
Research

LONG TERM RELATIONSHIP BETWEEN STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH IN SOUTH ASIA: PANEL DATA & ARDL MODEL ESTIMATIONS

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Abstract

This paper aims to explore the contribution of stock market development towards economic growth in case of four South Asian economies, India, Bangladesh, Pakistan and Sri Lanka for the period 1990 to 2011. Using panel data to determine the long run (LR) as well as the short run (SR) relationship, we constructed an index by combining the components of stock market development by using the method of Principal Component Analysis (PCA). Our results suggest that stock market development leads to economic growth in the LR as well as in the SR and 88% percent disequilibrium is corrected within one year and the LR equilibrium is achievable in almost one year.

Keywords: Economic Growth; Stock Market; Panel data ARDL; PCA
JEL Classification: O4, E44, C33, C13

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Introduction

Faced with scarce resources, stronger competition and structural imbalances, the growth of an economy is a very complex phenomenon which not only requires sophisticated planning, sustainability in policies and stronger physical infrastructure but an efficient financial system to channelize the funds from savers to investors to be utilized in a productive manner. Physical capital structure is central to growth as it portrays the face value of infrastructure in any economy. The financial system of an economy is more important since an efficient financial structure can stimulate economic growth through participation in the macroeconomic environment (Bell and Rousseau, 2001; Nurudeen, 2009; Mishkin, 2001 and Ekundayo, 2002). And indeed, more liquid and highly developed stock markets enhance productivity growth and increase the incentives for investing in the long-duration projects (Levine 1991; Caporale et al. 2004). Moreover, stock market in the presence of a well-functioning financial sector has the capability to boost up economic development (Beck and Levine 2001; 2004).

There has been an increased awareness about the importance of equity markets in economic progress in developing countries since the 1980s. In this regard, making predictions about future economic growth using stock market indicators has been extensively debated. The major focus of this paper is to explore whether stock markets contribute towards economic growth in the SR and in the LR in the South Asian region. To the best of our information, no study has used stock market development as an indicator to explore the impact of stock market development on economic growth in South Asia for the period 1990 to 2011. We will use panel data and Autoregressive Distributed Lag model ARDL for obtaining the LR and Error Correction Mechanism (ECM) for the SR estimates. Moreover, by using the method of Principal Component Analysis, we will generate a composite index of Stock Market Development (STMI). The remaining paper is sequenced as follows: Section 2 provides a brief literature review; section 3 discusses the data and modeling, section 4 presents the empirical findings while the paper is summarized and conclusions presented in section 5.

Literature Review

A substantial literature is available on stock market development's impact on economic growth and a number of authors have reported a positive association (Levine and Zervos 1998; Mohtadi and Agarwal 2001; Shen and Lee 2006; Barna and Mura 2010; Donwa and Odia 2010; Ogboi and Oladipo 2012) while some have reported an ambiguous relationship (negative, weak or no relationship) between the two (Mayer 1988; Wen and Jun 2005; Huang et al. 2007; Tang et al. 2007; Osamwonyi and Kasimu 2013 etc.). Recent literature on financial development and growth categorizes three basic channels which link financial structure with economic growth. First, financial development enlarges the proportion of savings which lead to investment in the real sectors of the economy. Second, financial development may directly affect investment through changing the rate of saving. Third, financial development brings efficiency in the allocation of capital through risk diversification (funds are directed to those areas which increase economic growth).

Worldwide integrated stock markets may influence the pace of economic growth and allocation of resources through diversification of risk, as suggested by Obstfeld (1994). Stiglitz (1989) concluded his remarks on the allocation of capital in a free market and the economies under government intervention. Goldsmith (1969) and Mackinnon (1973) found that financial liberalization is positively associated with economic growth. Beckaert and Harvy (2005) discussed the efficiency of capital market characterized by fairness and allocation of capital. They also explored the link between integration of capital market and economic growth and found a positive relationship between openness and economic growth. Nagaishi (1999) found a dubious relationship between stock market development and growth of the economy, arguing that in the context of India, stock market is not performing well in terms of mobilizing funds from savers to investors.

