STOCK MARKET DEVELOPMENT AND ECONOMIC GROWTH IN SOUTH AFRICA: AN ARDL-BOUNDS TESTING APPROACH

Prof Nicholas M Odhiambo

In this paper, the dynamic causal relationship between stock market development and economic growth in South Africa is examined – using the newly developed ARDL-Bounds testing procedure. The study uses three proxies of stock market development, namely stock market capitalisation, stock market traded value and stock market turnover, against real GDP per capita, a proxy for economic growth. Using the 1971-2007 data sets, the empirical results of this study show that the causal relationship between stock market development and economic growth is sensitive to the proxy used for measuring the stock market development. When the stock market capitalisation is used as a proxy for stock market development, the economic growth is found to Granger-cause stock market development. However, when the stock market traded value and the stock market turnover are used, the stock market development seems to Granger-cause economic growth. Overall, the study finds the causal flow from stock market development to economic growth to predominate. The results apply irrespective of whether the causality is estimated in the short-run or in the long-run.

Key Words: South Africa, Stock Market Development, Economic Growth

1. Introduction

Although a number of studies have been conducted on the causal relationship between financial development and economic growth in many developing countries, the majority of these studies have relied mainly on bank development as a proxy for financial development. Specific studies addressing the dynamic causal relationship between stock market development and economic growth are very scant. Even where such studies have been undertaken, the empirical findings on the direction of causality between stock market development and economic growth have been largely inconclusive, and evidence suggests that the outcome between the two sectors differs from country to country and overtime. Previous studies on this subject suffer from two major limitations. First, the majority of the previous studies have mainly used either the residual-based cointegration test associated with Engle and Granger (1987) or the maximum likelihood test based on Johansen (1988) and Johansen and Juselius (1990). Yet it is now well known that these cointegration techniques may not be appropriate when the sample size is too small (see Nerayan and Smyth, 2005; Odhiambo, 2009). Second, some of the previous studies over-relied on the cross-sectional data, which may not satisfactorily address the country-specific issues. The problem of using a cross sectional method is that by grouping

Department of Economics, University of South Africa, P.O Box 392, UNISA, 0003, Pretoria, South Africa, Email: nmbaya99@yahoo.com, Phone: 27-124294829

together countries that are at different stages of financial development, the country-specific effects of stock market development on economic growth and vice versa are not addressed (see also Odhiambo, 2009; Odhiambo, 2008, Ghirmay, 2004; Quah, 1993; Casselli et al., 1996). It is against this backdrop that the current study attempts to investigate the inter-temporal causal relationship between stock market development and economic growth in South Africa using the newly developed ARDL-Bounds testing approach. The study uses three proxies of stock market development, namely the stock market capitalisation, stock market traded value and stock market turnover, all of which are expressed as a ratio of GDP. The economic growth is, however, proxied by real GDP per capita.

The rest of the paper is structured as follows: Section 2 gives an overview of the financial market reforms and development in South Africa. Section 3 presents the literature review, while section 4 deals with the empirical model specification, the estimation technique and the empirical analysis of the regression results. Section 5 concludes the study.

