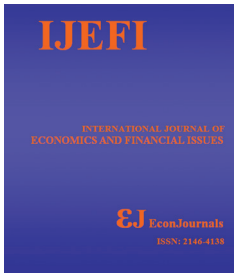

International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2016, 6(3), 1200-1208.

Stock Market Development and Economic Growth: Evidences from Asia-4 Countries

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ABSTRACT

The main purpose of this study is to examine the role of stock markets in economic growth for four Asian countries namely Bangladesh, India, China and Singapore. Annual time series cross country data over the period 1991 to 2012 and autoregressive distributed lag bound testing approaches an analytical technique are used. Our results suggest that there is long-term cointegration among economic growth, foreign direct investment (FDI), stock market development and inflation. The long-term elasticity estimates of the stock market development in all countries show expected sign but statistically significant only in China and Singapore. Incoming FDI is found to have positive relation to economic growth in all countries except India and statistically insignificant for all countries except China. In the short-run, stock market also has positive relation to economic growth in all countries but significant only in India and China. The impact of FDI on growth is significant and positive only for Singapore. The results indicate that the inflation variable is statistically significant in Bangladesh and Singapore. The empirical findings of the study reveal that stock market development and FDI inflows play vital roles in the process of economic growth and development in these selected countries.

Keywords: Economic Growth, Stock Market, Autoregressive Distributed Lag Model, Asia-4 Countries
JEL Classifications: C22, O16, O40, O53

1. INTRODUCTION

The prominence of stable financial market has been emphasized for the growth of a nation because a well-established stock market is generally believed to be an indicator of complete macroeconomic performance of a country. The proponents of stock market believe that it plays a pivotal role in the development of commerce and industry and as a result, it affects the economy of a country. Generally, the theoretical discussions concentrate on the growing intermediation part and functions of the stock market in encouraging liquidity, mobilizing and assembling savings, engendering information for prospective investments and capital allocation. It is assumed that the existence of active and stable stock market can stimulate the rate of economic growth. Bagehot (1873) reveals that finance plays a crucial role in economic growth. In a study, Schumpeter (1911) focuses on the prominence of banking system in economic growth. The studies of Goldsmith (1969), McKinnon (1973) and Shaw (1973) suggest that financial system performs a key role in economic growth. According to Levine (1997. p. 691), "to organize the vast literature on finance and economic activity, I break this primary function into five basic functions. Specifically, financial systems: Facilitate the trading, hedging, diversifying, and pooling of risk, allocate resources, monitor managers and exert corporate control, mobilize savings, and facilitate the exchange of goods and services."

In a study, Caporale et al. (2004) argue that a well-built stock market helps the investors to circumvent risk when capitalizing in encouraging projects. In addition, active stock markets perform a decisive role in assigning investment to the corporate sector. This will definitely have a factual influence on the entire economy. Also, finance is as a result not only pro-growth, but also pro-poor. Thus, the decision makers should consider the significance of financial sector development and formulate constructive policy (Beck et al., 2000; 2008). A well-functioning stock market contributes to total productivity, and developed financial markets are considered to

be important component of long-run economic growth (Levine et al., 2000; Husain, 2006; Yartey, 2008; Ozturk, 2008; Acaravci et al., 2009; Barna and Mura, 2010; Cooray, 2010; Shin, 2013). It is therefore expected that every stable stock market will expedite the convenience of long-term capital for cost-effective activities of production which is required for the process of economic growth and development. As it's believed, a suitable and smooth functioning stock market signifies a substantial condition for financial sector evolution. This is also considered a pre-requisite to the sustainable economic growth and development that makes the national economy to enhance more foreign investors.

For example, Bencivenga and Smith (1991) note that by decreasing uncertainty, the upsurge in liquidity may condense saving rates enough to invite a destructive impact on economic growth. In a study, Mayer (1988) expounds his views on this issue, noting that equity issuance is a quite negligible cause of corporate finance. In a similar study, Stiglitz (1994) asserts that stock market liquidity will not boost incentives for consuming resources to obtain information. However, Stiglitz claims that satisfactorily functioning stock market will expose information rapidly through price changes and efficient public exposure will decrease incentives to information acquirement. While, Lucas (1988) considers finance to be an "over-stressed" factor of economic growth Robinson (1952) affirms that economic growth is not caused by finance. Similarly, Sarkar (2007) has shown that there is no relationship between stock market and economic growth. The study of Ergungor (2008) suggests that financial system's structure is unrelated to economic growth. The study finds that there is a non-linear (contingent) linkage between economic growth and financial structure.