Harris (1997) carried out a cross country analysis for 49 countries – including developed as well as developing countries – in

the time period 1980-1991. He concluded that stock market and economic growth do not have a significant relationship. Empirical results obtained from two stages least square (2SLS) technique indicated that in case of developed countries there is some explanatory power but for developing countries there is no correlation between growth and stock market development. Tang et al (2007) explored the link between stock market and growth across 12 Asian countries in the time period 1980 to 2004. The use of cointegration technique proved the presence of a LR relationship in four of the countries including China, Philippines, Singapore and Taiwan. Granger causality test results confirmed bi-directional causality among the variables in case of China, Hong Kong, Malaysia, Indonesia and Thailand, and in case of Japan and Korea the test showed unidirectional causality. But they found no causality in case of Sri Lanka. Barna and Mura (2010) used quarterly data for Romania in order to explore the relationship between capital market development and economic growth over the period 2000 to 2009. They found that in case of Romania capital market development and economic growth are positively associated. Azarmi et al (2005) empirically evaluated the association of stock market development with economic growth for India and found a positive relationship in the pre-liberalization period and a negative relationship in the post liberalization period.

Stock market development according to Shahbaz et al (2008) contributes positively towards economic growth in Pakistan's case. Similarly, by developing a theoretical financial model, Bose (2005) explored a positive impact on economic growth of the stock market development. Nazir et al. (2010) studied the stock market development economic growth nexus for Pakistan over the period 1986 to 2008 and found a key contribution of the stock market in sustaining economic growth through financial development and market capitalization ratio. The study provided a strong relationship between total market size (market capitalization/GDP) and economic growth. Rahman and Salahuddin (2010) scrutinized the determinants of economic growth in case of Pakistan for the period 1971-2006. In order to study the LR relationship they used ARDL bound-testing and FMOLS methodologies and for studying the SR relationship they used ECM. Their results confirmed that well-organized stock markets contribute positively towards economic growth both in the LR and SR.

Data Sources and Methodology

To examine the stock market development-economic growth nexus in South Asia using Panel data for the period of 1990-2011 across four South Asian economies. We use data from the World Development Indicator (WDI) and International Financial Statistics (IFS).

Model Specification

The following function describes the link between GDP growth and the indicators of stock market development.

$$\text{GDP}_{it} = f(\text{MCAP}_{it}, \text{VTR}_{it}, \text{TVR}_{it}, \text{Z}_{it}) \dots\dots\dots (1)$$

- GDP* = Gross Domestic Product
MACP = Market Capitalization Ratio to GDP
VTR = Traded Shares Ratio to GDP
TVR = Traded Shares Ratio to Market Capitalization
Z = Vector of Control Variables
i & t = Country and Time

We use ACP, VTR and TVR as stock market development indicators to construct an index by using the PCA representing the level of stock market development in each of the countries. Moreover, 'Z' includes globalization and inflation variables. Globalization is represented by trade openness and financial openness as previously mentioned by Loot (2003) and Rudra (2005). The main reason for using globalization is that the time period of the study is also the era of liberalization/globalization, and could be an important determinant of GDP. The inflation variable is the percentage change in Consumer Price Index (CPI). Consequently, function (1) becomes:

$$\text{GDP}_{it} = f(\text{STMI}_{it}, \text{TOP}_{it}, \text{FOP}_{it}, \text{INF}_{it}) \dots\dots\dots(2)$$

Where STMI is the composite stock market development index, TOP represents trade openness, FOP stands for financial openness and INF symbolizes inflation. Moreover, 'i' and 't' represent country and time period respectively. The explanation regarding STMI

is provided in details in the next section. The variables in Equation (2) are explained as follows.

Construction of STMI

Over the literature a vast majority of researchers have represented stock market development by distinct indicators and at the same time linked them with growth.