2 Financial Market Reforms and Development in South Africa

The South African capital market is robust, liquid and well developed. The Johannesburg Stock Exchange (JSE), which was formed in 1887 is, in terms of capitalisation, one of the largest stock exchanges in the world. The JSE is included in the Morgan Stanley Index and the International Finance Corporation (IFC) Emerging Markets Indices. It has also been a key role player in the African Stock Exchanges Association since its formation in 1993. Currently, South African securities are traded simultaneously in Johannesburg, London, New York, Frankfurt and Zurich. In 1996, more than four million futures contracts, valued at US $62 billion, were traded, and in 1999 SAFEX moved from being the 22nd to the 18th largest volume exchange in the world. The Bond Exchange of South Africa (BESA) was also licensed to trade in 1996. BESA was licensed as an exchange under the Financial Markets Control Act, 1989 (Act No. 55 of 1989), for the listing, trading and settlement of interest bearing loan stock or debt securities. In 1996/97, the same year it was registered, more than 430 000 stocks with a nominal value in excess of US $704 billion changed hands in BESA (see Investment South Africa). By 2001 the bond exchange enjoyed an annual liquidity of more than 38 times the market capitalisation. This made it one of the most liquid emerging bond markets in the world (see Investment South Africa; South African Year Book 2001). For more than a century the securities stock industry in South Africa was highly regulated through practices that were enforced by the JSE. The JSE was conventionally based on a strict ‘single-capacity’ rule. Member firms were either brokers or principals in securities trading (e.g. equities and bonds) but could not be both simultaneously. Membership was also limited to South African citizens with unlimited liability. Banks, as limited liability companies, were thus excluded from membership. However, in November 1995, structural changes were imposed on the JSE that resulted in a ‘Big Bang’ in 1996[1]. By 2003, the number of listed companies in the JSE had risen to 472 and the market capitalisation was estimated at US

[1] For more details, see SA Financial Sector Forum (1997), South Africa Yearbook (1993; 1999; 2000), Felkana et al (2001).

$182.6 billion, while the average monthly traded value was US $6,399 million. As at September 2006, the market capitalisation of the JSE was US $579.1 billion. Currently, the JSE is the 16th largest stock exchange in the world.

4. Stock Market Development and Economic Growth

The proponents of the market-based financial system assert that the stock-market system is better than the bank system in that it generates efficient information about the performance of firms, reflecting the market fundamentals in the real sector (see Lee, 2001). Sigh (1997), for example, argues that between 1982 and 1992, the total market capitalisation of companies quoted on the stock exchange in a number of developing countries increased by a factor of 20. Beyond their role in domestic financial liberalisation, stock markets played a paramount role in external financial liberalisation in developing countries. Sigh, by closely examining the implications of these developments, concludes that, since financial liberalisation makes the financial system more fragile, it is not likely to enhance long-term growth in developing countries. Levine and Zervos (1996) argue that a well-developed stock market may be able to offer other forms of financial services than those available from banking systems, and may, therefore, provide a different kind of impetus to investment and growth. Specifically, the authors argue that increased stock market capitalisation, measured either by the ratio of the stock market value to GDP or by the number of listed companies, may improve an economy's ability to mobilise capital and diversify risk. It is estimated that the world's stock market capitalisation grew from $4.7 trillion in the mid-1980s to $15.2 trillion in the 1990s (Demirguc-Kunt and Levine, 1996; Arestis and Demetriades, 1997). The total value of shares traded on developing countries' stock markets rose over twenty-five-fold between 1983 and 1992 (Sigh, 1997). The total value of shares traded on emerging markets, on the other hand, jumped from less than 3% of the total $1.6 trillion world total in 1985 to 17% of the $9.6 trillion world total in 1994 (Demirguc-Kunt and Levine, 1996). This shows that the role of the stock market in economic development could be substantial.