The effect of the stock market on economic growth is so far a debatable issue as many prior studies have explained stock market from different perspectives. According to Levine (1996. p. 7) Do stock markets affect overall economic development? Some analysts have viewed stock markets in developing countries as 'Casinos' that have little positive impact on economic growth." In a study, Husain (2006) points out that Japan has the most advanced stock market followed by East Asia such as China, Korea, Malaysia, Thailand, Singapore, Hong Kong, Philippines and Indonesia. According to Ghosh and Revilla (2007), Asia's stock markets have been key source of funding for the region, though, their full capacity has not yet been exploited effectively. The study of Lipinsky and Ong (2014) notes the significance of the Asian stock market, suggesting that the role played by the stock market in corporate financing in Asia is undeniably estimable. The character of Asia's stock markets as a vital driver of economic growth in the region is yet to be duly appreciated. An important feature of the Asia's stock markets is that it has become relatively more cohesive with the international financial system. It has been observed that foreign investments have risen in many of the region's stock markets since the Asian financial crisis. This is the case in some of the bigger markets, recommencing their enlargement following the severe cutback during the global financial crisis. In Asia's stock markets, the number of foreign listings has tripled during the past 10 years, although still small (2% of the total) if compared to 10% each in the USA and Europe, Middle-East and Africa. Whereas, nearly 20,000 companies are listed in Asia's stock markets, just under the rest of the world collective the numbers of listed companies are over 10,000 in the USA and a total of 13,300 in Europe, Middle-East and Africa in 2012.

This study strives to examine the relationship between the stock market development and economic growth in selected countries from Asia namely Bangladesh, India, China and Singapore (hereafter BICS). These countries are, respectively, low income, lower middle income, upper middle income, and high income countries based on the World Bank classification. For empirical analysis, time series cross country data over the period 1991 to 2012 are used. The study investigates whether stock markets play paramount role in promoting economic growth of BICS. Further, to evaluate whether stock market cause economic growth, or economic growth cause stock market development. A novel striking feature of this study is that, it is distinguished from the other studies in term of time period, set of variables, set of countries and empirical methodology. The outcomes are expected to serve as guide to decision makers in formulating policy that may promote the stock market development to enhance higher level of economic growth. Apparently, empirical studies on stock market development and economic growth in BICS countries generally appear to be rare. Therefore, this study will contribute and enrich the literature in this area of study.

The remainder of the study is designed as follows: Section 2 reviews empirical studies on the relationship between stock market development and economic growth. Section 3 deals with the data and empirical methodology. Section 4 interprets the empirical findings. Finally, Section 5 presents the conclusion of the study.

2. LITERATURE REVIEW

The available literature reveals that several prior studies have examined the connection between stock market development and economic growth, yet, they have not reached conclusion as their results remain contradictory. While some have found a positive relationship between these variables, others have reported negative or mixed results. For example, Atje and Jovanovic (1993) employ a data set for 39 countries and finds statistically significant positive relationship between stock markets and economic growth for the period 1980-1988. The study of Thornton (1995) uses data from 22 Asian, Latin American and Caribbean developing economies and observes that in many cases, financial deepening does not make much difference to economic growth. Also, for eight countries, no lead-lag link was identified and for other six countries, economic growth led to financial deepening. The study adds that though, the financial deepening does not make a difference, it is more expected to stimulate economic growth than to impede it. In a study for Greece during 1986-1999, Hondroyiannis et al. (2005) find a bi-directional relationship between economic growth and capital market development. Nieuwerburgh et al. (2006) find a long-term relationship between financial market and economic development in Belgium during 1873-1935, and suggests that stock markets development causes economic growth in the country. In the case of sub-Saharan Africa, Enisan and Olufisayo (2009) observe that the stock market development and economic growth has a significant positive long-run relationship during the period 1980-2004. For

Egypt and South Africa, the stock market is co-integrated with economic growth and the Granger causality test indicates that stock market Granger causes economic growth. Other results of granger causality tests suggest a bidirectional link between stock market and economic growth for Cote D'Ivoire, Kenya, Morocco and Zimbabwe. However, in the case of Nigeria, weak evidence is observed for the relationship between these variables.