Since this paper is using market capitalization, value trade and turnover ratio as the indicators of stock market, we will have to deal with the problem of multicollinearity as observed previously by Demiguc-Kunt and Lvine (1996) and Alajekwu and Achugbu (2012). In order to avoid the problem we will use the PCA popularized by Pearson (1901) in order to build a composite index representing the level of stock market development in the countries under study. The composition of STMI is as follows.

$$STMI_{it} = \omega_1 MCAP_{it} + \omega_2 TVR_{it} + \omega_3 VTR_{it} \dots \dots \dots (3)$$

Where ω_1 , ω_2 and ω_3 represent weights of the components of stock market development calculated using Principal Components Analysis PCA. APPENDIX A provides our PCA estimates. For each country, the first principal component explains the maximum of the total variation which seems to be a better option than taking any other linear combination of stock market development indicators. From linear combination of the three stock market development indicators with weights specified by the first eigenvector, we obtained the first principal component. Next, we put these weights into equation (3) to get STMI.

Unit Root Test

This paper employs two unit root tests based on panel data in order to explore the order of integration of the variables. The tests are (i) Levine, Lin and Chu (2002) and (ii) Im, Pesaran and Shin (2003).

Co-integration Analysis: ARDL Bound Testing

The econometric literature provides us with a variety of econometric techniques³ concerning co-integration analysis in order to examine co-integration relationships among various macroeconomic variables. This paper utilizes ARDL by Pesaran and Smith (1998), Pesaran and Shin (1999) and Pesaran et al (2001) in order to detect whether the variables are co-integrated i.e whether there is any relationship among the variables in the LR. In comparison with other co-integration techniques, ARDL has many advantages which diverges us from using any other technique. The ARDL error correction description for equation (2) is given as follows.

$$\begin{aligned} \Delta \text{Log}(GDP)_{it} = & \alpha + \sum_{j=1}^m \beta_{1j} \Delta \text{Log}(GDP)_{it-j} + \sum_{j=0}^m \beta_{2j} \Delta \text{STMI}_{it-j} + \sum_{j=0}^m \beta_{3j} \Delta \text{TOP}_{it-j} + \sum_{j=0}^m \beta_{4j} \Delta \text{FOP}_{it-j} \\ & + \sum_{j=0}^m \beta_{5j} \Delta \text{INF}_{it-j} + \delta_1 \text{Log}(GDP)_{it-1} + \delta_2 \text{STMI}_{it-1} + \delta_3 \text{TOP}_{it-1} + \delta_4 \text{FOP}_{it-1} + \delta_5 \text{INF}_{it-1} \\ & + \mu_{it} \dots \dots \dots (4) \end{aligned}$$

Where the initial part of equation (4) includes α , the drift term, variables with coefficients β , correspond to the model's SR dynamics, whereas, the part with coefficients δ represents LR relationship. Moreover, μ is the white noise error term i.e. $\mu \sim (0, \Omega)$. Null hypothesis in the equation is $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ which means there is no co-integrating relationship.

In case the null hypothesis gets rejected, i.e. bound testing confirms the co-integration; we proceed further to calculate the LR coefficients using the following model:

$$\begin{aligned} \text{Log}(GDP)_{it} = & \alpha + \sum_{j=1}^m \beta_{1j} \text{Log}(GDP)_{it-j} + \sum_{j=0}^m \beta_{2j} \text{STMI}_{it-j} + \sum_{j=0}^m \beta_{3j} \text{TOP}_{it-j} + \sum_{j=0}^m \beta_{4j} \text{FOP}_{it-j} \\ & + \sum_{j=0}^m \beta_{5j} \text{INF}_{it-j} + \mu_{it} \dots \dots \dots (5) \end{aligned}$$

To obtain the SR coefficients for the SR relationship, the following model is utilized.

$$\begin{aligned} \Delta \text{Log}(GDP)_{it} = & \alpha + \sum_{j=1}^m \beta_{1j} \Delta \text{Log}(GDP)_{it-j} + \sum_{j=0}^m \beta_{2j} \Delta \text{STMI}_{it-j} + \sum_{j=0}^m \beta_{3j} \Delta \text{TOP}_{it-j} + \sum_{j=0}^m \beta_{4j} \Delta \text{FOP}_{it-j} \\ & + \sum_{j=0}^m \beta_{5j} \Delta \text{INF}_{it-j} + \delta_1 \text{Log}(GDP)_{it-1} \\ & + \lambda \text{ECM}_{it-1} \dots \dots \dots (6) \end{aligned}$$

3-Other cointegration techniques include Engle-Granger (1987), FMOLS procedure of Phillips and Hansen (1990) and Johansen and Juselius (1990).