Unfortunately, the empirical studies on the link between stock market development and economic growth, especially in developing countries, are very scant. Some of the studies which have examined the relationship between stock market development and economic growth include Korajczyk (1996), Levine and Zervos (1996), Levine and Zervos (1998), Filer et al (1999), Rousseau and Wachtel (2000), Beck and Levine (2001), Minier (2003), Rioja and Valev (2004), Caporale et al (2004) and N'Zue (2006), among others. Korajczyk (1996), while investigating whether internationally integrated stock markets are positively correlated with capital accumulation and economic growth, finds that stock market integration tends to increase capital accumulation, showing a positive correlation between stock market integration and economic growth. While conducting the relationship between financial deepening and economic growth for 41 countries, Levine and Zervos (1996) find that stock market development has more influence on the growth of the economy than other financial deepening indicators. Levine and Zervos (1998) ask whether stock markets are really a key to economic growth or they are merely burgeoning casinos. In their empirical investigation, they find that stock market liquidity and banking development are positively and robustly correlated with future growth. Filer et al (1999) also find that an active equity market is an important engine of economic growth in developing countries. Rousseau and Wachtel (2000), in examining the relationship between stock markets, banks and growth, conclude that both the banking sector and stock market development explain subsequent growth, even after controlling for the reverse causality. Beck and Levine (2001), by applying novel econometric procedures to test for the independent impact of banks and stock markets on economic growth, find that the expansion of both banks and stock markets significantly affects growth. However, Miner (2003), while investigating whether the partial correlation between economic growth and stock market development differs based on countries' levels of financial and economic development, claims that a positive correlation between stock market development and economic growth does not appear to hold for counties with low levels of market capitalisation. This finding seem to have been supported by Rioja and Valev (2004), whom, while using data for 74 countries, assert that the nexus between stock market development and economic growth changes in different regions. Caporale et al. (2004), in an attempt to examine the causal link between stock market development, financial development and economic growth in seven countries, finds that a well developed stock market can foster growth in the long-run. Recently, N'Zue (2006), in a study on the relationship between stock market development and economic growth in Cote D'Ivoire, finds a uni-directional causality running from stock market development to economic growth.

4. Estimation Techniques and Empirical Analysis

4.1 Cointegration – ARDL Bounds Testing Procedure

In this study the recently developed Autoregressive Distributed Lag (ARDL) - Bounds testing approach is used to examine the long-run cointegration relationship between each of the three proxies of stock market development and economic growth. The ARDL modelling approach was originally introduced by Perasan and Shin (1999) and later extended by Perasan et al. (2001). The ARDL cointegration approach has numerous advantages in comparison with other cointegration methods. Unlike other cointegration techniques, the ARDL does not impose a restrictive assumption that all the variables under study must be integrated of the same order. In other words, the ARDL approach can be applied regardless of whether the underlying regressors are integrated of order one [I(1)], order zero [I(0)] or fractionally integrated. Secondly, while other cointegration techniques are sensitive to the size of the sample, the ARDL test is suitable even if the sample size is small. Thirdly, the ARDL technique generally provides unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous (see also Harris and Sollis, 2003). The ARDL model used in this study can be expressed as follows:

Model 1 – Stock Market Capitalisation and Economic Growth

$$\Delta Iny_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta Iny_{t-i} + \sum_{i=0}^{n} a_{2i}\Delta InSCAP_{t-i} + a_3 Iny_{t-1} + a_4 InSCAP_{t-1} + \mu_t \text{...............(1)}$$

$$\Delta InSCAP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\Delta InSCAP_{t-i} + \sum_{i=0}^{n} \beta_{2i}\Delta Iny_{t-i} + \beta_3 Iny_{t-1} + \beta_{4I} InSCAP_{t-1} + \mu_t \text{..........................(2)}$$

Model 2 – Stock Market Traded Value and Economic Growth

$$\Delta Iny_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i}\Delta Iny_{t-i} + \sum_{i=0}^{n} \phi_{2i}\Delta InSTKT_{t-i} + \phi_3 Iny_{t-1} + \phi_4 InSTKT_{t-1} + \mu_t \text{........(3)}$$

$$\Delta InSTKT_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta InSTKT_{t-i} + \sum_{i=0}^{n} \delta_{2i}\Delta Iny_{t-i} + \delta_3 Iny_{t-1} + \delta_4 InSTKT_{t-1} + \mu_t \text{................(4)}$$

Model 3 – Stock Market Turnover and Economic Growth

$$\Delta Iny_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i}\Delta Iny_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\Delta InSTOV_{t-i} + \alpha_3 Iny_{t-1} + \alpha_4 InSTOV_{t-1} + \mu_t \text{........(5)}$$

$$\Delta InSTOV_t = \lambda_0 + \sum_{i=1}^{n} \lambda_{1i}\Delta InSTOV_{t-i} + \sum_{i=0}^{n} \lambda_{2i}\Delta Iny_{t-i} + \lambda_3 Iny_{t-1} + \lambda_4 InSTOV_{t-1} + \mu_t \text{................(6)}$$

Where: Iny = log of per capita real GDP; InSCAP = log of stock market capitalisation; InSTKT = log of stock market traded; InSTOV = log of stock market turnover; μ_t = white noise error term; Δ = first difference operator.