The study of Boubakari and Jin (2010) obtains different results on the relationship between stock market and economic growth for five Euronext countries namely Belgium, France, Portugal, Netherlands and United Kingdom during 1995:Q1 to 2008:Q4. The study reports a positive relationship between the stock market and economic growth for some countries where the stock market is liquid and extremely active. Conversely, the causality linkage is rejected for those countries where the stock market is small and less liquid. For the study of 42 emerging markets during 1995-2006, Masoud and Hardaker (2012) find that the stock market development has a significant positive impact on economic growth. Miguel et al. (2013) report bidirectional causality between the stock market and economic growth in Portugal for the period 1993-2011 but find no flow of causality from bank financing to economic growth. In the work of Azam (2013), financial deepening is found to have a statistical positive relationship to economic growth for Azerbaijan during 1995-2011, while no evidence is found in the case of Kazakhstan. In the case of the former Communist countries of Central and Eastern Europe and the Commonwealth of Independent States, Cojocaru et al. (2014) indicate that credit to the private sector used for financial development has a positive impact on economic growth during 1990-2008. Balago (2014) finds that financial sector development variables including banking sector credits, total market capitalization and foreign direct investment (FDI) have positive impact on economic growth in Nigeria during 1990-2009. In another study, Nguyen and Pham (2014) find causality between stock market development and economic growth in Canada but it is not the case in Australia during 1981:Q3 to 2012:Q3. In the case of Canada, the findings suggest that stock market development and economic growth have long-run linkage and that the stock market development does help boost the future economic growth.

Some prior studies have empirically estimated the financial development and economic growth relationship in the context of Asian countries. For example, a study by Ahmed and Ansari (1998) examine financial sector development and economic growth relationship for South Asian-3 countries namely India, Pakistan, and Sri Lanka for the period 1973-1991. Empirical findings from causality analysis suggest that financial sector development causes economic growth in the Granger sense for these countries. Luintel and Khan (1999) use annual data ranging from a minimum of 36 to a maximum of 41 years for 10 countries namely Costa Rica, Colombia, Greece, India, Korea, Malaysia, Philippines, Sri Lanka, South Africa, and Thailand. The results reveal bidirectional causality between financial development and economic growth in all 10 countries. Another study by Caporale et al. (2004) examined the connection between financial development and growth for some selected countries namely Argentina, Chile, Greece, Korea, Malaysia, Philippines and Portugal during the period 1977:1-1998:4. The findings reveal a connection between the variables only for 5 out of 7 countries. For 3 South Asian countries namely Bangladesh, India, and Pakistan, the study of Wadud (2005) finds that there is causality running from financial development to economic growth over the period 1976-2002.

Over the period 1980-2004, Tang et al. (2007) examine the relationship between stock markets and economic growth in Asian-12 countries. Their findings indicate a long-run linkage between stock markets and economic growth only in four out of twelve countries namely China, Philippines, Singapore and Taiwan. Results of granger causality tests reveal that there is bidirectional causality relationship between stock markets and economic growth only in the case of China, Hong Kong, Indonesia, Malaysia and Thailand. However, in the case of Japan and Korea, a unidirectional causal effect runs from the stock markets to economic growth in the short-run. For India and Singapore, causality runs from economic growth to stock markets in the short-run, but in the case of Sri Lanka, no causality is found among the variables. Mun et al. (2008) also finds that stock market development Granger causes economic growth without a feedback for Malaysia during the period 1977-2006. Azam et al. (2014) finds that FDI, infrastructure, saving, energy consumption and income are the important determinants of Romanian's stock market during 1990-2013. Azam and Ibrahim (2014) observe that FDI inflow has a positive impact on the stock market of Malaysia during 1988-2012.