Where, λ is the error correction term's coefficient representing how quickly it is possible to achieve the equilibrium in the LR. Its value is expected to be significant as well as to be negative which will suggest the correction of error within one year.

Empirical Results:

Unit root Hypothesis

Levine, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS) test were applied for making it sure that whether the variables are stationary at level or at first difference. The table below provides summary of results for both the tests. LLC calculates t-stat whereas IPS calculates W-statistics. Initially these tests were applied to the variables at level and then at 1st difference.

Table 1:
Estimation of Panel Unit-Root

Variable	LLC (t-stat)		IPS (W-stat)	
	Constant	Constant + Trend	Constant	Constant + Trend
GDP	27.75	5.48	22.61	8.15
Δ GDP	-0.97	-5.69*	-1.95**	-4.24*
STMI	-0.91	-0.12	-0.73	-0.21
Δ STMI	-8.62*	-7.76*	-7.60*	-6.72*
TOP	0.86	-1.54	1.68	-0.46
Δ TOP	-7.00*	-4.68*	-6.90*	-5.38*
FOP	2.35	0.13	1.86	-0.40
Δ FOP	-3.77*	-3.54*	-3.59*	-2.83*
INF	-2.76*	-3.24*	-3.02*	-1.85**

(*) and (**) indicate significance respectively at 1% and 5%
 Δ indicates the variable at 1st difference.

Results clearly confirm that except INF all the variables are stationary at 1st difference. This leads us to using ARDL.

Lag Selection for ARDL

Unrestricted Vector Autoregressive (VAR) is usually applied to obtain the lag length order through Akaike's Information Criterion (AIC), Schwartz-Bayesian Criterion (SBC) and Hannan-Quinn (HQ) information criterion. On the basis of ARDL, the following table provides the summary of the progress of lag selection.

Table 2:
Selection of Appropriate Lag Order

Lag	AIC	SBC	HQ
0	25.779	25.95353	25.84727
1	12.60306*	13.65023*	13.01266*
2	12.62026	14.54008	13.37121

(*) indicates the number of lags selected by the criterion.

Table 2 shows that in order to perform ARDL bound testing we will incorporate one lag of each variable in the model. This selection has taken place for the overall model on the basis of unrestricted VAR through minimum value of AIC, SBC and HQ.

Co-integration Analysis: ARDL Bound Testing

After estimating equation (4) and testing for null hypothesis given in section 3.4, the following table summarizes the results of Bound Testing.

Table 3:
Bound Testing by ARDL

Critical Value	Dependent Variable		F-Statistic	
	Log (GDP)		<i>Order of Lag = 1</i>	
			15.75*	
	Pesaran et al (2001) ⁱ		Narayan (2005) ⁱⁱ	
	<i>Lower Bound</i>	<i>Upper Bound</i>	<i>Lower Bound</i>	<i>Upper Bound</i>
1%	8.75	9.63	10.15	11.23
5%	6.56	7.30	07.08	07.91
10%	5.59	6.26	05.91	06.63

(*) represents significance at 1% level of significance

(i) Values taken from Table C1 (V) of Pesaran et al (2001)

(ii) Values taken from Table C1 (V) of Narayan (2005)

In the ARDL bound testing results, presented in table 3, our F-Statistic is 15.75, > the upper bound value at 1% significance level. This value allows us to reject the null hypothesis of no co-integration. Having rejected the null hypothesis, we conclude that our variables in the model are co-integrated and they have LR relationship. Next, in order to estimate the LR as well as SR elasticities, we employed the ARDL method of estimation². In doing so, we first find the individual order of lag with the help of unrestricted VAR where the AIC or SBC gives its minimum value. The table below provides summary of the ARDL individual lag selection procedure.

