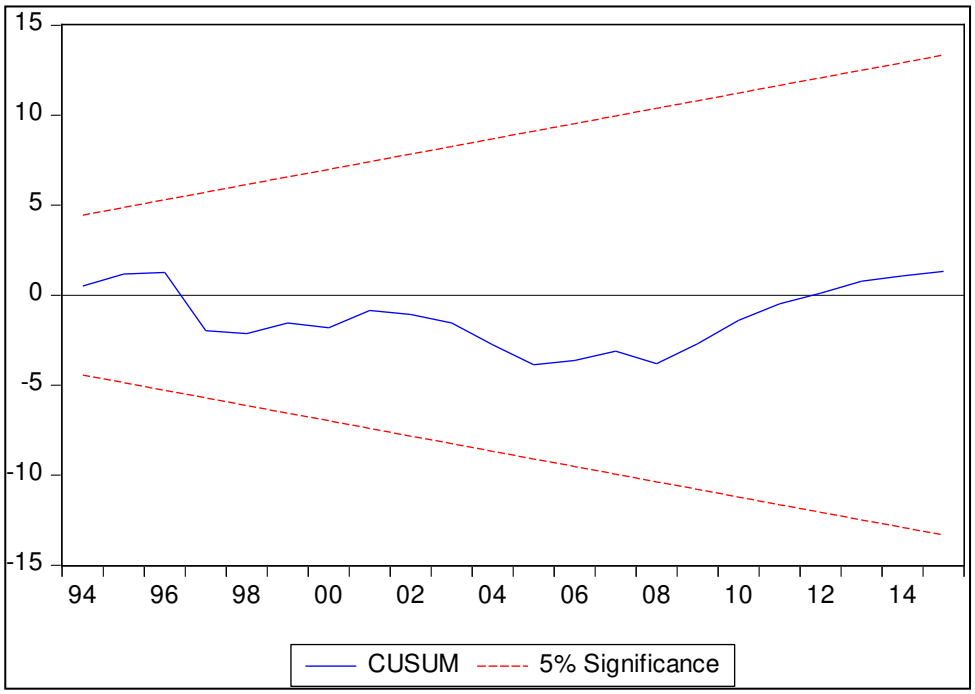

Figure A.2: The plot of cumulative sum of squares of recursive residuals of the main results

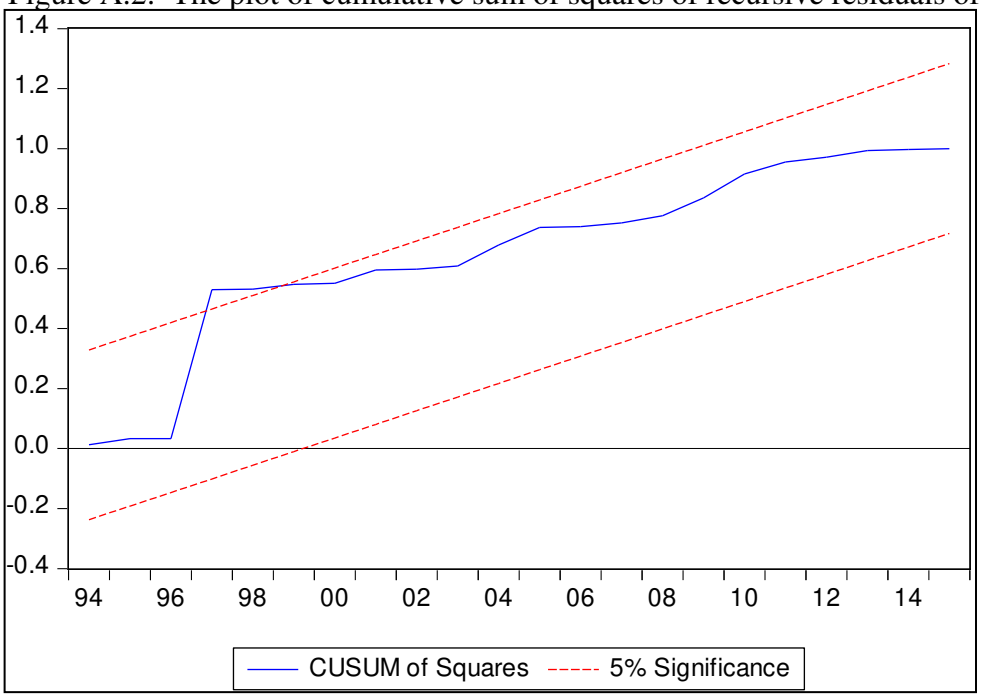

Figure A.3: The plot of cumulative sum of recursive residuals

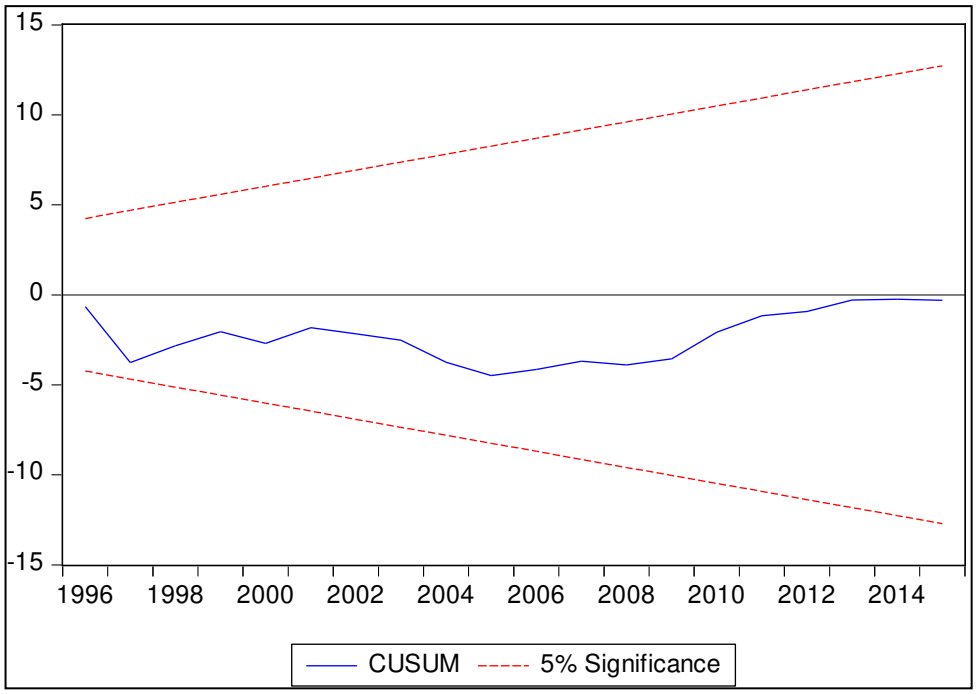

Figure A.4: The plot of cumulative sum of squares of recursive residuals