On the other hand, numerous erstwhile studies have found insignificant or weak negative relationship between the stock market development and economic growth. For example, in a study, Harris (1997) re-examines the correlation between stock markets and economic growth on the data earlier used by Atje and Jovanovic (1993), but finds no proof that the level of stock market determines the growth per capita output. The results of Ram (1999) reveal that there is insignificant or weak negative relationship between financial development and real gross domestic product (GDP) per capita growth rate for 95 countries. The study highlights that, contrary to the conclusions reached in many prior studies, the empirical result found does not favor the view that financial development encourages economic growth. The empirical findings of Arestis et al. (2001) during the period 1968-1998 indicate that both stock markets and banks appear to play a key role in promoting economic growth in France, Germany and Japan. However, in the case of United Kingdom and United States, the relationship between financial development and economic growth is found to be statistically weak. Empirical results of Dawson (2003) reveal that financial development has an insignificant impact on economic growth for 13 Central and East European Countries (CEECs) over the period 1994-1999. The study further maintains that economic growth in CEECs is not inhibited by underdeveloped financial sector.

In a similar study, the findings of Azarmi et al. (2005) do not favor the hypothesis that the stock market development is related to the economic growth in India during the period 1981-2001. In particular, the study finds an inverse relationship between stock market development and economic growth for the post-

Table 1: Descriptive statistics

Countries	Mean±SD			
	Y	*SMC*	*INF*	*FDI*
Bangladesh	438.11±164.97	6.53±5.70	6.14±2.53	0.465±0.492
China	2069.04±1964.93	43.01±40.70	4.64±6.24	110.38±108.02
India	730.97±431.17	50.21±31.14	7.97±3.31	12.48±13.93
Singapore	30421.84±12280.63	161.41±50.93	1.98±1.73	225.77±19.461

FDI: Foreign direct investment, SD: Standard deviation

liberalization period. Naceur and Ghazouani (2007) indicate that the relationship between stock market development and growth is insignificant for 11 MENA countries for the period 1979-2003. In addition, it is found that the connection between bank development and economic growth is negative after controlling for the stock market development in these selected countries. Findings by Demetriades and Hussein (1996) reveal little evidence to show that financial sector is prominent to stimulate economic development for 16 countries[1,2]. In their study, Haque and Hossain (2011) find that dynamic model used in the study is not meaningful to detect the stock market relationship to per capita growth rate in the SAARC region during 1980-2008. The study suggests that stock market and liquidity do not have any important effects on the real economic growth in the SAARC countries. Another study by Wang and Ajit (2013) shows that there is opposite relationship between the stock market and economic growth in China during the period 1996-2011. The results of Owusu and Odhiambo (2015) also suggest that in the long-run, stock market developments and capital account liberalization policies have no encouraging impact on economic growth in Ghana. Similar results obtained for Ghana by Owusu and Odhiambo (2014) also indicate that the stock market developments and capital account liberalization policies have no positive impact on economic growth in the long-run.

The general observation from the review of previous studies is that the connection between stock market development and economic growth is either positive or negative and in some cases, no relationship at all. The variation in results may be due to peculiarity of the country under study or the nature of data. In view of the contradictory or inconclusive results reported by the prior studies where some have found positive, negative or even mixed results, the present study hypothesizes as follows:

H_0: There is robust linkage between the stock market and growth on BICS.

H_a: There is no robust linkage between the stock market and growth on BICS.

3. DATA AND METHODOLOGY

3.1. Data Sources and Variables

The study employs annual time series data for four Asia countries namely Bangladesh, India, China and Singapore. The data cover the period 1991 to 2012. The variables used are GDP per capita (current US$), stock market capitalization of listed companies (percent of GDP) is the share price times the number of shares outstanding, inflation is the annual growth rate of the GDP implicit deflator, and FDI net inflows (current US$). The data for all variables are obtained from the World Bank database (2014). The annual cross section descriptive statistics of all the variables included in this study are reported in Table 1.