Table 4:
Individual Lag Selection through Unrestricted VAR (AIC and SBC)

	<i>AIC (2,0,1,1,0), SBC (1,0,1,1,0)</i>							
	Lag Order = 0		Lag Order = 1		Lag Order = 2		Lags Selected	
	<i>AIC</i>	<i>SBC</i>	<i>AIC</i>	<i>SBC</i>	<i>AIC</i>	<i>SBC</i>	<i>AIC</i>	<i>SBC</i>
Log(GDP)	3.45	3.48	-4.17	-3.99*	-4.22*	-3.90	2	1
FOP	7.22*	7.25*	8.01	8.18	8.96	8.29	0	0
INF	5.71	5.74	5.51*	5.69*	5.62	5.95	1	1
STMI	3.24	3.27	1.52*	1.69*	1.56	1.89	1	1
TOP	5.56*	5.73*	5.59	5.81	5.80	6.01	0	0

(*) represents minimum value belong to the criterion

Having found the appropriate individual lag order we estimated equation (5) in order to expose the LR elasticities. We considered the lag order selected by SBC as it allows us to include minimum number of lags in the model. Estimation results are presented in the following table.

Table 5:
LR Estimation Results using ARDL

<i>Regressors</i>	Dependent Variable: Log(GDP) _t						
	Const	STMI_t	STMI_{t-1}	FOP_t	TOP_t	INF_t	INF_{t-1}
<i>Coefficients</i>	-20.46*	0.026*	0.029*	0.119*	0.048*	-0.044*	-0.064*
			R² = 0.99				
			Adj R² = 0.99				
			F-Statistic = 27144.17				
			D.W-Statistic = 2.19				

(*) indicates significance at 1% level of Significance

2-For details see Pesaran et al (2001)

All the variables are statistically significant and possess signs consistent with existing theory. It is clear from table 5 that in the LR stock market development significantly contributes towards economic growth in South Asia. The coefficient of STMI confirms that stock market development in the South Asian region increases economic growth significantly by around 2.6% in the LR. These results are consistent with those provided by Demirguc-Kunt and Levine (1996). Well functioning stock markets have significant impacts on the economy stock markets provide firms with equity capital at lower cost; shape the investment behavior of the firms that depends on the continuous adjustment of share prices; it allows investors to price and effectively hedge against risk; and play a key role in attracting foreign investment that increases the availability of investment resources for the economy (Demirguc-Kunt and Levine, 1996). Coherent with the role of stock market in the economy as described by Demirguc-Kunt and Levine (1996), trade openness and stock market development are expected to have positive effects on economic growth. In table 5 the coefficients of FOP and TOP are highly significant and having appropriate signs. It shows that globalization is an important determining factor contributing towards LR economic growth in South Asia. These results strongly support the argument of Udegbum (2002) what if economies open their borders to international trade and they have well developed stock markets they will have higher growth rates. Our results show that an increase in inflation leads to decline in LR economic growth.

Table 6:
ECM of ARDL³

Dependent Variable: $\Delta \text{Log}(\text{GDP})_t$								
<i>Regressors</i>	Cns	ΔSTMI_t	ΔSTMI_{t-1}	ΔFOP_t	ΔTOP_t	ΔINF_t	ΔINF_{t-1}	ECM_{t-1}
<i>Coefficients</i>	8.62*	0.047*	0.092*	0.059*	0.077*	-0.021*	-0.097*	-0.88*

$R^2_{\text{qure}} = 0.85$
 $\text{Adj } R^2_{\text{qure}} = 0.85$
F-Statistic = 4.860
D.W-Statistic = 1.84

(*) represents significant at 1% level of significant

3-(1,0,1,1,0) SBC

The first lag of Error Correction Term represented by ECM_{it-1} is negative and significant at 1% level of significance. These outcomes favor the co-integration among variables given in equation (2). Estimated value of the coefficient of ECM is -0.88 which means 88 percent correction of the disequilibrium within the current year. Moreover, our results also explain that SR variations in STMI contribute positively towards GDP growth.

Conclusion:

The major aim of this paper was to scrutinize the relationship between stock market and economic growth in the context of both SR and the LR. We constructed STMI by using stock market performance indicators using PCA representing the level of stock market performance in each country. We used ARDL for obtaining estimates for the LR and ECM for obtaining estimates for the SR relationship amongst stock market development and economic growth.