The bounds testing procedure is based on the joint F-statistic (or Wald statistic) for cointegration analysis. The asymptotic distribution of the F-statistics is non-standard under the null hypothesis of no cointegration between examined variables. The null hypothesis of no cointegration among the variables in equation (1) is (H_o: $a_3 = a_4 = 0$) against the alternative hypothesis (H1: $a_3 \neq a_4 \neq 0$). In equation 2, the null hypothesis of no cointegration is (H_o: $\beta_3 = \beta_4 = 0$) against the alternative hypothesis (H1: $\beta_3 \neq \beta_4 \neq 0$). In equation 3, the null hypothesis of no cointegration is (Ho: $\phi_3 = \phi_4 = 0$) against the alternative hypothesis (H1: $\phi_3 \neq \phi_4 \neq 0$). In equation 4, the null hypothesis of no cointegration is (Ho: $\delta_3 = \delta_4 = 0$) against the alternative hypothesis (H1: $\delta_3 \neq \delta_4 \neq 0$). In equation 5, the null hypothesis of no cointegration is (Ho: $\alpha_3 = \alpha_4 = 0$) against the alternative hypothesis (H1: $\alpha_3 \neq \alpha_4 \neq 0$). Finally, in equation 6, where the stock market turnover is the dependent variable, the null hypothesis of no cointegration is (Ho: $\lambda_3 = \lambda_4 = 0$) against the alternative hypothesis (H1: $\lambda_3 \neq \lambda_4 \neq 0$). Pesaran and Pesaran (1997) and Pesaran et al. (2001) report two sets of critical values for a given significance level. One set of critical values assumes that all variables included in the ARDL model are I(0), while the other is calculated on the assumption that the variables are I(1). If the computed test statistic exceeds the upper critical bounds value, then the Ho hypothesis is rejected. If the F-statistic falls into the bounds then the cointegration test becomes inconclusive. If the F-statistic is lower than the lower bounds value, then the null hypothesis of no cointegration cannot be rejected.

4.2 Granger Non-Causality Test

Once the long-run relationships have been identified in section 4.1, the next step is to examine the short-run and long-run Granger-causality between the three proxies of stock market development and economic growth using the following models (see Odhiambo, 2009; Narayan and Smyth, 2008).

Model 1 –Stock Market Capitalisation and Economic Growth

$$\Delta Iny_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta Iny_{t-i} + \sum_{i=0}^{n} a_{2i}\Delta InSCAP_{t-i} + ECM_{t-1} + \mu_t \text{..............(5)}$$

$$\Delta InSCAP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\Delta InSCAP_{t-i} + \sum_{i=0}^{n} \beta_{2i}\Delta Iny_{t-i} + ECM_{t-1} + \mu_t \text{...........(6)}$$

Model 2 – Stock Market Trade Value and Economic Growth

$$\Delta Iny_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i}\Delta Iny_{t-i} + \sum_{i=0}^{n} \phi_{2i}\Delta InSTKT_{t-i} + ECM_{t-1} + \mu_t \text{........(7)}$$

$$\Delta InSTKT_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta InSTKT_{t-i} + \sum_{i=0}^{n} \delta_{2i}\Delta Iny_{t-i} + ECM_{t-1} + \mu_t \text{................(8)}$$

Model 3 – Stock Market Turnover and Economic Growth

$$\Delta Iny_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i}\Delta Iny_{t-i} + \sum_{i=0}^{n} \phi_{2i}\Delta InSTOV_{t-i} + ECM_{t-1} + \mu_t \text{........(9)}$$

$$\Delta InSTOV_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta InSTOV_{t-i} + \sum_{i=0}^{n} \delta_{2i}\Delta Iny_{t-i} + ECM_{t-1} + \mu_t \text{................(10)}$$

Where ECM_{t-1} = the lagged error-correction term obtained from the long-run equilibrium relationship.

Although the existence of a long-run relationship between [SCAP, y]; [STKT, y] and [STOV, y] suggests that there must be Granger-causality in at least one direction, it does not indicate the direction of temporal causality between the variables. The direction of the causality in this case will be determined by the F-statistic and the lagged error-correction term. While the t statistic on the coefficient of the lagged error-correction term represents the long-run causal relationship, the F statistic on the explanatory variables represents the short-run causal effect (see Odhiambo, 2009; Narayan and Smyth, 2006). It should, however, be noted that even though the error-correction term has been incorporated in all the equations (5) – (10), only equations where the null hypothesis of no cointegration is rejected will be estimated with an error-correction term (see also Narayan and Smyth, 2006; Morley, 2006).

4.3 Data Source and Definition of Variables

Data Sources

Annual time series data, which covers the 1971 and 2007 period, has been used in this study. The data has been obtained from different sources, including South African Reserve Bank annual reports, quarterly bulletins, etc. In addition, different volumes of the International Financial Statistics (IFS) Yearbook, published by the International Monetary Fund, and World Bank Statistical Yearbook has been used to supplement the local data.

Definition of Variables

i) Economic Growth

The economic growth variable is measured by real per capita GDP, which is computed as follows:

Real GDP per capita (y/N) = Real GDP (y)/Total Population (N)

ii) Stock Market Development (STK/GDP)

The stock market development is proxied by the following variables: a) the stock market capitalisation ratio, which is calculated by dividing the value of listed companies (market capitalisation) by GDP; b) the value traded ratio, which is equal to the total value of shares traded on the stock exchange divided by the GDP; and c) the stock market turnover ratio, which is calculated as the ratio of the total value traded divided by the stock market capitalisation.

4.4 Stationarity Tests

Just like in other time series data, the variables stock market capitalisation (SCAP/GDP), stock market traded value (STKT/GDP), stock market turnover (STOV/GDP) and economic growth (y/N) must be tested for stationarity before running the causality test. For this purpose, the current study uses some of the most recent unit root tests, namely the Phillips-Perron test following Phillips and Perron (1988) and the Dickey-Fuller generalised least square (DF-GLS) de-trending test proposed by Elliot et al (1996). The results of the stationarity tests at level (not presented here) show that all variables are non-stationary at level. Having found that the variables are not stationary at level, the next step is to difference the variables once in order to perform stationarity tests on differenced variables. The results of the stationarity tests on differenced variables are presented in Tables 1 and 2.

Table 1: Stationarity Tests of Variables on first Difference - Phillips-Perron (PP) Test

Variable	NO TREND	TREND	Stationarity Status
	Phillips-Perron (PP)		
DLy/N	-5.452940***	-5.534507***	Stationary
DLSCAP	-3.786428***	-4.670688***	Stationary
DLSTKTV	-3.670845***	-3.680596***	Stationary
DLSTOV	-8.233949***	-7.025910***	Stationary

Note:

1)The truncation lag for the PP tests is based on Newey and West (1987) bandwidth.

2) ***, **, and * denote 1% , 5% and 10% level of significance, respectively.

Table 2: Stationarity Tests of Variables on first Difference – Dickey-Fuller - GLS Test

Variable	NO TREND	TREND	Stationarity Status
DLy/N	-5.52182***	-5.671912***	Stationary
DLSCAP	-3.80799***	-4.752256***	Stationary
DLSTKT	-3.95489***	-4.114719***	Stationary
DLSTOV	-2.1015440*	-3.2000900**	Stationary

Note:
1) Critical values for Dickey-Fuller GLS test are based on Elliot-Rothenberg-Stock (1996, Table 1).
2) ***, **, and * denote 1% , 5% and 10% level of significance, respectively.

The results reported in Tables 1 and 2 show that after differencing the variables once, all the variables were confirmed to be stationary. The Phillips-Perron and DF-GLS tests applied to the first difference of the data series reject the null hypothesis of non-stationarity for all the variables used in this study. It is, therefore, worth concluding that all the variables are integrated of order one.

4.5 Cointegration Test

In this section the long-run relationship between [SCAP, y]; [STKT, y] and [STOV, y] is examined using the ARDL bounds testing procedure. In the first step, the order of lags on the first differenced variables in equations (1) – (6) is obtained from the unrestricted equations by using the Akaike Information Criterion and Schwartz Bayesian Criterion. In the second step, we apply a bounds F-test to equations (1) – (6) in order to establish a long-run relationship between the variables under study. The results of the bounds test are reported in Table 3.

Table 3: Bounds F-test for Cointegration

Model 1 – Stock Market Capitalisation and Economic Growth		
Dependent variable	Function	F-test statistic
y	y (SCAP)	0.5831
SCAP	STKCAP (y)	9.4416***
Model 2 – Stock Market Traded Volume and Economic Growth		
Dependent variable	Function	
y	y (STKTV)	6.3301***
STKTV	STKTV (y)	3.8443
Model 3 – Stock Market Turnover and Economic Growth		
y	y(STOV)	6.40179***
STOV	STOV (y)	3.2242
Asymptotic Critical Values		

	1 %	5%	10%

	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Pesaran et al (2001), p. 300, Table CI(ii) Case II	4.94	5.58	3.62	4.16	3.02	3.51

Note: * denotes statistical significance at the 10% level.

The results reported in Table 3 show that the cointegration relationship between stock market development and economic growth is sensitive to the choice of the proxy used for measuring the stock market development. When the stock market capitalisation is used as a proxy for the stock market development, the calculated F-statistic is found to be higher than the upper-bound critical value at the 1% in the stock market development equation, but not in the stock market capitalisation equation. However, when the stock market traded value and the stock market turnover are used as proxies for the stock market development, the calculated F-statistics turns out to be higher than the upper-bound critical value at the 1% level in the economic growth equation, but not in the stock market equations. This implies that there is a unique cointegration vector in Models 1, 2 and 3.

4.6 Analysis of Causality Test Based on Error-Correction Model

Having found that there is a long run relationship between [SCAP, y]; [STKT, y] and [STOV, y] in Models 1, 2 and 3, the next step is to test for the causality between the variables used by incorporating the lagged error-correction term into equations (7), (8) and (9) respectively. The causality in this case is examined through the significance of the coefficient of the lagged error-correction term and joint significance of the lagged differences of the explanatory variables using the Wald test. The results of these causality tests are reported in Table 4.

Table 4: Granger Non-Causality Tests

Model 1 – Stock Market Capitalisation And Economic Growth				
Dependent Variable	**Causal Flow**	**F-Statistic**	**t-Test on ECM**	**R^2**
Economic Growth (y)	Stock Market Capitalisation → Economic Growth (y)	0.71977 [0.7202]	-	0.40
Stock Market Capitalisation	Economic Growth (y)→ Stock Market Capitalisation	1.4664 [0.2375]	-2.235**	0.30
Model 2 – Stock Market Traded Volume and Economic Growth				
Dependent Variable	Causal Flow	F-Statistic	t-Test on ECM	R^2
Economic Growth (y)	Stock Market Traded Volume →Economic Growth (y)	0.99364 [0.4928]	-2.298**	0.42

Stock Market Traded Volume	Economic Growth (y) → Stock Market Traded Volume	0.32764 [0.9730]	-	0.25
Model 2 – Stock Market Turnover and Economic Growth				
Dependent Variable	Causal Flow	F-statistic	t-test on ECM	R^2
Economic Growth (y)	Stock Market Turnover → Economic Growth (y)	0.93304 [0.5382]	-2.103**	0.42
Stock Market Turnover	Economic Growth (y)→ Stock Market Turnover	0.35899 [0.9605]	-	0.28

The empirical results reported in Table 4 show that there is a long-run unidirectional causal flow from economic growth to stock market capitalisation and from stock market traded value and stock market turnover to economic growth. The long-run causality from economic growth to stock market capitalisation is supported by the coefficient of the lagged error-correction term in the stock market capitalisation equation, which is negative and statistically significant, as expected. Likewise, the long-run causality from the stock market traded value to economic growth and from the stock market turnover to economic growth is supported by the coefficients of the lagged error-correction terms in the economic growth equations, which are negative and statistically significant. A summary of the causality test between the three proxies of stock market development and economic growth is presented in Table 5.

Table 5: Summary of Causality Tests

Variables	**Causality**	**General Conclusion**
Economic Growth (ΔLy) and Stock Market Capitalisation (ΔLCAP)	-There is a long-run unidirectional causal flow from economic growth to stock market capitalisation.	- Economic growth Granger-causes stock market capitalisation.
Economic Growth (ΔLy) and Traded Stock Market (ΔSTKT)	- There is a long-run causal flow from the stock market traded volume to economic growth.	- Stock market traded volume Granger-causes economic growth
Economic Growth (ΔLy) and Stock Market Turnover (ΔLSTKTOV)	- There is a long-run causal flow from stock market turnover to economic growth.	- Stock market turnover Granger-causes economic growth.

5. Conclusion

In this study, the direction of causality between the stock market development and economic growth is estimated in South Africa - using the newly developed ARDL-Bounds testing approach. The study uses three proxies of stock market development, namely stock market capitalisation, stock market traded value and stock market turnover, against real GDP per capita, a proxy for economic growth. The study attempts to answer two critical questions. Does the stock market development Granger-cause economic growth? Is the causal flow between economic growth and stock market development sensitive to the proxy used for the measurement of stock market development? Using the 1971-2007 data set, the empirical results of this study show that the causal relationship between stock market development and economic growth is sensitive to the proxy used for measuring the stock market development. When the stock market capitalisation is used as a proxy for stock market development, the economic growth is found to Granger-cause stock market development. However, when the stock market traded value and the stock market turnover are used, the stock market development seems to Granger-cause economic growth. Overall, the study finds the causal flow from stock market development to economic growth to predominate. The findings of this study are consistent with the conventional supply-leading response in which the financial sector is expected to precede and induce the real sector development. The results apply irrespective of whether the causality is estimated in the short-run or in the long-run.

References

Arestis, P. and Demetriades, P. (1997), "Financial Development and Economic Growth: Assessing the Evidence", *The Economic Journal* 107: 783-799.

Beck, T. and Levine, R. (2001), "Stock Markets, Banks and Growth: Correlation or Causality, policy Research Working Papers 2670, Washington DC: World Bank.

Caporale, G M, Howells, P.G and Soliman, A.M (2004), "Stock Market Development and Economic Growth: The Causal Linkages", *Journal of Economic Development* 29(1): 33-50.

Casselli F., Esquivel, G. and Lefort F. (1996), "Reopening The Convergence Debate: A New Look at Cross-Country Growth Empirics", *Journal of Economic Growth* 1(3).

Demirguc-Kunt, A. and Levine, R. (1996), "Stock Markets, Corporate Finance and Economic Growth: An Overview", *World Bank Economic Review* 10 (May): 223-239.

Elliot, G., Rothenberg, T. and Stock, J. (1996), "Efficient Tests for an Autoregressive Unit Root", *Econometrica* 64: 813-36.

Engle, R.F. and Granger, C.J. (1987), "Cointegration and Error-correction - Representation, Estimation and Testing", Econometrica 55, 251-78.

Filer, R., Hanonsek, J. and Campas, N (1999), "Do Stock Markets Promote Growth?", Working Paper No. 267, (September).

University of Dar-es-salaam, *Economic Research Bureau* (ERB), Paper 84.3:

Ghirmay, T. (2004), "Financial Development and Economic Growth in sub-Saharan African Countries: Evidence From Time Series Analysis", *African Development Review* 16, 415-432.

Harris, R. and Sollis, R. (2003), *Applied Time Series Modelling and Forecasting*. Wiley, West Sussex.

Johansen, S. (1988), "Statistical Analysis of Cointegration vectors", *Journal of Economic Dynamics and Control,* 12, pp.231-54.

Johansen, S. and Juselius, K. (1990), "Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics,* 52, pp.169-210.

Korajczyk, R. (1996), "A Measure of Stock Market Integratrion for Development and Emerging Markets", *The World Bank Economic Review* 10(2): 267-89.

Lee, Kongkook (2001) "Note on Study of the Changes of Financial System" Ref. 00.12-Department of Economics, University of Massachusetts.

Levine, R. (1997), "Financial Development and Economic Growth", *Journal of Economic Literature,* 35 (2), 688-727.

Levine, R. and Zervos, S. (1996), "Stock Market Development and Long Run Growth" *World Bank Economic Review* 10 (2).

Levine, R. and Zervos, S. (1998), "Stock Markets, Banks and Economic Growth" *American Economic Review* 98 (June): 537-58.

Minier, J. (2003), 'Are Small Stock Markets Different?" *Journal of Monetary Economics* 50:1593-1602.

Morley, B. (2006), "Causality Between Economic Growth and Migration: An ARDL Bounds Testing Approach", *Economics Letters* 90, 72-76.

Narayan, P.K. (2005), "The Saving and Investment Nexus For China: Evidence From Cointegration Tests", *Applied Economics* 37, 1979-1990.

Narayan, P.K. and Smyth, R. (2005), "Electricity Consumption, Employment and Real Income in Australia: Evidence From Multivariate Granger Causality Tests", *Energy Policy* 33, 1109-1116.

Narayan, P.K. and Smyth, R. (2006), "Higher Education, Real Income and Real Investment in China: Evidence From Granger Causality Tests", *Education Economics* 14, 107-125.

Narayan, P.K. and Smyth, R. (2008), "Energy Consumption and Real GDP in G7 Countries: New Evidence From Panel Cointegration With Structural Breaks", Energy Economics 30, 2331-2341.

Newey, W.K. and West, K.D (1987), "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix", *Econometrica* 55: 703-8.

N' Zue, F. (2006), "Stock Market Development and Economic Growth: Evidence from Cote D' Ivoire", *Africa Development Review* 18(1): 123-143.

Odhiambo, N.M. (2008), "Financial Depth, Savings and Economic Growth in Kenya: A Dynamic Causal Linkage", *Economic Modelling* 25(4), 704-713.

Odhiambo, N.M. (2009), "Energy Consumption and Economic Growth in Tanzania: An ARDL Bounds Testing Approach", *Energy Policy,* Vol. 37, Issue 2.

Pesaran, M. and Shin, Y. (1999), "An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis" in S. Strom, (ed) Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch centennial Symposium, Cambridge University Press, Cambridge.

Pesaran, M., Shin, Y. and Smith, R. (2001), "Bounds Testing Approaches to the Analysis of Level Relationships", *Journal of Applied Econometrics* 16, 289-326.

Phillips, P.C.B. and P. Perron (1988), "Testing for a Unit root in Time Series Regression", *Biometrika* 75: 335-346.

Quah, D. (1993), "Empirical Cross-Section Dynamics in Economic Growth", *European Economic Review* 37(2-3).

Rioja, F. and N. Valev (2004), "Finance and the Sources of Growth at Various Stages of Economic Development", *Economic Enquiry* 42 (1): 127-40.
Roussean, P.L. and Wachtel, P. (2000) "Equity Markets and Growth: Cross-Country Evidence on Timing and Outcomes, 1980-1995, *Journal of Business and Finance* 24 (Nov.): 1933-57.
Singh, A. (1997),"Stock Market, Financial Liberalisation and Economic Development", *Economic Journal* 107 (May): 771-82.
South Africa Official Year Book, Various issues.