3.2. Model Specification

In order to verify the linkage among economic growth, stock market development, inflation rate and incoming FDI variables, the following model is proposed to be used.

$$Y_t = \alpha_0 + \alpha_1 SMC_t + \alpha_2 INF_t + \alpha_3 FDI_t + \varepsilon_t \quad (1)$$

Where, *Y* represents the GDP per capita, *SMC* stands for market capitalization, *INF* denotes inflation, *FDI* stands for foreign direct investment, and ε_t is the error term. Theoretically, study expects the regression coefficient α_1 to be positive implying that stock market development contributes to economic growth. Inflation as a macroeconomic variable has been included in the model since high inflation is believed to indicate macroeconomic instability of a country. Consequently, inflation negatively affects economic growth and thus, the sign of coefficient α_2 is expected to be negative. *FDI* contributes to the economy in several ways such as increased competition due to access to bigger markets with variety of products, creating job opportunities and increasing government revenue, etc. Therefore, it is expected that the sign of the coefficient α_3 is positive.

3.3. Unit Root Test

Generally, most macroeconomic variables are non-stationary and therefore, the study start by ascertaining the presence of unit root in all series in spite of the fact that autoregressive distributed lag (ARDL) approach can be applied irrespective of the order of integration (I(0) or I(1)) of the series. There are many tests for unit root to confirm the stationarity of variables as described in literature. These tests include Phillips and Perron (PP) by Phillips and Perron (1988), augmented Dickey and Fuller (ADF) test by Dickey and Fuller (1979), DF-generalized least squares unit root test proposed by Elliott et al. (1992), KPSS test presented by Kwiatkowski et al. (1992), Ng-Perron unit root test by Ng and Perron (2001) and Zivot and Andrew unit root test proposed by Zivot and Andrews (2002). This study uses Dickey and Fuller (1979) and Phillips and Perron (1988) unit root tests because they ensure robustness ofthe results. The estimation of PP statistics employs Bartlett kernel with Newey-West Bandwidth. Specifically, PP test corrects for higher order autocorrelation and the likely problem of heteroscedasticity in the series (Kouakou, 2011) while

1 Costa Rica, El Salvador, Greece, Guatemala, Honduras, India, Korea, Mauritius, Pakistan, Portugal, South Africa, Spain, Sri Lanka, Thailand, Turkey and Venezuela.

2 Wang and Ajit (2013) have also shown that the study Wan (2002) failed to find any visible relationship between capital market development and growth in China.

ADF requires that the error term is devoid of autocorrelation and is homogeneous (Owoye and Onafowora, 2007). The lags used for the estimations under the two methods are automatically selected.

3.4. Tests for Cointegration

To examine the long-run relationship among the variables, most relevant methods of cointegration require that the order of integration of each variable be tested. There are many univariate co-integration approaches such as ARDL or bound test, fully modify ordinary least squares developed by Phillips and Hansen (1990) and the Engle and Granger (1987). This study utilizes ARDL approach. The ARDL bound testing approach to cointegration was introduced by Pesaran et al. (2001). Generally, ARDL is a frequently used technique because of its various advantages over other techniques. The main advantage of the ARDL model is that it can be employed whether series are stationary at level I(0) or at first difference I(1). In addition, another merit of this model is that both short-run and long-run estimates can be made simultaneously. Pesaran et al. (2001) provided two sets of critical values for a given level of significance. These are lower bound value and upper bound value. The former case assumes that all the series are stationary at level I(0) and the latter assumes that all the series are stationary at first difference I(1). The sample used in this study consists of 23 observations and uses the critical values provided by Narayan (2005), Narayan and Boulton (2004). The models to be estimated for the ARDL bound testing for cointegration are specified in Equations (2-5).

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 SMC_{t-1} + \alpha_3 INF_{t-1} + \alpha_4 FDI_{t-1} + \sum_{t=1}^{\rho} \alpha_{5i} \Delta Y_{t-1} + \sum_{i=0}^{\rho} \alpha_{6i} \Delta SMC_{t-i} + \sum_{i=0}^{p} \alpha_{7i} \Delta INF_{t-i} + \sum_{i=0}^{p} \alpha_{8i} \Delta FDI_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta SMC_t = \beta_0 + \beta_1 SMC_{t-1} + \beta_2 Y_{t-1} + \beta_3 INF_{t-1} + \beta_4 FDI_{t-1} + \sum_{i=1}^{\rho} \beta_{5i} \Delta SMC_{t-1} + \sum_{i=1}^{\rho} \beta_{6i} \Delta Y_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta INF_{t-i} + \sum_{i=1}^{p} \beta_{8i} \Delta FDI_{t-i} + \varepsilon_t \quad (3)$$