Our analysis for the period 1990-2011 across four South Asian economies show that both in the LR and the SR there exists a positive connection between stock market development and economic growth. Results reveal that stock markets despite huge inconsistencies in economic infrastructure are contributing towards fostering economic growth of the South Asian economies. Moreover, the negative and highly significant coefficient of the error correction term suggests that 88% percent disequilibrium is corrected within one year across individuals and the LR equilibrium is achievable nearly within a year. Our results also show a significant impact of globalization and inflation on economic growth in the region.

References

- Alajekwu, U. B., and Achugbu, A. A. (2012). The Role of Stock Market Development on Economic Growth in Nigeria: A Time Series Analysis. *African Research Review*, 6(1), 51-70.
- Azarmi, T., Lazar, D. and Jeyapaul, J. (2005) Is the Indian Stock Market A Casino? *Journal of Business & Economics Research*, 3(4), 63-72.
- Barna, F. and Mura, P. (2010) Capital Market Development and Economic Growth: The Case of Romania. *Annals of the University of Petroani, Economics*, 10(2), 31-42.
- Beckaert, G. Harvey, C. and Lundblad, C. (2005) Does financial liberalization spur growth? *Journal of Financial Economics*, 77, 3-55.
- Beck, T. and Levine, R. (2001) *Stock Markets, Banks and Growth: Correlation or Causality*. Policy Research Working Papers 2670, Washington DC: World Bank.
- Beck, T. and Levine, R. (2004) *Stock Markets, Banks, and Growth: Panel Evidence*. *Journal of Banking & Finance*, 28(3), 423-442.
- Bell, C. and Rousseau, P. L. (2001) Post-Independence in India: A Case of Finance-Led Industrialization? *Journal of Development Economics*, 65, 153-175.
- Bose, N. (2005) Endogenous Growth and the Emergence of Equity Finance. *Journal of Development Economics*, 77, 173-188.
- Caporale, G. M., Howells, P. and Soliman, A. M. (2004) *Stock Market Development and Economic Growth: the Causal Linkage*. *Journal of Economic Development*, 29(1), 33-50.
- Demirguc-Kunt, A. and Levine, R. (1996) *Stock Markets, Corporate Finance and Economic Growth: An Overview*. *World Bank Economic Review*, 10, 223-239.
- Donwa, P. and Odia, J. (2010) An Empirical Analysis of the Impact of the Nigerian Capital Market on Her Socio-economic Development. *Journal of Social Sciences*, 24(2), 135-142.
- Ekundayo, I. K. (2002) *Creating a conducive Environment for Investment in the Nigerian Capital Market*. Paper Presented at Public Enlightenment on Opportunities in the Capital Market for industrial Development of Kogi stat 'Lokoja 29th March to 1st April.
- Harris, R. (1997) *Stock market and development: A re-assessment*. *European Economic Review*, 41, 139-146.

- Huang, F., Zhao, X. and Hou, T. (2007) Empirical study of breakup between stock market and economy from the correlation coefficient between stock index and GDP. *Journal of Dalian University of Technology*, 2007(3)
- Im K.S., Pesaran M.H. and Shin Y. (2003) Testing for Unit Roots in Heterogeneous Panels, *Journal of Econometrics* 115 (revised version of 1997's work), 53-74.
- Levine, R. and Zervos, S. (1998) Stock Markets, Banks, and Economic Growth. *American Economic Review*, 88, 536-558.
- Levine, R. (1991) Stock Markets, Growth, and Tax Policy, *The Journal of Finance*, 46(4), 1445-1465.
- Mayer, C. (1998) New issues in corporate finance. *European Economic Review*, Issue, 32, 1167-1188.
- Mishkin, F. S. (2001) *The Economics of Money, Banking, and Financial Markets*, 6th Edition, New York: Addison Wesley Longman.
- Mohtadi, H. and Agarwal, S. (2001) *Stock Market Development and Economic Growth: Evidence from Developing Countries*. Retrieved from: <http://faculty.apec.umn.edu/mohta001/PA1-4-01.pdf>
- Nagaishi, M. (1999) Stock Market Development and Economic Growth Dubious Relationship. *Economic and Political Weekly*, 34(29), 2004-2012.
- Narayan, P.K. (2005) The saving and investment nexus for China: evidence from cointegration tests". *Applied Economics*, 37, 1979-1990.
- Nazir, M., Nawaz, M. and Gilani, U. (2010) Relationship between economic growth and stock market development. *African Journal of Business Management*, 4(16), 3473-3479.
- Ogboi, C. and Oladipo, S. O. (2012) Stock Market and Economic Growth: The Nigerian Experience. *Research Journal of Finance and Accounting*, 3(4), 103-110.
- Osamwonyi, I. O. and Kasimu, A. (2013) Stock Market and Economic Growth in Ghana, Kenya and Nigeria. *International Journal of Financial Research*, 4(2), 83-98.
- Pearson, K. (1901) On lines and planes of closest fit to systems of points in space. *Philosophical Magazine*, 2(6), 559-572.
- Pesaran, M. H. and Smith, R. P. (1998) Structural analysis of cointegrating VARs. *Journal of Economic Surveys*, 12(5), 471-505.