$$\Delta INF_t = \delta_0 + \delta_1 IND_{t-1} + \delta_2 Y_{t-1} + \delta_3 SMC_{t-1} + \delta_4 FDI_{t-1} + \sum_{i=1}^{\rho} \delta_{5i} \Delta INF_{t-1} + \sum_{i=1}^{\rho} \delta_{6i} \Delta Y_{t-i} + \sum_{i=1}^{p} \delta_{7i} \Delta SMC_{t-i} + \sum_{i=1}^{p} \delta_{8i} \Delta FDI_{t-i} + \varepsilon_t \quad (4)$$

$$\Delta FDI_t = \lambda_0 + \lambda_1 FDI_{t-1} + \lambda_2 Y_{t-1} + \lambda_3 SMC_{t-1} + \lambda_4 INF_{t-1} + \sum_{i=1}^{\rho} \lambda_{5i} \Delta FDI_{t-1} + \sum_{i=1}^{\rho} \lambda_{6i} \Delta Y_{t-i} + \sum_{i=1}^{p} \lambda_{7i} \Delta SMC_{t-i} + \sum_{i=1}^{p} \lambda_{8i} \Delta INF_{t-i} + \varepsilon_t \quad (5)$$

Where, α_0, β_0, δ_0, λ_0 are drift components, ε_t represent white noise error term, Δ stands for first difference and rest of the variables are as defined earlier. The objective of this test is to confirm whether the coefficients of the level series of Equations (2-5) are jointly significantly different from zero against the corresponding alternative hypothesis.

4. EMPIRICAL RESULTS

4.1. Unit Root Test Results

The results of the unit root tests are reported in Table 2. The results show that some variables (Inflation of Bangladesh, Inflation of India, inflation and stock market of Singapore) are stationary at level, I(0). The remaining variables that are non-stationary at level became stationary at first difference. The results reveal that the variables are of different order of integration, I(0) and I(1). Thus, the application of ARDL model is appropriate in testing the cointegration among the variables.

4.2. ARDL Cointegration Test Results

The results of bound F-test are reported in Table 3. This study uses the critical tabulated values presented by Narayan (2005) as reported in Table 4. If the calculated F-statistics is greater than the upper bound value, the H_0 of no cointegration is rejected. On the other hand, if the F-statistics falls below the lower bound values, then, H_0 of no cointegration cannot be rejected. Finally, if the computed F-statistic falls between upper bound and lower bound values, the results are inconclusive.

The results reported in Table 3 shows that, for Bangladesh, the null hypothesis of no cointegration is rejected at 1% significant level when each of *Y* and *INF* is considered as dependent variable. Similarly, with each of *SMC* and *FDI* as dependent variable, for Bangladesh, the null hypothesis of no long-run relationship among the variables is also rejected at 5% level

Table 2: Unit test results

Country	Variable	Level series		First difference	
		ADF test statistics	PP test statistics	ADF test statistics	PP test statistics
Bangladesh	*Y*	4.701	4.701	−5.539***	−6.461***
	SMC	−1.160	−0.981	−4.563***	−6.681***
	INF	−3.340**	−3.312**	−6.510***	−12.174***
	FDI	0.575	2.124	−4.627***	−4.774***
India	*Y*	1.036	1.040	−3.431**	−3.386**
	SMC	−2.409	−2.409	−6.952***	−8.308***
	INF	−2.733*	−2.686*	−6.058***	−6.366***
	FDI	−0.957	−0.873	−5.264***	−5.260***
China	*Y*	0.338	7.280	−7.330***	8.353***
	SMC	−2.389	−2.310	−4.344***	−7.189***
	INF	−1.719	−1.719	−3.241**	−3.142**
	FDI	3.466	3.100	0.057	−4.572***
Singapore	*Y*	0.734	0.639	−3.271***	−3.234**
	SMC	−3.488**	−3.479**	−5.690***	−7.040***
	INF	−3.310**	−3.304**	−6.243***	−9.159***
	FDI	1.665	−0.123	−5.843***	−7.486***

The optimal lag length is selected automatically based on the AIC in ADF approach. In the PP test technique, the optimal lag is selected based on Newey West (using a Bartlett kernel). ***.** and * denote statistical significance at 1%, 5% and 10% level respectively. ADF: Augmented Dickey and Fuller, FDI: Foreign direct investment, PP: Phillips and Perron, AIC: Akaike information criterion

of significance. In the case of India, the null hypothesis of no cointegration cannot be accepted as the F-statistics for each of *Y*, *SMC*, and *FDI* as dependent variable is greater than the upper critical bound value at 10%, 1%, and 1% level of significance respectively. For Singapore, *INF* and *FDI* are co-integrated with other explanatory variables when each is used as dependent variable. Finally, for China only *FDI* as dependent variable has a long-run relationship to other variables in an equation. Overall, the bound results suggest the existence of long-run relationships among the variables (*Y*, *SMC*, *INF*, and *FDI*). Therefore, we proceed to estimate the long-term and short-term regression coefficients.

4.3. Long-run Relationship

The long-run estimates of *Y* with respect to *SMC*, *INF* and *FDI* are reported in Table 5. Results show that *SMC* in Bangladesh, India, China and Singapore has expected sign but only statistically significant at 5% level in China and Singapore. However, *INF* shows unexpected sign in all but statistically significant only in Singapore. Finally, *FDI* has the expected sign for all countries except in the case of India and statistically insignificant in Bangladesh and India, significant in China and Singapore.

4.4. Short-run Relationship

Results given in Table 6 indicate that *SMC* has expected sign in all countries but statistically significant at 1% and 5% level only in India and China respectively. This implies that a 1% increase in *SMC* contributes 2.193% in India and 0.244% in China. In addition, inflation shows unexpected sign in all countries except in India but statistical significant only in Bangladesh and Singapore. The inflation variable is statistically insignificant in India and China but statistically significant in Bangladesh and Singapore at 10% and 1% level respectively.

In summary, there is evidence of both long-term and short-term relationship between economic growth, stock market development, inflation and *FDI* in case of Bangladesh, India, China and Singapore.

We further perform diagnostic tests and the results are presented in Table 7. The results show that there is no evidence of serial correlation, the functional form and the normality are okay, and the models do not suffer from heteroscedasticity problem. Hence, models passed all the diagnostic tests. Over all, these results are in line with the findings of relevant studies including Tang et al. (2007), Caporale et al. (2004), Mun et al. (2008) and Azam and Ahemd (2015).

5. CONCLUDING REMARKS

This examined the vital role of stock markets in economic growth in the context of Asia-4 countries over the period ranging from 1991 to 2012. We employed the ARDL bound testing approach

Table 3: Bounds cointegration test–An ARDL approach

Equations based on variables	Computed F-statistics	Decision
$F(Y_{BAN}/SMC_{BAN}INF_{BAN}FDI_{BAN})$	5.263***	Cointegration
$F(SMC_{BAN}/Y_{BAN}INF_{BAN}FDI_{BAN})$	5.207**	Cointegration
$F(INF_{BAN}/Y_{BAN}SMC_{BAN}FDI_{BAN})$	5.940***	Cointegration
$F(FDI_{BAN}/SMC_{BAN}INF_{BAN}Y_{BAN})$	4.084**	Cointegration
$F(Y_{IND}/SMC_{IND}INF_{IND}FDI_{IND})$	3.680*	Cointegration
$F(SMC_{IND}/Y_{IND}INF_{IND}FDI_{IND})$	6.686***	Cointegration
$F(INF_{IND}/Y_{IND}SMC_{IND}FDI_{IND})$	3.073	No Cointegration
$F(FDI_{IND}/SMC_{IND}INF_{IND}Y_{IND})$	9.285***	Cointegration
$F(Y_{CHI}/SMC_{CHI}INF_{CHI}FDI_{CHI})$	125.69***	Cointegration
$F(SMC_{CHI}/Y_{CHI}INF_{CHI}FDI_{CHI})$	1.620	No cointegration
$F(INF_{CHI}/Y_{CHI}SMC_{CHI}FDI_{CHI})$	0.792	No cointegration
$F(FDI_{CHI}/SMC_{CHI}INF_{CHI}Y_{CHI})$	20.907***	Cointegration
$F(Y_{SIN}/SMC_{SIN}INF_{SIN}FDI_{SIN})$	1.425	No cointegration
$F(SMC_{SIN}/Y_{SIN}INF_{SIN}FDI_{SIN})$	2.963	No cointegration
$F(INF_{SIN}/Y_{SIN}SMC_{SIN}FDI_{SIN})$	5.225**	Cointegration
$F(FDI_{SIN}/SMC_{SIN}INF_{SIN}Y_{SIN})$	4.981**	Cointegration

The test equations include only constant term. The lag selection based on SBC and manual selection. ***,** and * denote statistical significance at 1%, 5% and 10% significance level respectively. BAN, IND, CHI and SIN are country codes for Bangladesh, India, China and Singapore respectively, FDI: Foreign direct investment, ARDL: Autoregressive distributed lag

Table 4: Tabulated critical bound value

1% Significance		5% Significance		10% Significance	
Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
3.657	5.256	2.734	3.920	2.366	3.353

The critical bound values are reported from Narayan (2005) case III page No. 1988

Table 5: Long-term estimates for economic growth (*Y*)

Country	Variables	Coefficient	Standard error
Bangladesh	*SMC*	209.62	2267.121
	INF	343.90	3952.201
	FDI	1.829	18.222
India	*SMC*	48.74	83.011
	INF	34.83	119.670
	FDI	−0.0084	0.066
China	*SMC*	9.381**	4.042
	INF	8.468	12.746
	FDI	0.028**	0.003
Singapore	*SMC*	39.105**	37.051
	INF	3166.312***	1092.534
	FDI	0.658***	0.107

*** and ** denote statistical significant at 1% and 5% level respectively, FDI: Foreign direct investment

Table 6: Short-term estimates for economic growth (*Y*)

Countries	Variables	Coefficients	Standard error
Bangladesh	*SMC*	1.927	1.407
	INF	3.162*	1.783
	FDI	0.0168	0.025
India	*SMC*	2.193***	0.595
	INF	−0.023	5.873
	FDI	−0.002	0.004
China	*SMC*	0.244**	0.349
	INF	1.517	2.033
	FDI	0.003***	0.493
Singapore	*SMC*	10.992	8.875
	INF	268.702***	3.312
	FDI	0.185***	0.041

*** and ** denote statistical significant at 1% and 5% level respectively

Table 7: Residual diagnostic tests based on the estimated ARDL model

Diagnostic tests	Bangladesh	India	China	Singapore
Serial correlation	1.048 (0.306)	1.260 (0.262)	0.003 (0.954)	0.005 (0.940)
Function form	0.130 (0.718)	2.510 (0.113)	0.0851 (0.771)	2.414 (0.120)
Normality	0.149 (0.928)	0.920 (0.631)	2.538 (0.281)	1.162 (0.559)
Heteroscedasticity test	2.093 (0.148)	5.079 (0.110)	0.007 (0.929)	4.528 (0.330)

The values in parenthesis represent the P values. ARDL: Autoregressive distributed lag

as analytical technique. The empirical results imply that there is long-term cointegration among the macroeconomic variables used such as economic growth, *FDI*, stock market development and inflation. Whereas, the long-term estimated coefficients of stock market development for all countries show expected signs, they are only statistically significant at 5% level for China and Singapore. The *FDI* inflows validate positive impact on economic growth for all countries except in the case of India, and statistically insignificant for all except in the case of China. The short-term analysis of stock market demonstrates positive impact on economic growth in all countries but only significant at 1% level in India and China. The impact of *FDI* inflow on economic growth is significant and positive at 5% level only for Singapore. However, the inflation variable is statistically significant in Bangladesh and Singapore at 10% and 1% level respectively.

The empirical findings of the study reveal that stock market development plays a significant role in the process of economic growth and development in these selected countries. Our results further suggest that along with the stock market development, one cannot ignore the importance of *FDI* inflows to economic growth. The encouragement of stock market and incoming *FDI* certainly contribute to the enhancement of economic growth and development. The findings of the study have some valuable policy implications. The policy makers need to formulate effective and prudent policy in order to expand stock market and encourage foreign investment. Given these sound policies, the outcome will further improve the macroeconomic performance of these economies.

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