- Pesaran, M. H. and Shin, Y. (1999) An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. in (ed) S. Strom, *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge: Cambridge University Press.
- Pesaran, M. H., Shin, Y. and Smith, R. P. (2001) Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16, 289–326.
- Rudra, N. (2005) Globalization and the Strengthening of Democracy in the Developing World. *American Journal of Political Science*, 49(4), 704-730.
- Shahbaz, M., Nadeem, A. and Liaquat, A. (2008) Stock Market Development and Economic Growth: ARDL Causality in Pakistan. *International Research Journal of Finance and Economics*, 14, 182-195.
- Shen, C. and Lee, C. C. (2006) Same Financial Development yet Different Economic Growth: Why? *Journal of Money, Credit and Banking*, 38(7), 1907-1944.
- Tang, H. P., Habibullah, M. S. and Pua, C. H. (2007) Stock market and economic growth in selected Asian countries. *Journal of Economics, Finance and Administrative Sciences*, 7, 43-52.
- Udegbonam, R. I. (2002) Openness, Stock Market development, and Industrial Growth in Nigeria. Retrieved from: <http://ideas.repec.org/a/pid/journal/v41y2002i1p69-92.htm>
- Wen, W. Z. and Jun, Z. J. (2005) A Paradox concerning Stock Market and Economic Growth and Positive Analyses. *The Study of Finance and Economics*, 2005(3)

APPENDIX: I
Principal Component Analysis:

Table 3: PCA for Bangladesh				Table 3: PCA for Pakistan			
	Cmp 1	Cmp 2	Cmp 3		Cmp 1	Cmp 2	Cmp 3
Egn value	2.468	0.489	0.044	Egn value	2.099	0.843	0.058
Var Prp.	0.823	0.163	0.015	Var Prp.	0.699	0.281	0.019
Cuml Prp.	0.823	0.985	1.000	Cuml Prp.	0.699	0.981	1.000
Eigenvectors:				Eigenvectors:			
Variable	Vctr 1	Vctr 2	Vctr 3	Variable	Vctr 1	Vctr 2	Vctr 3
MCAP_BNG	0.543	0.738	-0.401	MCAP_PK	0.499	-0.744	0.444
TVR_BNG	0.628	-0.039	0.777	TVR_PK	0.679	0.017	-0.734
VTR_BNG	0.558	-0.674	-0.484	VTR_PK	0.538	0.668	0.514

Table 4: PCA for India				Table 4: PCA rincipal Component Analysis for Sri Lanka			
	Cmp 1	Cmp 2	Cmp 3		Cmp 1	Cmp 2	Cmp 3
Egn value	1.836	1.097	0.067	Egn value	2.339	0.602	0.058
Var Prp.	0.612	0.366	0.022	Var Prp.	0.779	0.200	0.019
Cuml Prp.	0.612	0.978	1.000	Cuml Prp.	0.779	0.980	1.000
Eigenvectors:				Eigenvectors:			
Variable	Vctr 1	Vctr 2	Vctr 3	Variable	Vctr 1	Vctr 2	Vctr 3
MCAP_IND	0.463	0.733	-0.498	MCAP_SR	0.552	-0.671	0.493
TVR_IND	0.726	0.008	0.687	TVR_SR	0.642	-0.034	-0.765

APPENDIX: II
Behavior of the STMI in each Country:

