STOCK MARKETS, BANKS AND ECONOMIC GROWTH: A TIME –SERIES EVIDENCE FROM SOUTH AFRICA

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ABSTRACT:

The objective of this paper is to examine the casual relationship between stock markets, banks and economic growth in South Africa using quarterly time series data from 1983:q1-2007:q4. The paper uses Vector Error Correction model (VECM) based causality tests to establish a link between financial development (represented by both banking and stock market systems) and economic growth.

Impulse response functions (IRFs) and Variance Decomposition (VDCs) are computed to further examine the short-run dynamics among the variables in the system. Also, Structural Vector Auto regression (SVAR) is applied to examine the link between financial development and economic growth. This is achieved by following Blanchard and Quah's(1989) technique to identify the components of residuals to recover the shocks based on endogenous economic theory The empirical investigation suggests that in the long-run, there is evidence of bidirectional causality between financial development and economic growth using the banking system proxy by Bank Credit to Private sector (BCP). While, when stock markets variables are used that is Turnover Ratio (TR) and Value of shares Traded (VT), the results indicate unidirectional causality from economic growth to stock market system. The Impulse response functions (IRFs) and variance decompositions (VDCs) indicate that financial development (BCP,TR, and VT) have short-run impact on economic growth at the immediate year of initial shocks and VDCs shows that all the indicators for financial development contain some useful information in predicting the future path of economic growth. Meanwhile, SVAR results indicate little evidence that finance promote economic growth in the long-run.

JEL Classification: C32; E44; G10; G21; O40;

Keywords: Vector autoregression, Economic growth, Stock markets; Banks

1.0 Introduction

Theoretical literature has offered conflicting predictions on the role of financial development and economic growth. Schumpeter (1911), Gurley and Shaw (1955) Goldsmith (1969), McKinnon (1973) and Shaw (1973);[1] all argue that financial repression which characterised the Less Developed Countries (LDCs) tend to retard economic growth. Therefore, rapid economic development in these countries can only be achieved when they liberalize their financial sector – deregulating interest rate, removing selective credit control and encourage free competition in the banking sector. Lucas (1988) on the other hand believes that the role of financial development in the growth process has been over-exaggerated and to him financial development does not contribute to long-term economic growth. Stiglitz and Weiss (1981) also argue that in Less Developed Countries (LDCs), banks may refuse to give loans to new innovative and productive borrowers because of high risk of default associated with new borrowers. A high risk premium would only encourage the riskier borrowers, a process that discourages safe borrowers and thereby reducing the opportunity for innovation and hence retard economic growth.

However, when it comes to specific role of stock markets and banks in the economic development, there are also conflicting theoretical predictions. Stiglitz (1985) has shown that banks perform a better role in promoting economic growth than stock markets especially when it comes to resource allocation. Singh (1997) indicates that stock markets do not lead to long-run economic growth due to macroeconomic instability, volatility and arbitrariness of pricing process. Japillo and Pagano (1994) and Atje and Jovanovich (1993) have indicated that stock markets contribute positively in economic growth. However, Boyd and Prescott (1986), Boyd and smith (1998) and Blackburn et al (2005) have all shown that both stock market and banks are necessary in promoting economic growth. Therefore, they consider stock markets as compliment to banks rather than substitutes.

Financial liberalization in Africa, has led to an increase in the role of stock markets in the financial system. According to Yartey and Adjasi (2007) before 1989, there were just five stock markets in Sub-Sahara Africa and three in North Africa but today there are nineteen stock exchanges. South Africa is Africa's biggest economy and has since the advent of democracy in the 1990s embarked upon wide of range financial reforms both in the banking sector and stock market system. This reform has made financial system of South Africa ranked 25th in the world in 2008 by World Economic Forum's first financial development index ahead of India, Brazil and Russia. This has also made South Africa to be included in the major global stock market indexes. Also IMF (2008) confirms that

[1] See Levine (1997, 2004) for excellent literature review on financial development and economic growth

South Africa financial system is “fundamentally sound” with good legal framework and sound financial infrastructure supported by prudent macroeconomic management.

Following the increasing role of stock markets in both developed and developing countries, recent empirical papers are now modelling simultaneously stock markets, banks and economic growth in their empirical work – Rousseau and Wachtel (2000), Levine and Zervos (1998), Arestis et al (2001) Beck and Levine (2004) and Dritsaki et al (2005) have all considered stock markets and banks jointly with economic growth in their work. Beck and Levine (2004) have pointed out that *“any examination of stock market effects on growth should simultaneously consider the impact of growing sophistication in the intermediating sector” (pp.1940)* They further argue that omitting a stock market variable makes it difficult to appropriately examine banks development and economic growth when controlling for stock market system.

It should however, be noted that from the above empirical works only Arestis et al (2001) and Dritsaki et al (2005) used time-series data. While Arestis et al (2001) focus on developed financial markets, Dritsaki et al (2005) focus on Asian financial markets. Therefore, to my knowledge, no effort has been made in the area of time-series data (especially of considering jointly both banking and stock markets) to look in to Sub-Sahara Africa financial markets, this study attempts to fill this gap for South Africa using time-series data. The paper also considers structural vector autoregressive (SVAR) technique by following Blanchard and Quah (1989) methodology of long-run restriction. This technique is used to test the supply-leading hypothesis which states that financial development does have a long-run impact on economic growth. South Africa is chosen for this work because of two reasons: 1) its good record of financial reforms coupled with sound macroeconomic policies. South Africa’s economy over the last few decades has also undergone a series of financial system restructuring particularly in banks and stock markets. This provides the necessary motivation of assessing the financial system for South Africa in relation its economic growth. 2) It also has long period time series data especially on stock markets variables which other Sub-Sahara Africa countries lack. The objective of this paper therefore is to examine the casual relationship between banks, stock markets and economic growth in South Africa through a Vector Auto regression (VAR) approach. Impulse response functions (IRFs) and Variance Decomposition (VDCs) are computed to further examine the short-run dynamics among the variables in the system. Through VECM-based causality tests the results indicate bidirectional causality between banking development and economic growth and unidirectional causality between stock markets development and economic growth. However, the result from the SVAR indicates a unidirectional causality from economic growth to financial development. Following this introduction, the rest of the paper is organised as follow: section two gives a brief review of South African financial system. Section three is the literature review and theoretical framework. Section four consists of data and measurement and econometric methodology. Section five presents the empirical results and section six concludes the paper.

. **2.0 A Review of South Africa Financial system**

South Africa is the biggest economy on the continent of Africa with a diversified productive base and sound macroeconomic reforms which help in boosting competition, creating jobs and promoting economic growth. Recently the South African financial system has been ranked 25th in the world by world economic forum first development report ahead of India, Russia and Brazil which ranked 31st 36th and 40th respectively. IMF (2008) states that: "*South Africa's sophisticated financial system is sound; the system is diversified and spans a broad of activities that are supported by elaborate legal and financial infrastructure and generally effective regulatory framework." (pp.6)* Access to financial services has also improved over the years. This is achieved through public-private intervention policies. For example the population of those having access to banks has increased from 25% in 1994 to 63% in 2008 (IMF, 2008). This remarkable success could partly be attributed to Financial Services Charter (FSC) which has help to provide effective access to adequate financial services for all thereby improving racial representation in ownership and fostering corporate governance.

Prior to 1975, the South Africa financial system was characterised with elements of financial repression, the interest rates were fixed at a rate determined by the South Africa Reserve Bank. (SARB) However, thereafter, it allowed the interest rate to be determined through the market forces and by 1980; the Direct Control mechanism over deposit interest rate quoted by banks was abolished.

In 1985, the SARB created the banking supervision department with the main aim of supervising foreign activities of South Africa banking institutions which has brought it in line with 1983 Basle Concordat principle. That Banks should extend their supervisory activities to international activities of banking institutions. Also as part of reforms of the financial sector, the Financial Services Board was established in 1990. It is an independent institution charged with the responsibility of effective supervision of non-banking financial institutions. Some of the financial institutions regulated by FSB include mutual banks, country's exchanges and insurers and also provide advisory role to minister of finance.

In February, 1991, the four major leading financial institutions, Allied Bank, United Bank, Volksak and Sage Bank merged and created the largest banking group in South Africa, the Amalgamated Bank of South Africa (ABSA). In order to bring South Africa financial settlement in line with international practice on settlement system and systematic risk management procedures, the National payment act of 1998 was introduced.

According to IMF (2008) commercial banks in South Africa are the dominant segment of the financial sector with assets of about 120% of GDP. The four biggest banks which include the Amalgamated Bank of South Africa (ABSA), First Rand Bank, Ned Bank, and Standard Bank account for about 85% of the total asset and with international presence in Botswana, Mozambique, Namibia and

Zimbabwe. The South Africa financial sector is also open to foreign financial institutions. For example, Barclays Bank becomes the main shareholder of ABSA in 2005 and in 2007 the Industrial and Commercial Bank of China (ICBC) acquired 20% stake in Standard Bank.

The Johannesburg Stock Exchange (JSE) was established in 1887 and today is Africa's largest stock exchange. At present, it has developed other active markets like financial derivative markets and agricultural products markets. It also has active bond markets, the Bonds exchange of South Africa (BESA) which was formally registered in 1996 as an exchange, and now carries out bond automated trading settlement. Major changes introduced in the operation of the financial markets following the liberalization programme include the JSE electronic screen trading, corporate and non-residents participation and provision for negotiated commission and principal versus broking trade by members of the exchange. In 1998, there was the introduction of the Share Transaction Totally Electronic Limited (STRATE) which is the South Africa's electronic settlement and depository system for dematerialised equities and replaced the paper settlement.

The performance of the JSE has been robust; its market capitalization is one of the largest in the emerging markets reflecting South Africa inclusion in the major investible global stock market indexes. That is, following these reforms, the JSE is now for example, a member of the world Federation of exchanges and plays an active role in this regards. The World Federation of Exchanges is the global trade association for the exchange industry. Today it has widened its activities to include a range of products and securities in the financial arena including derivatives markets, clearing houses, settlement institutions, central depositories, information technology provides internet business. In May, 2002, the JSE commenced trading on London Stock Exchange which they called LSE SETs; this comes after 2001 when the JSE entered an agreement with LSE in the area of data dissemination, remote membership and dual primary listings on both exchanges thereby allowing JSE investors access to world class technology. Therefore, liberalization of the JSE has resulted in the massive increase in stock market turnover and foreign investment in the local financial assets. In 2007, according to South Africa Reserve Bank (2008), the JSE operated the twelfth largest derivatives exchange in the world in terms of volume and remained the largest global participant in single-stock futures based on the number of contracts traded.

3.0 Literature review and theoretical framework

Stock market, Banks and Economic growth:

The theoretical work is briefly reviewed under three groups: stock market, banks and complementary. This is because there are divergence views when it comes to the specific role of banks and stock markets in promoting economic growth. However, the theoretical work of this study is based on the complementary views, i.e. both banks and stock markets are necessary in promoting economic growth.

Stock market: Greenwood and Jovanovic (1990) presents a model in which financial intermediation and the rate of economic growth are endogenously determined. The model uses dynamic programming and explains that through research, collection and analyse of information, the flow of resource can be enhanced which leads to economic growth. Through this process financial intermediation becomes positively linked with economic growth. Bencivenga, Smith and Starr (1996) through overlapping generation models indicate that stock market development facilitate reduction in transaction cost which helps in promoting economic growth making it easy for investors and savers to frequently sell and buy their assets. Greenwood and Smith (1997) equally suggest that stock market components of financial system play an important role in the efficient allocation of resources which helps in promoting specialization, reducing the cost of mobilizing savings and ultimately higher economic growth. At the firm level, Jensen and Murphy (1990) carry out a study on the analysis of over 2000 CEOs and they indicate that stock markets enhance corporate control through reducing the principal-agent problem by aligning the interest of managers and owners in which case the managers would strive to maximize the firm value. Morck and Nakuruma (1995) acknowledge that because of banks inherent bias towards prudence, this tends to prevent corporate innovation and growth. Allen and Gale (2000) explain that although banks may be effective in eliminating duplication of information gathering and processing, they are not effective in gathering and processing information especially in uncertain situation involving innovative products and process.

Banks: Meanwhile, on the other hand, Stiglitz (1985) critically examine the activities of stock markets and banks by evaluating the behaviour of managers in relation to shareholders funds and argues that stock markets liquidity will not enhance incentives for acquiring information about firms or exerting corporate governance. Singh (1997) also explains that although financial liberalization has promoted rapid expansion of stock markets in most of the leading developing economies but that alone cannot lead to long-run economic growth. One of main reasons for this is that the interaction between stock markets and credit markets in the wake of unfavourable economic shocks may exacerbate macroeconomic instability and reduce long-term growth.

Complementary: Boyd and Smith (1998) present a framework in which both the debt and equity market impact on the level of economic growth. It states that both debt and equity markets are considered as complements rather than substitutes in financing investment. Earlier theoretical papers tend to focus either on debt (bank loans) or equity. In this model, investors have access to two types of technology. The first type of technology is publicly observed and yields low expected return on investment. The second type is not publicly observed and yields high expected return but subject to a costly state verification (CSV) problem. Therefore, Agents face-a trade off between technologies with low return but not publicly observable and technology with high expected return but subject to the CSV problem. It indicates that as economy continues to grow, capital accumulates leading to a relative fall in price of capital and this has implication of increasing the cost of monitoring. Therefore, at certain level of per capital income, the debt market is used and beyond that level of threshold of income per capita, the cost of verification of unobservable technology begin to increase and eventually the stock market with observable return technology comes in to use to reduce the effect of increasing the costly state verification implying an increase in the amount of equity finance relative to debt finance. Blackburn et al (2005) present a model which is similar to Boyd and Smith (1998). Their overlapping generation models consider the joint determination of both banks and stock markets as determined by state-dependent and moral hazard conditions. In this model, there is feedback effect from economic growth to the determination of financial structure be it banking or stock market or on a mixture of banks and stock markets. Capasso (2008) uses an optimal capital structure model to provide a link between components of stock market and long-term economic growth. He indicates a strong relationship between stock market and economic growth with firms showing greater preference towards issuing equity than debt as capital continues to accumulate. That is as the economy continue to grow, information costs continue to decrease as well so does the cost of equity relative to debt financing which promote the development of stock market

From the above theoretical discussion, and following Dritsaki et al (2005), the model is specified as follows:

$$Y = f(SM, BCP, INV) \qquad (1)$$

Where Y represents GDP per capita, SM represents one of the stock market variables, market capitalization to GDP, value of shares traded to GDP and turnover ratio to GDP. BCP is the bank credit to private sector which is a proxy for banking system and INV is the level of investment

3.1 Empirical literature

Levine and Zervos, (1998) assess the impact of stock markets and banks on long-run economic growth using an endogenous growth model. After examining data on 47 countries over a period of 1976 to 1993, the results show that both stock markets and banking development are positively and significantly related to economic growth and both are good predictors of economic growth. They use six measurements of stock market development, these are: a measure stock market sizes, two measures of stock market liquidity, a measure of stock market volatility and two measures of stock market integration. While on the banking measurement, they use Bank credit to private sector. Rousseau and Wachtel (2000) use panel vector autoregression with generalized method of moment technique to examine simultaneously the relationship between stock markets, banks and economic growth. They use M3/GDP as a measure of banking sector variable while stock market system is measured by market capitalization and total value traded. After examining the relationship on 47 countries using annual data from 1980-1995, their results indicate that both banks and stock markets promote economic growth.

Arestis et al (2001) through quarterly time-series data, examine the relationship between stock market development and economic growth for five developed economies while controlling for the effect of banking system and market volatility. These countries are: USA, UK, France, Germany, and Japan. The period covered 1968-1998 although the data span is different for different countries in the sample. The variables used in the VAR framework include the real GDP, the ratio of market capitalization, domestic bank credit to private sector and stock market volatility .The results reveal that in Germany, there is bidirectional causality between banking system development and economic growth. Stock market on the other hand is weakly exogenous to the level of output. In the USA, financial development does not cause real GDP in the long-run. Japan exhibits bidirectional causality between both banking system and stock market and the real GDP while in the UK, the results indicate evidence of unidirectional causality from banking system to stock market development in the long-run but the causality between financial development and economic growth in the long-run is very weak. The evidence in France suggests that in the long-run both the stock market and banking system contribute to real GDP but the contribution of the banking system is much stronger.

Beck and Levine (2004) assess whether stock markets and banks have positive influence on economic growth. Using a dynamic panel data set on 40 countries over a period 1976-1998 and with the application of GMM estimators their results shows that after controlling for simultaneity and omitted variables bias; both stock market and financial development enter all of the system panel growth regression significantly.

Capasso (2006) using a sample of 24 advanced OECD and some emerging economies investigates the linkage between stock market development and economic growth covering the period 1988-2002. The finding shows a strong and positive correlation between stock market development and economic growth and later concludes that stock markets tend to emerge and develop only when economies reach a reasonable size and with high level of capital accumulation.

Carporale, Howello and Soliman (2005) based on the endogenous growth model study the linkage between stock market, investment and economic growth using vector auto regression (VAR) framework. It uses quarterly data covering the period 1971q1 - 1998q4 for four countries: Chile, South Korea Malaysia and Philippine. The stock market variables are measured through the ratio of market capitalization to GDP and ratio of value-traded to GDP. The overall findings indicate that the causality between stock market components, investment and economic growth is significant and it is in line with endogenous growth model. It shows also that the level of investment is the channel through which stock markets enhance economic growth in the long-run.

Dritsaki and Melina (2005) use a trivariate VAR model to examine the causal relationship between stock, credit market and economic growth for Greece. They use industrial production as a proxy of economic development, while market capitalization and money supply (M2) are used as proxy for stock and credit market respectively. Using monthly data covering the period 1988:1 - 2002:12, their results reveal unidirectional causality from economic development to stock market and bidirectional causality between economic developments and banking sector. The paper establishes no causal relationship between stock market function and banking sector.

Singh (2008) utilises time series data for India to examine the relationship between financial development and economic growth for the period 1951-1952 to 1995-1996. Using bivariate VAR, impulse responses and variance decomposition their results suggest the existence of bidirectional causality between financial development and economic growth.

Handa and Khan (2008) also use time series data on 13 countries to test four causality hypotheses between financial development and economic growth. They utilise both banking and stock market variables to measure financial development. After applying Johansen procedure and VEC model the results show the existence of unidirectional causality from economic growth to financial development for Bangladesh, Sri Lanka, Brazil, Malaysia, Thailand and Turkey. Meanwhile, for Germany, Japan, India, Argentina, the UK and the USA they establish bidirectional causality between financial development and economic growth and no causality exists for Pakistan.

Ang (2008) examines the mechanism that links financial development and economic growth for Malaysia. Through Autoregressive Distributed Lag (ARDL), he examines six mechanisms that provide the linkage between financial development and economic growth. These are: financial development, private saving, foreign direct investment, saving-investment correlation, private investment and aggregate output. The results indicate that financial development has a strong linkage with economic growth through qualitative and quantitative channels. It further observes that some of the repressionist policies of the Malaysian government such as interest rate controls and high reserve requirement tend to have positive impact on economic growth. He concludes that government has a critical role to play in promoting effective and sound financial system.

Luintel et al (2008) using a sample of fourteen countries, apply a time series and a dynamic heterogeneous panel methods to examine the relationship between financial structure and economic growth. The results indicate that for most countries in the sample, financial structure and financial development tend to have a strong impact on economic growth. It further indicates that the panel estimates do not correspond to country-specific estimates and also the cross-country data could not be pooled. Meanwhile, on the time series, there is long-run relationship between the level of output, capital stock, financial structure and financial development.

Zang and Chul Kim (2007) carry out a panel data test to establish the direction of causality between financial development and economic growth. They use Sims-Geweke causality tests on the panel data provided and used by Levine et al (2000). The paper uses three measures of financial indicators: the ratio of commercial banks assets divided by commercial banks plus central banks assts, the ratio of private sector credit provided by financial intermediaries to GDP and Liquid Liabilities. The panel data set consists of seven time periods for 74 countries covering the period 1961-1995. Their results contrast the findings of Levine et al (2000) by showing that economic growth leads financial development. They also carry out sensitivity analysis to check the robustness of their findings and after all the tests the results remain the same.

4.0 Data and Measurement

This study uses quarterly data with the sample period from 1983:q1 to 2007:q4 (100 observations). The data consists of four variables: real GDP (LGDP), investment ratio (LINV), financial development is represented by banking and stock market variables. The banking variable is represented by Bank credit to private sector (BCP) while the stock market variables are represented by market capitalization (MC), turnover ratio (TR) and value of shares traded (VT). All the data are measured in logarithm form except Bank credit to private sector (BCP), turnover ratio (TR) and value of shares traded (VT). The data are obtained from International Financial Statistics (IFS), South Africa Reserve Bank, and Johannesburg Stock Exchange (JSE)

Investment ratio: This is obtained from gross fixed capital formation divided by nominal GDP. According to endogenous economic theory, investment provides a positive link to economic growth. Ndikumana (2000), Yartey and Adjasi (2007) and Xu (2000) all used this measurement in their work.

Turnover Ratio: This measures the market liquidity which is usually given as total value of shares traded divided by total value of listed shares or market capitalization. Beck and Levine (2004) prefer this measurement to other measurement of stock market variables. This is because unlike other measures, the numerator and denominator of turnover ratio contain prices.

Value Traded: Rousseau and Wachtel (2000) and Beck and Levine (2004) both use this measurement and it is given as the ratio of value shares traded to nominal GDP. However, according to Beck and Levine (2004), the value traded has two weaknesses: (1) *"it does not measure the liquidity of the market, it just measures trading relative to the size of the economy" (2) "also since value traded is the product of quantity and price, this means that it can rise without an increase in the number of transaction" (P.428)*

Market Capitalization: This is measured as the value of listed shares divided by nominal GDP. Meanwhile, Beck and Levine (2004) have shown that with market capitalization, there is no theory suggesting that mere listing of shares will influence resource allocation and economic growth. Levine and Zervos (1998) also indicate that market capitalization is not a good predictor of economic growth[2].

Bank credit to private sector: This proxy is believed to be superior to other measures of financial development. It represents an accurate indicator of the functioning of financial development because it is a measure of the quantity and quality of investment. It excludes credit to public sector which better reflects the extent of efficient resources allocation[3]

This paper follows Beck and Levine (2004), Levine and Zervos (1998) and Beck et al (2000) by deflating the market capitalization and bank credit to private sector. This is because real GDP is a flow variable which is defined relative to a period whilst bank credit to private sector (BCP) and market capitalization (MC) are stock variable which are measured at the end of period. Therefore, this indicates that there is stock-flow problem a process if ignored may result in producing a misleading result. The problem is solved by deflating end of year Bank credit to private sector and Market capitalization by end of year consumer price index (CPI) and deflates the GDP by the CPI. Then take the average of Bank credit to private sector (BCP) and Market capitalization (MC) in period t and period t-1 and relate it to the real flow variable for period t[4].

4.1 Econometric methodology

The paper employs the VAR framework and it is made up of four variables: real Gross Domestic Product (LGDP), Investment ratio (LINV), financial development proxy is given by Bank credit to private sector (BCP) and stock market development proxy is given market by capitalization (MC), turnover ratio (TR), and total value of shares traded (VT).

VAR is adopted for this particular work because with VAR, according Ang and McKibbin (2007), once the variables are cointegrated; it becomes easy to distinguish between the short run dynamics

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[2] However, Arestis et al (2001) have shown that in the context of time-series data, market capitalization tend to perform better than other measures of stock market development.

[3] Both Beck et al (2000) and Levine, et al (2000) have indicated that it is better to use bank credit to private sector as a proxy of financial indicator since it excludes those credits to public sector.

[4] BCP = 0.5* $\dfrac{\left[\dfrac{BCP_t}{CPI_t} + \dfrac{BCP_{t-1}}{CPI_{t-1}}\right]}{\dfrac{GDP_t}{CPI_t}}$ CPI= consumer price index in year t

and long run causality. Also the VAR framework eliminates the problems of endogeneity by treating all the variables as potentially endogenous as explained by Sims (1980).

The basic aim of our empirical estimation is to first, examine the long-run relationship among the banks, stock market and the level of GDP. Second, evaluate the dynamics causal relationship among these variables. Third, use the structural VAR (SVAR) to examine how each variable response is shocked by other variables of the VAR framework through the impulse response functions and variance decomposition by following the Blanchard and Quah (1989) long-run restrictions.

The VAR of order p model can be expressed as follows:

$$\mathrm{Y}t = \mu + \mathrm{A}_1 y_{t-1+----------+} A_{p-1} y_{t-p} + \varepsilon_t \qquad (2)$$

The VAR can be expressed in VECM form once the variables are I (1) order of integration:

$$\Delta y_t = \quad \pi_0 + \pi xt - 1 + \pi 1 \Delta xt - 1 + \pi 2 \Delta xt - 2 + ------ + \pi \rho \Delta xt - \rho + \varepsilon_t \qquad (3)$$

Where π_0 an (4x1) vector of intercept with elements π_{j0} and π_i is (n x n) coefficient matrices with elements π_{jk} (i). Meanwhile, ε_t is an independently and identically distributed n- dimensional vector with zero mean and constant variance. Therefore, if π is of rank 1 < r < 4, this means that it can be decomposed in to $\pi = \alpha\beta'$ where β is the matrix of co integrating vectors and α is the matrix of adjustment.

$$\Delta y_t = \mu + \pi 1 \Delta yt - 1 + -------- + \pi \rho - 1 \Delta yt - \rho + 1 + \alpha\beta' yt - 1 + \varepsilon_t \qquad (4)$$

The term $\alpha\beta' y_{t-1}$ is the linear combination process. Therefore, according to Engle and Granger (1987) when a set of variables are I (1) and are cointegrated then short-run analysis of the system should incorporate error correction term (ECT) in order to model the adjustment for the deviation from its long-run equilibrium. The Vector error correction model (VECM) is therefore characterised by both differenced and long-run equilibrium models thereby allowing for the estimates of short-run dynamics as well as long-run equilibrium adjustments process. In this paper, given the four variables, the VECM can be expressed as follow:

$$\Delta LGDP_t = \phi_1 + \alpha_{11} ECT_{t-i} + \sum_{i=1}^{p-1} \beta_{11i} \Delta LGDP_{t-i} + \sum_{i=1}^{p-1} \beta_{12i} \Delta LINV_{t-i} + \sum_{i=1}^{p-1} \beta_{13i} \Delta BCP_{t-i} + \sum_{i=1}^{p-1} \beta_{14i} \Delta SM_{t-i} + \varepsilon_{1t}$$

$$\Delta LINV_t = \phi_2 + \alpha_{21} ECT_{t-i} + \sum_{i=1}^{p-1} \beta_{21i} \Delta LGDP_{t-i} + \sum_{i=1}^{p-1} \beta_{22i} \Delta LINV_{t-i} + \sum_{i=1}^{p-1} \beta_{23i} \Delta BCP_{t-i} + \sum_{i=1}^{p-1} \beta_{24i} \Delta SM_{t-i} + \varepsilon_{2t}$$

$$\Delta BCP_t = \phi_3 + \alpha_{31} ECT_{t-i} + \sum_{i=1}^{p-1} \beta_{31i} \Delta LGDP_{t-i} + \sum_{i=1}^{p-1} \beta_{32i} \Delta LINV_{t-i} + \sum_{i=1}^{p-1} \beta_{33i} \Delta BCP_{t-i} + \sum_{i=1}^{p-1} \beta_{34i} \Delta SM_{t-i} + \varepsilon_{3t}$$

$$\Delta SM_t = \phi_4 + \alpha_{41} ECT_{t-i} + \sum_{i=1}^{p-1} \beta_{41i} \Delta LGDP_{t-i} + \sum_{i=1}^{p-1} \beta_{42i} \Delta LINV_{t-i} + \sum_{i=1}^{p-1} \beta_{43i} \Delta BCP_{t-i} + \sum_{i=1}^{p-1} \beta_{44i} \Delta SM_{t-i} + \varepsilon_{4t}$$

(5)

Where ΔSM represents one of the stock market variables, which in this study comprises turnover ratio (TR) and value of shares traded (VT). The market capitalization ratio (MC) is dropped because there is no evidence of cointegration.

ECT_{t-1} is the error correction term lagged one period and ε_t's the Gaussian residuals. Ang and McKibbin (2007) explain that there are two sources of causation: through the ECT ($\alpha \neq 0$) and through the lagged dynamic terms. That is through the VECM framework, two types of Granger causality tests can be performed: the short-run Granger non-causality test and long-run causality through the weak exogeneity test. The VECM-based causality test is performed through the Wald test and it is used to analyse both the short-run dynamics and long-run causality between finance and economic growth. For example, in equation 5.1, if we want to test in the short-run that ΔBCP_t does not cause $\Delta LGDP_t$, this can be done by testing the lagged dynamic terms under the null hypothesis Ho: all $\beta_{13i} = 0$ if the null is not rejected it means financial development, represented by banking system does not Granger cause economic growth. The long-run causality is examined through the weak exogeneity test of Ho: $\alpha_{11} = 0$ by using likelihood ratio test with χ^2 distribution. The strong exogeneity test is performed under the null hypothesis that ΔBCP_t does not cause $\Delta LGDP_t$ is expressed as Ho: $\beta_{13i} = 0 = \alpha_{11} = 0$ is not rejected. However, the dynamic specification is estimated using four lags and statistically least significant lag variables are sequentially eliminated so that parsimonious specification is obtained using the general-to specific methodology of Davidson et al (1978). The parsimonious Granger causality tests based on multivariate error-correction model is used to examine the direction of causality between finance represented by both banking system and stock market variables and economic growth.

This paper also uses Structural vector auto regression model (SVAR) with additional restrictions to identify the components of residuals using economic theory. The structural VAR (SVAR) approach builds on earlier work of Sims (1980) by attempting to identify the impulse responses through *apriori* restrictions on the covariance matrix of the structural errors. The essence of this is to simply avoid arbitrary identifying restrictions which characterises the unrestricted VAR. However, several techniques can be used to recover the required information. The standard reduced-form VAR provides reduced –form errors from which structural shocks can be recovered. Short-run and long-run approaches can be used to recover the required information. Sims (1986), Bernanke (1986) and Blanchard and Watson (1986) use the short-run approach by applying non-recursive and direct restriction on the contemporaneous interactions among the variables using economic theory. An alternative approach is the long-run restriction of Blanchard and Quah (1989), Shapiro and Watson (1988) and Astley and Garrat (1996) It uses restriction on the long-run dynamic effect of the shocks on particular variables in the system to identify the structural shocks. In this paper, we follow the Blanchard and Quah (1989) long-run restriction approach.

From the above and following the Blanchard and Quah (1989), the model is expressed as an infinite moving average representation of the variables such that:

$$\Delta_{xt} = A_0\varepsilon_t + A_1\ \varepsilon_{t-1} + ... = \sum_{i=0}^{\infty} A\varepsilon_{t-1} = A(L)\varepsilon_t \quad (6)$$

Where $\Delta_{xt} = \begin{bmatrix} \Delta LGDP_t \\ \Delta BCP_t \end{bmatrix}$ $\quad \Delta\varepsilon_t = \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$

Changes in $\Delta LGDP$, and ΔBCP are all assumed to be stationary while permanent and transitory errors, ε are uncorrelated white noise disturbances. The ε_{1t} and ε_{2t} are the demand shocks and supply shocks respectively. It is assumed that demand shocks have temporary effect on the level of GDP. The identity matrix is obtained by normalizing the variance of the structural shocks such that: $E\ (\varepsilon_t\varepsilon_t)$ = I that is, these shocks are orthogonal and serially uncorrelated

The reduced-form of the model in the moving-average representation is:

$$\Delta x_t = e_t + C_1 e_{t-1} + ... = \sum_{i=0}^{\infty} C_1 e_{t-1} = C\ (L)_{et} \quad (7)$$

This can be represented as follows:[5]

$$\begin{bmatrix} \Delta LGDP_t \\ \Delta FD_t \end{bmatrix} = \begin{bmatrix} C_{11}(L) C_{12}(L) \\ C_{21}(L) C_{22}(L) \end{bmatrix} \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \quad (8)$$

---

[5] It should be noted that ΔFD_t is used as a proxy for financial development representing both the banking system (BCP) and stock market systems (TR) and (VT)

Where e_t is a vector of estimated reduced-form residuals with variance $\mathrm{E}(e_t e_t) = \Omega$ and matrices C_i represents the impulse response function of shocks to $\Delta LGDP$, and ΔFD respectively and $C(L)$ is the infinite polynomial in the lag operator $A(L) = C(L)^{-1}$.

From equation 6 and 7, it can be shown that the reduced-form residuals are related to the structural residuals as:

$e_t = A(0)\varepsilon_t$ (9)

Where $A(0)$ is a matrix of the contemporaneous effects of the structural innovations. It follows that:

$E(e_t e_t) = A(0)E(\varepsilon_t \varepsilon_t)A(0)$ (10)

Since $E(\varepsilon_t \varepsilon_t)$ = I, then $A(0)A(0)' = \Omega$ (11)

Given the estimates of this Matrix $A(0)$ we can recover the structural shocks from the residuals of equation (8). We impose long-run restriction to identify the FD shock. Each of the matrices in the equation (8) is a polynomial in the lag operator. Therefore, in order to achieve exact-identifying restriction, we need only one restriction, i.e. $n(n-1)/2$ restriction. To test the supply-leading hypothesis, We restrict the temporary effect to zero, $C_{11}(L) = 0$. This theoretical restriction is based on the assumption of endogenous growth theory which has shown in their theoretical papers that financial development does have long-run effect on economic growth - Pagano (1993), Greenwoodwich and Jovanovich (1990), Levine (1993) and Boyd and Smith (1996). Therefore, the restriction is based on the assumption that financial development causes economic growth

Impulse response: With impulse response, we can trace the time path of the structural shocks on the dependent variables of the VAR model. Sims (1980) cholesky decomposition can be used to identify the impulse response function in a VAR model by ensuring that shocks are uncorrelated. This is achieved by transforming the VAR into a vector moving average in terms of structural. While the forecast-error of variance decomposition analysis allows us to infer the proportion of the movement in sequence due to its own shocks and shocks in other variables. That is how much of a change in a variable is due to its own shock and how much due to shocks to other variables. Through the impulse response and variance decomposition, the short-run dynamics among the economic variables in the VAR system can be examined and draw some inferences about the direction of causal flows among the economic variables in the system. This is done through cholesky factorization where the standard errors are generated through 10,000 Monte Carlo simulations. The impulse response functions and variance decomposition are performed at level VAR models estimated with lag four as suggested by selection criteria of AIC, SC and HPE.

5.0 Empirical Results

This paper starts the analysis of empirical results with unit root tests. This is followed by cointegration tests using maximum likelihood procedure of Johansen (1988) and Johansen and Juselius (1992). The next stage is the examination of short-run dynamics and long run causality between financial development and economic growth through the Engel-Granger Vector error correction model (VECM). However, the impulse response function and variance decomposition are also obtained and analysed. The paper also uses structural vector auto regression model (SVAR) to obtain impulse response and variance decomposition following Blanchard and Quah (1989) long-run restriction framework.

5.1 Unit root tests:

To examine the existence of stochastic non-stationary in the series the paper establishes the order of integration of individual time series through the unit root tests. Four unit root tests are carried out. These are: Augmented Dickey-fuller (ADF), Detrended Dickey-fuller (DF-GLS), Phillip- Peron (PP) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS). The series are: real GDP (LGDP), investment ratio (LINV), turnover ratio (TR), value of shares traded (VT), market capitalization (MC) and bank credit to private sector (BCP). The results indicate that all the series are integrated of order one I (1). That is all the series are non-stationary at level but stationary at first difference. The results are presented in table (1) below:

Table 1(a): unit root results Level (constant)

Variables	ADF	Lag	DG-GLS	Lag	PP	KPSS
LGDP	0.0267	(1)	0.749	(1)	0.131	0.827*
LINV	1.939	(1)	-0.689	(1)	-2.416	0.607*
BCP	0.027	(0)	0.749	(0)	0.132	0.827 **
TR	0.155	(3)	0.309	(5)	-1.426	1.054*
VT	2.813	(3)	2.346	(4)	-0.822	1.044*
MC	-1.308	(3)	-0.570	(3)	-0.138	0.700**
	1st difference (constant)					
Variables	ADF	Lag	DG-GLS	Lag	PP	KPSS
LGDP	-5.627	(0)	-5.520	(0)	-5.704	0.532

LINV	-7.851	(0)	-2.386	(2)	-8.345	0.636
BCP	-10.39	(0)	-9.794	(0)	-10.39	0.222
TR	-12.20	(2)	-3.215	(4)	-16.74	0.136
VT	-5.221	(3)	-3.714	(3)	-14.77	0.279
MC	-4.089	(2)	-3.296	(2)	-5904	0.196

The asterisk *, **, and *** implies 1%, 5%, and 10% levels of significance respectively.

Table 1(b): unit root results Level (constant and trend)

Variables	ADF	Lag	DG-GLS	Lag	PP	KPSS
LGDP	-0.364	(1)	-0.668	(1)	-0.016	0.277*
LINV	-1.017	(0)	-0.309	(1)	-0.758	0.251*
BCP	-1.191	(0)	-1.506	(0)	-1.131	0.085*
TR	-1.944	(5)	-1.405	(5)	-3.837	0.225*
VT	-0.344	(4)	-0.297	(4)	-3.660	0.262*
MC	-2.203	(3)	-2.340	(3)	-1.157	0.262*
	1st difference (constant and trend)					
Variables	ADF	Lag	DG-GLS	Lag	PP	KPSS
LGDP	-6.052	(0)	-6.017	(0)	-5.938	0.091
LINV	-9.097	(0)	-6.602	(0)	-9.278	0.051
BCP	-10.49	(0)	-10.54	(0)	-10.49	0.121
TR	-12.21	(2)	-3.175	(4)	-17.03	0.122
VT	-12.51	(2)	-3.215	(3)	-19.29	0.086
MC	-4.096	(2)	-3.951	(1)	-5.882	0.112

The asterisk *, **, and *** implies 1%, 5%, and 10% levels of significance respectively.

5.2 Tests for cointegration:

The cointegration tests are carried out based on the Johansen (1988) and Johansen and Juselius (1992) maximum likelihood framework. The essence is to establish whether long-run relationship exists among the variables of interest. The results of the tests for the three models are presented in table 2 and they indicate that both the trace test and maximum eigenvalue statistics reject the null of $r \leq 0$ against the alternative $r \geq 1$ at 5% level of significance suggesting the evidence for the presence of one cointegrating vector in both models A and B respectively. However, there is no evidence of cointegration in model C. Since VAR models are always sensitive to lag, the paper uses AIC, SC and LR selection criteria all which suggest the use of VAR lag-length four for both model A and B and lag-length two for model C. Model C was however dropped in the causality test since there is no existence of cointegration

Johansen cointegration test

Table 2 Model A: (LGDP, LINV, BCP, TR) VAR lag =4

H_0	H_1	λ Trace	5%critical value	λ max	5%critical value
$r = 0$	$r \geq 1$	59.22 ***	47.85	35.71***	27.58
$r \leq 1$	$r \geq 2$	23.51	29.80	13.60	21.13
$r \leq 2$	$r \geq 3$	9.908	15.49	8.071	14.26
$r \leq 3$	$r \geq 4$	1.837	3.841	1.837	3.841

Model B: (LGDP, LINV, BCP, VT) VAR lag = 4

H_0	H_1	λ Trace	5%critical value	λ max	5%critical value
$r = 0$	$r \geq 1$	52.15	47.86 **	32.35**	27.58
$r \leq 1$	$r \geq 2$	19.79	29.80	12.09	21.13
$r \leq 2$	$r \geq 3$	7.703	15.49	7.571	14.26
$r \leq 3$	$r \geq 4$	0.132	3.841	0.132	3.841

Model C: (LGDP, LINV, BCP, MC) VAR lag =2

H_0	H_1	λ Trace	5%critical value	λ max	5%critical value
$r = 0$	$r \geq 1$	39.07	47.86	23.15	27.58
$r \leq 1$	$r \geq 2$	15.92	29.80	10.02	21.13
$r \leq 2$	$r \geq 3$	5.901	15.50	5.606	14.26
$r \leq 3$	$r \geq 4$	0.295	3.841	0.295	3.841

r indicates the number of cointegrating vector. (**) and (***) denote statistical significance at 5% and 10% respectively

The paper carries out misspecification tests of no-serial correlation, normality and heteroscedasticity tests for model A and model B respectively. The Lagrange Multiplier (LM) test is performed to examine the evidence of first order serial correlation. The results suggest that there is no serial correlation for both models at lag-length four. The normality test is performed through the joint Jarque-Bera (JB) statistics and it indicates that residuals are normally distributed for model A; however, for model B, the JB statistics rejects the null hypothesis of normal distribution of residuals

(foot note). The heteroscedasticity test involves an auxiliary regression of the squared residuals on the original regressors and all their squares. The results indicate no presence of heteroscedasticity in both model A and model B respectively. The misspecification results are presented in table F in the appendix7

5.3 Causality:

Once the level of cointegration has been established, the next stage is to test for causality among the variables of interest. Vector error correction model (VECM) - based causality test was carried out through the Wald test and also through parsimonious VECM. The results of Wald test are presented in table 3(a) for model A and 3(b) for model B respectively. For model A, the result indicates a short-run Granger causality from a Turnover ratio (TR) to GDP, that is, TR which represents the stock market system, Granger causes the level of GDP. Also, in the short-run, GDP Granger causes BCP which represents the banking the system. In the long-run, the weak exogeneity tests show the evidence of bidirectional causality between financial development and economic growth. This result is consistent with Luintel and Khan (1999) results. However, with stock market system, there is evidence of no feedback effect as the result indicates unidirectional causality from economic growth to turnover ratio (TR). This result is also consistent with the results of Dritsaki et al (2005). The overall causality in the system is tested through the strong exogeneity and shows that the null hypothesis that financial development does not granger- cause GDP is rejected at 5% level of significance with the banking variable (BCP) and 1% level of significance with stock market variable (TR). On the null hypothesis that GDP does not granger-cause financial development is rejected at 5% level of significance with the banking system, while, the null hypothesis is not rejected for stock market variable.

Table 3(b) presents the results for model B and suggests that in the short-run there is evidence of one granger causality and that is from stock market system (VT) to the level of GDP. In the long-run, however, the weak exogeneity results indicate unidirectional causality from GDP to financial development. (Banks and Stock markets). The strong exogeneity tests also support the evidence of weak exogeneity.

Table 3(a) Model A {LGDP, LINV, BCP, TR} Granger non causality tests

Hypothesis Ho: Δ BCP $\neq$ Δ GDP	Short-run Granger non causality (all $\beta_{13i}=0$)	Weak exogeneity test ($\alpha_{11}=0$)	Strong exogeneity test (all $\beta_{13i}=\alpha_{11}=0$)
	9.163(4)	11.75(1)***	15.05(5)**
Ho: Δ TR $\neq$ Δ GDP	(all $\beta_{14i}=0$)	($\alpha_{11}=0$)	(all $\beta_{14i}=\alpha_{11}=0$)
	10.63(4)**	11.75(1)***	15.31(5)***
Ho: Δ GDP $\neq$ Δ BCP	(all $\beta_{31i}=0$)	($\alpha_{31}=0$)	(all $\beta_{31i}=\alpha_{31}=0$)

	13.13(4)**	7.849(1)***	13.69(5)**
Ho: Δ GDP $\neq$ Δ TR	(all $\beta_{41i} = 0$)	$\alpha_{41} = 0$	(all $\beta_{41i} = \alpha_{41} = 0$)
	2.368(4)	0.00008.13(1)	2.514(5)

Numbers in parentheses represent the degree of freedom for the chi-square

Table 3 (b) Model B {LGDP, LINV, BCP, VT} Granger non causality tests

Hypothesis Ho: Δ BCP $\neq$ Δ GDP	Short-run Granger non causality (all $\beta_{13i} = 0$)	Weak exogeneity test ($\alpha_{11} = 0$)	Strong exogeneity test (all $\beta_{13i} = \alpha_{11} = 0$)
	6.261(4)	12.04 (1)***	13.75(5)**
Ho: Δ VT $\neq$ Δ GDP	(all $\beta_{14i} = 0$)	($\alpha_{11} = 0$)	(all $\beta_{14i} = \alpha_{11} = 0$)
	10.01(4)**	12.04(1)***	14.31(5)***
Ho: Δ GDP $\neq$ Δ BCP	(all $\beta_{31i} = 0$)	($\alpha_{31} = 0$)	(all $\beta_{31i} = \alpha_{31} = 0$)
	7.673(4)	2.873(1)	8.741(5)
Ho: Δ GDP $\neq$ Δ VT	(all $\beta_{41i} = 0$)	($\alpha_{41} = 0$)	(all $\beta_{41i} = \alpha_{41} = 0$)
	1.842(4)	2.873(1)	3.273(5)

Numbers in parentheses represent the degree of freedom for the chi-square

The parsimonious vector error correction model (VECM) for both models are presented in table 4(a) and 4(b) respectively. The parsimonious VECM is obtained following general to specific frame work. The long-run causality (ECM $_{t-1}$) suggests bidirectional causality between financial development and economic growth using the banking system (BCP) and unidirectional causality for economic growth to stock market system (TR). Model B shows unidirectional causality form economic growth to financial development that is both in the banking and stock market variables. The overall results are consistent with the Wald test results. The overall diagnostics tests are good except for LINV, BCP and TR that fail the normality test in model A and BCP and VT in model B.

Table 4 (a) ***Model A*** ***Parsimonious VECM***

Variables	Δ LGDP	Δ LINV	Δ BCP	Δ TR
C	0.001(4.55)***	-0.004(-3.05)***	0.012(1.84)*	0.08(1.926)**
Δ LGDP $_{t-1}$	0.435(3.94)***	-	4.254(2.03)**	-
Δ LGDP $_{t-3}$	-	1.413(4.20)**	-3.659(-2.50)**	-
Δ LINV $_{t-1}$	-	0.241(3.29)**	-	-

Δ $LINV_{t-2}$	0.069(2.37)**	-	-	-
Δ $LINV_{t-4}$	0.080(2.11)**	-	-	-
Δ TR_{t-1}	-0.002(-2.87)***	-	-0.035(-2.40)**	-0.541(-4.54)***
Δ TR_{t-2}	-0.001(-2.44)***	-	-0.031(2.92)***	0.481(-3.03)***
Δ TR_{t-3}	-0.001(-2.35)***	-	-	-0.307(-1.88)**
Δ TR_{t-4}	-	-	-	0.241(1.99)**
ECM_{t-1}	-0.056(2.95)***	-0.006(-0.14)	0.897(3.12)***	0.2100(0.10)
$AdjR^2$	0.477	0.281	0.361	0.347
B-G LM test χ^2	0.221	0.915	0.099	0.093
Hetro. test χ^2	0.223	0.114	0.369	0.725
Normality	0.259	0.000	0.033	0.0007

*Asterisks indicate the following level of significance,*10%, **5% and ***1% respectively using t- statistics*

Table 4(b) Model B Parsimonious VECM

Variables	Δ LGDP	Δ LINV	Δ BCP	Δ VT
C	0.002(4.71)***	-0.007(-4.65)	0.008(1.25)	0.207(2.24)**
Δ $LGDP_{t-1}$	0.391(4.56)***		-	33.33(0.104)
Δ $LGDP_{t-3}$	-	1.294(4.22)***	-	-
Δ $LGDP_{t-4}$	-	0.957(3.09)***	-	-
Δ $LINV_{t-2}$	0.061(2.32)**	-	-	-5.706(-0.88)
Δ $LINV_{t-4}$	0.070(2.94)***	-	-	5.904(0.94)
Δ BCP_{t-1}		0.0364(2.20)**	-	2.567(0.28)
Δ VT_{t-1}	-		0.014(2.14)**	-0.635(-4.34)***
Δ VT_{t-2}	-	-		-0.642(-6.88)***
Δ VT_{t-3}	-	-	-	-0.433(-3.63)***
Δ VT_{t-4}	-	-	0.019(2.89)***	
ECM_{t-1}	-0.032(-2.89)***	-0.079(-1.80)	0.405(1.62)	8.736(1.94)

AdjR^2	0.338	0.356	0.177	0.395
B-G LM test χ^2	0.321	0.132	0.575	0.546
Hetro. test χ^2	0.020	0.231	0.420	0.332
Normality	0.144	0.661	0.014	0.000

Asterisks indicate the following level of significance,*10%, **5% and ***1% respectively using t- statistics

5.4 Impulse Response function and Variance decomposition

The results of variance decomposition at level VAR reveal the forecast error in each variable that can be attributed to innovations in other variables over five quarterly time periods (20 periods). In model A, the forecast error variances of all the variables in the system are largely due to their own innovations although over time the innovations of other variables show a tendency to increase gradually. It should be noted however, that a response is considered as significant if it does not contain zero line within its confidence interval band ($\pm$ 2 S.D)

The results in table (A) in the appendix first shows the variance decomposition of LGDP and indicates that large percentage of forecast error is due to its own innovations (about 66% up to fifth quarter-periods) while the innovations of BCP, LINV, and TR explain about 14%, 10%, and 11% respectively of the variation in LGDP. The variance decomposition of BCP indicates that about 65% of innovations in BCP are due to its own shocks in the first quarter (accounted for about 65%) however, by the fifth quarter period this percentage declines to 28%. While, on the other hand, LGDP, LINV and TR explain about 34%, about 3% and about 35% of the variation in the BCP during the 5^{th} quarter time period. The variance decomposition of TR indicates that in the first quarter period, 91.5% of the forecast error variances are due to its own innovations and in the 5^{th} quarter period, it declines to 80.6%. The remaining variation in the forecast error variances are explained by LGDP (3.5%), LINV (4.3%) and BCP (11.5%) respectively.

The results of impulse responses are shown in figure (1) .At initial stage; it shows that the responses of all the variables in the system are due to their own shocks although this gradually decreases over time which is consistent with results from variance decomposition. This means that the variables return to its previous equilibrium value of zero if there are no further shocks over some periods. In this study, since we are interested in the causal flows between financial development and economic growth. Therefore, only the impulse responses for LGDP, BCP, TR and VT are analysed. It should also be noted that once the innovations are characterised by the presence of contemporaneous correlation then results obtained can be sensitive to choleski ordering scheme of the variables in the

VAR system.[6] It can be observed that there is large response of each variable in the system to its own innovations. The LGDP shows a relative lower increase in response to a standard deviation shock given to the innovations of BCP and TR respectively. That is, the shocks of an impulse response in BCP and TR are approximately positive on LGDP but they are relatively weak. The response of BCP shocks leads to a sizable increase in LGDP particularly from second quarter-periods to fifth quarter-period. Meanwhile the response of TR to a standard deviation shock to LGDP is negative and not significant it later picks up to a positive position but still not significant. Therefore, from these results above, it can be concluded that there is bidirectional Granger causality between economic growth and financial development for banking system (BCP) and a unidirectional Granger causality from economic growth to stock market system (TR)

Model B results are presented in table (B) in the appendix. It indicates that forecast error variances of LGDP are mainly explained by its own shocks from the first quarter period to the fifth quarter period though it shows gradual decline from 98% in the first quarter to 65% in the fifth quarter. By the fifth quarter time period, the forecast error variances explained by LINV, BCP, and VT are 21%, 3% and 10.8% respectively. It can also be observed that most of the forecast error variances of BCP are explained by its own shocks; accounting for about 89% of innovations in the first time period and later decline to 76% in the fifth quarter- time period. Mean while, the innovations of LGDP, LINV and VT, explain 18.9%, 1.5% and 3.0% respectively of the variation in BCP in the fifth quarter time-period. The variance decomposition of VT also indicates that a high percentage (79.9%) of variations is due to its own shocks in the first quarter-time period. The variations of 6.9%, 3.4% and 9.7% are explained by LGDP, LINV and BCP respectively. By fifth quarter time-period, the forecast error variances of VT has declined to 40.6% from about 80% in the first quarter time-period and that of LGDP increases to 38.8% in the fifth period. The remaining percentages of 1.5% and about 19% of LINV and BCP explained the variations in VT respectively.

Model B impulse responses in figure (2) show that the response of LGDP shocks to BCP has a positive but weak effect while the shock of LGDP to VT is positive and significant. The impulse response for BCP shocks tends to lead a positive increase in LGDP. The impulse response of VT to LGDP indicates a positive and significance effect to a standard deviation shock in LGDP. The overall results indicate bidirectional Granger causality between financial development and economic growth using banking system (BCP) though the response of LGDP to BCP is weak. VT also indicates bidirectional Granger causality.

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[6] It is clear that once the innovations are characterized by the presence of contemporaneous correlation, it means that the results may be sensitive to cholesky ordering scheme of variables in the system. Attempts were made for alternative ordering schemes and the results of the impulse response function and variance decomposition remain consistent. Therefore, results are reported based on the following order (LGDP, LINV, BCP and TR).

5.5 SVAR

As already explained for just-identified restrictions to be achieved, we need at least one restriction. That is $n(n-1)/2$ restrictions and following Blanchard and Quah (1989) framework, to test the hypothesis that financial development represented by both stock market and banks does have long-run impact on economic growth the temporary effect is restricted to zero. After estimating the just-identified restrictions, the results generated from impulse responses and variance decomposition are reported in figure 5(a, b, and c) in the appendix and tables 8 respectively. The estimation of SVAR is carried out in a bivariate VAR model[7]. The results of the unit root tests indicate that all the series are I (1) and lag 2 is used which suggest absent of serial correlation.

Figure 5(a) presents the impulse responses from a shock to LGDP in the bivariate model for GDP and financial development (BCP). It shows that the level of GDP increases but not so significantly to about 0.2% which is the new steady state. Figure 5(b) indicates the bivariate VAR model of LGDP and turnover ratio (TR). The impulse responses from a shock to LGDP shows the level of GDP increases immediately to about 0.3% and later settles to a new steady state approximately above 0.1%. Meanwhile, Figure 5(c) which shows the bivariate VAR of LGDP and value of shares traded (VT) indicate a positive response of VT to LGDP shocks. The LGDP increases to over 0.3% and later settles at steady rate of 0.2%. The results indicate that both stock markets and banks do have little effect in promoting economic growth in the long-run.

6.0 CONCLUSION

The objective of this paper is to examine the casual relationship between stock markets, banks and economic growth in South Africa using quarterly time series data from 1983:q1-2007:q4. The uses Vector Error Correction model (VECM) based causality tests to establish a link between financial development (represented by both banking and stock market systems) and economic growth.

Impulse response functions (IRFs) and Variance Decompositions (VDCs) are computed to further examine the short-run dynamics among the variables in the system. Structural Vector Auto regression (SVAR) is also employed to further examine the link financial development and economic growth. This is achieved by following Blanchard and Quah's (1989) technique to identify the components of residuals to recover the shocks based on endogenous economic theory.

The empirical investigation suggests that in the long-run, there is evidence of bidirectional causality between financial development and economic growth using the banking system. While, when stock

[7] Garrat et al (2002) indicates that the Blanchard and Quah (1989) long-run estimation can effectively be estimated with a small VAR model.

markets variables are used that is Turnover Ratio (TR) and Value of shares Traded (VT), the results indicate unidirectional causality from economic growth to stock market system. The Impulse response functions (IRFs) and variance decompositions (VDCs) indicate that financial development (BCP,TR, and VT) have short-run impact on economic growth at the immediate year of initial shocks and VDCs shows that all the indicators for financial development contain some useful information in predicting the future path of economic growth

From this study, it indicates that financial sector plays a critical role in the South Africa economy. Since the advent of democracy in the 1990s, South Africa financial system has undergone massive restructuring in line with market-based liberalization reforms. These reforms have now made South African financial market as one of the best in the world by providing world class financial infrastructure and services. There is need to continue with these reforms in order to enable it contribute effectively to economic growth. However, a lot still need to be done to translate this achievement in to proper growth process by extending adequate provision loans to small scale enterprises which constitute large part of employment generation.

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APPENDIX

Table (A) Model A :{ LGDP, LINV, BCP, TR} at VAR level

1.**Variance Decomposition of LGDP**

	Explained by shocks in			
Time Horizon (Year)	LGDP	Investment (LINV)	Bank credit (BCP)	Value shares traded (TR)
4	95.90	0.188	3.627	0.282
	(4.615)*	(1.561)	(4.053)	(1.453)
8	91.68	1.107	6.694	0.513
	(8.919)*	(4.243)	(7.525)	(2.972)
12	84.63	4.383	7.847	3.138
	(13.11)*	(7.338)	(9.758)	(7.112)
16	75.03	9.013	8.748	7.212
	(16.11)*	(9.861)	(11.82)	(11.29)
20	65.67	13.59	9.915	10.81
	(17.60) *	(11.70)	(13.71)	(14.27)

2. Variance Decomposition of Bank credit (BCP)				
4	7.677	6.086	65.64	20.59
	(6.800)	(6.110)	(9.948)*	(7.271)*
8	9.510	5.495	54.69	30.30
	(8.893)	(7.231)	(13.11)*	(10.66)*
12	16.80	3.813	42.94	36.26
	(11.34)	(6.598)	(14.97)*	(12.59)*
16	26.61	2.961	33.72	36.71
	(12.93)	(6.131)	(15.35)*	(13.25)*
20	33.86	2.603	28.58	34.96
	(13.74)	(6.178)	(15.23)*	(13.47)*
3. Variance Decomposition of Turnover ratio (TR)				
4	3.891	0.786	3.739	91.58
	(4.536)	(2.927)	(4.403)	(6.620)*
8	3.318	1.122	2.655	92.90
	(4.980)	(3.845)	(4.168)	(7.214)*
12	3.046	2.257	3.933	90.76
	(5.528)	(5.097)	(6.161)	(9.159)*
16	2.742	3.536	7.094	86.63
	(6.147)	(6.179)	(9.324)	(11.87)*
20	3.565	4.348	11.49	80.60
	(7.625)	(6.884)	(11.56)	(14.41)*

Figure (1) Model A :{ LGDP, LINV, BCP, TR}

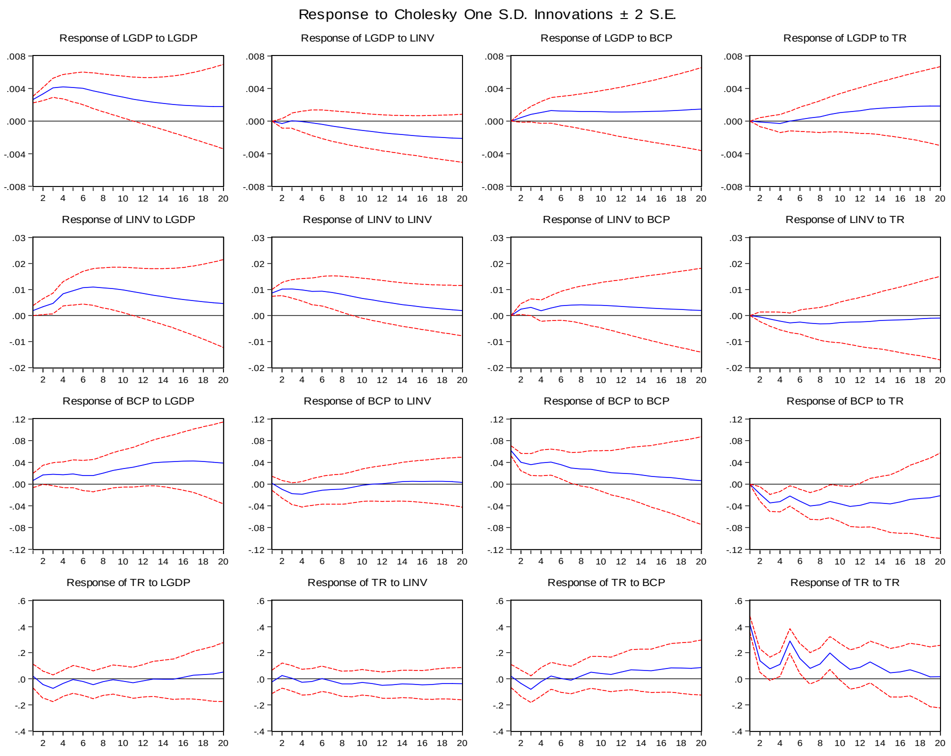

Table (c) Model B :{ LGDP, LINV, BCP, VT}

1.Variance Decomposition of LGDP

	Explained by shocks in			
Time Horizon (Year)	LGDP	Investment (LINV)	Bank credit (BCP)	Value shares traded (VT)
4	98.01	0.275	1.181	0.530
	(3.604)*	(1.720)	(2.711)	(1.897)
8	93.50	2.365	0.891	3.236
	(8.441)*	(5.286)	(4.415)	(5.491)
12	84.08	8.347	0.893	6.675
	(13.83)*	(9.301)	(6.925)	(8.687)
16	73.645	15.30	1.764	9.288
	(17.24)*	(12.09)	(10.66)	(10.41)
20	64.99	21.07	3.061	10.87
	(19.05)*	(13.82)	(14.13)	(11.29)

3. Variance Decomposition of Bank credit (BCP)

4	4.420	2.657	88.98	3.942
	(5.666)	(4.545)	(7.600)*	(3.321)
8	4.273	2.180	89.48	4.059
	(6.917)	(5.566)	(9.455)*	(4.833)
12	7.206	1.622	87.04	4.126
	(8.907)	(5.498)	(11.56)*	(6.142)
16	13.01	1.614	81.711	3.660
	(10.95)	(5.601)	(13.57)*	(6.697)
20	18.93	1.591	76.42	3.052
	(12.50)	(5.834)	(14.93) *	(6.981)

Variance Decomposition of Value shares traded (VT)				
4	6.915	3.448	9.712	79.92
	(5.327)	(4.349)	(6.144)	(7.968)*
8	11.14	2.871	14.45	71.53
	(7.025)	(4.424)	(7.986)	(9.708)*
12	20.73	2.228	17.95	59.08
	(9.537)	(4.246)	(10.52)	(11.92)*
16	31.03	1.760	19.21	47.99
	(11.68)	(4.278)	(12.83)	(13.65)*
20	38.86	1.582	18.97	40.59
	(13.17)	(4.650)	(14.65)	(14.73)*

Figure (3) Model B :{ LGDP, LINV, BCP, TR} at unrestricted VAR level

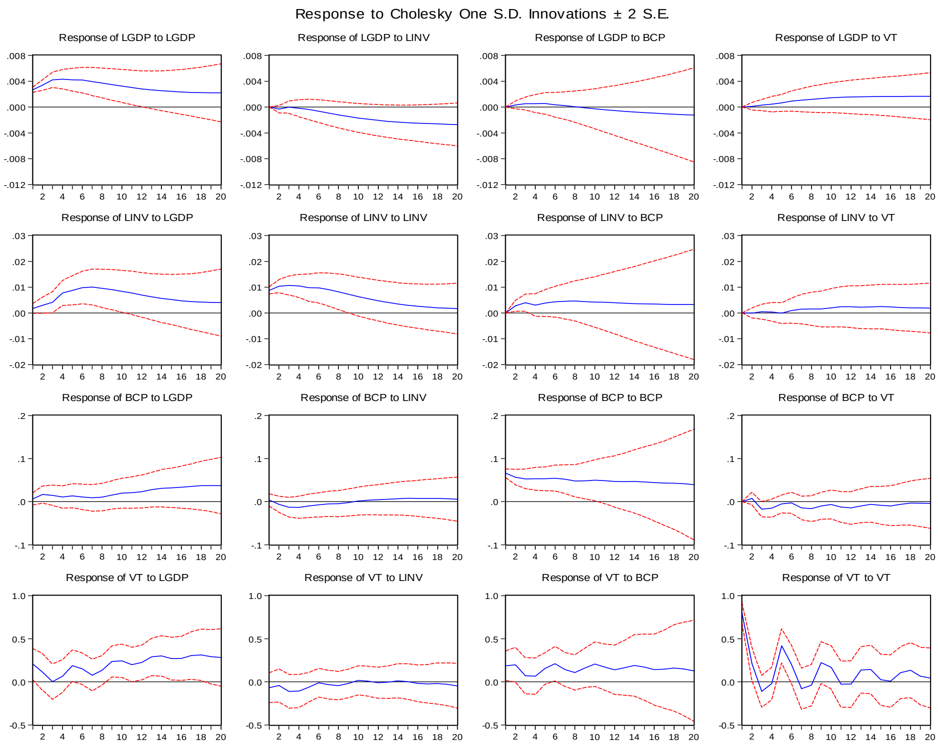
Response to Cholesky One S.D. Innovations ± 2 S.E.
Response of LGDP to LGDP
Response of LGDP to LINV
Response of LGDP to BCP
Response of LGDP to VT
Response of LINV to LGDP
Response of LINV to LINV
Response of LINV to BCP
Response of LINV to VT
Response of BCP to LGDP
Response of BCP to LINV
Response of BCP to BCP
Response of BCP to VT
Response of VT to LGDP
Response of VT to LINV
Response of VT to BCP
Response of VT to VT

Figure 5 (A)

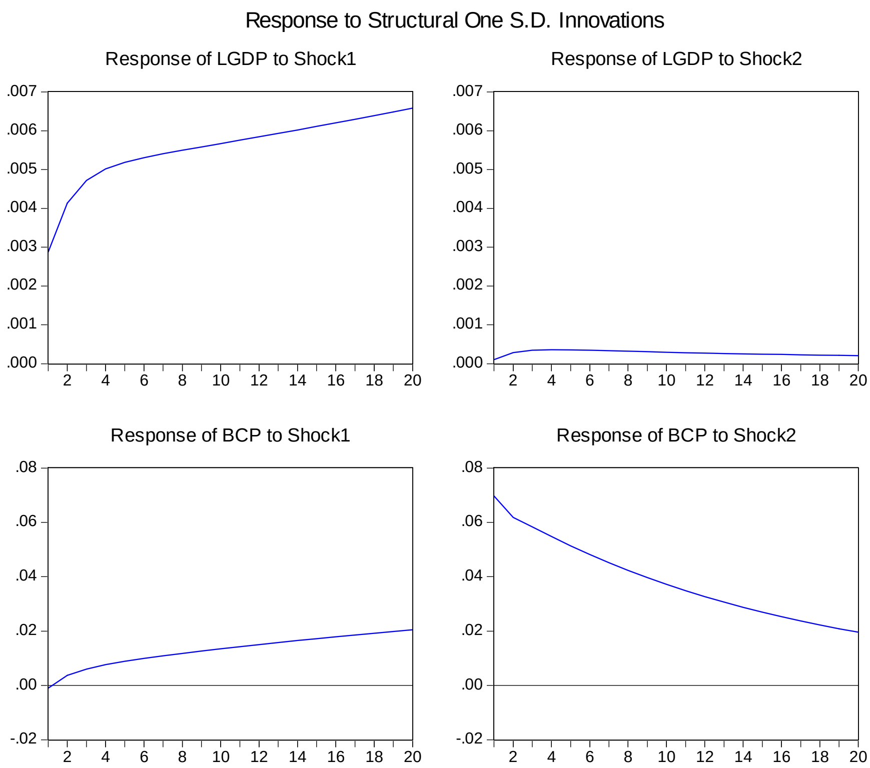
Response to Structural One S.D. Innovations
Response of LGDP to Shock1
Response of LGDP to Shock2
Response of BCP to Shock1
Response of BCP to Shock2

Figure 5(b)

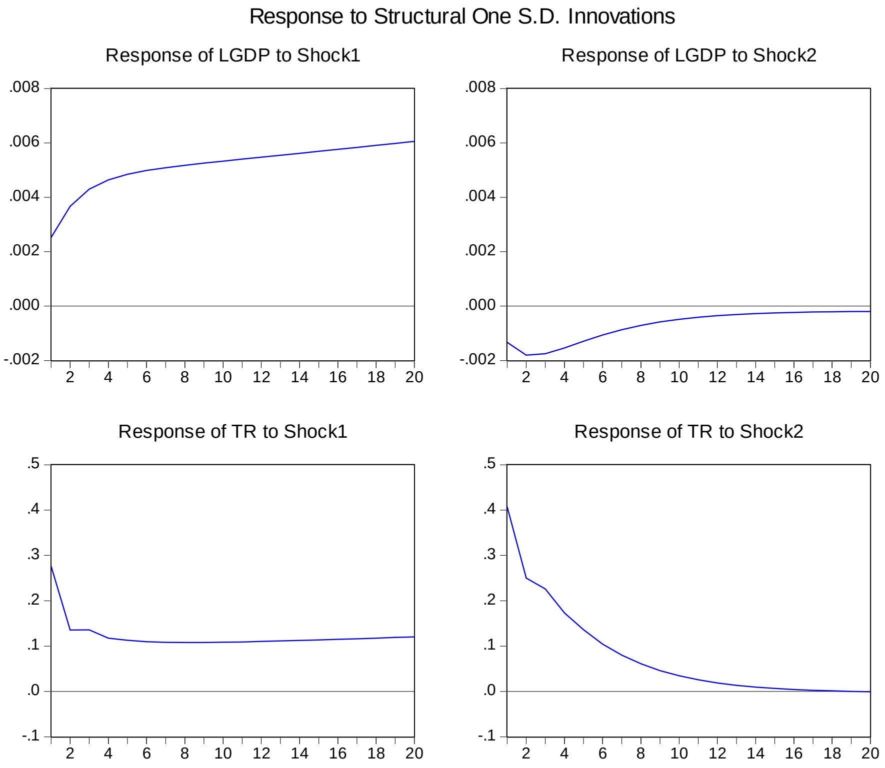

Figure 5(c)

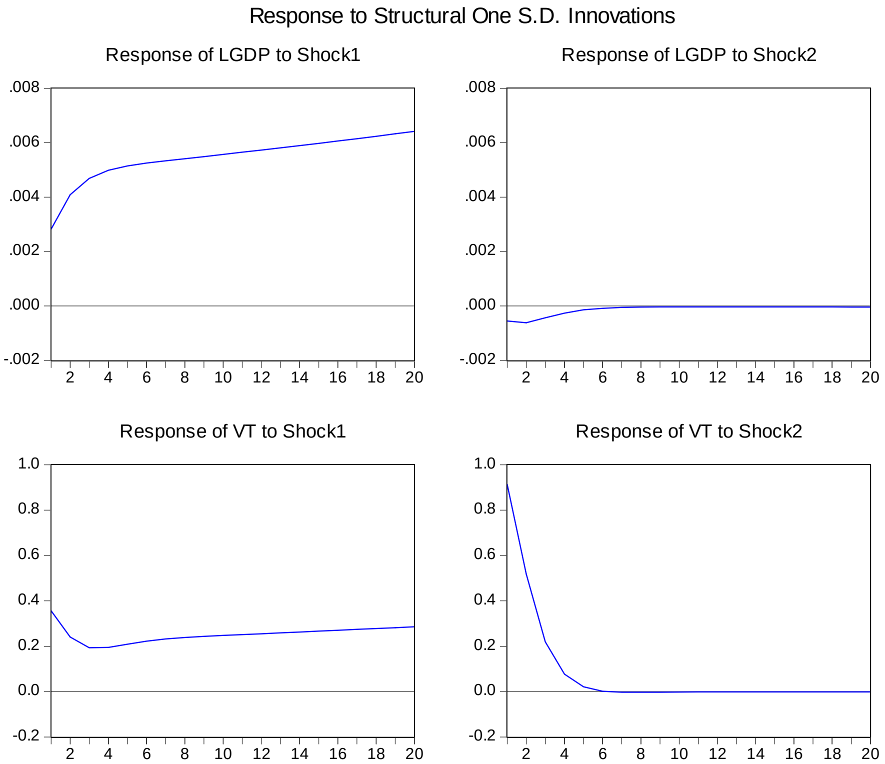

Table (E)

1.Variance Decomposition of LGDP(Demand shocks)			
Explained by shocks in			
Time Horizon (Year)	S.E.	LGDP	Bank credit (BCP)
4	0.008	99.53	0.471
8	0.013	99.56	0.430
12	0.018	99.64	0.360
16	0.021	99.70	0.299
20	0.025	99.75	0.251
	S.E.	LGDP	TR
4	0.008	85.13	14.87
8	0.013	91.73	8.266
12	0.017	94.72	5.270
16	0.020	96.27	3.728
20	0.023	97.18	2.818
	S.E.	LGDP	VT
4	0.008	98.71	1.283
8	0.013	99.47	0.521
12	0.017	99.68	0.311
16	0.021	99.78	0.214
20	0.024	99.84	0.159

Selection of the order of the multivariate VAR and P-values for misspecification tests

Model A

Lag optimal(4)	LR	FPE	AIC	SC	LM-test	NORM	HETRO
1 2 3 4	1048.9 46.250 18.823 40.956	8.29e-13 6.72e-13 7.54e-13 6.23e-13	-16.47 -16.68 -16.57 -16.77	-15.91 -15.69 -15.13 -14.89	0.374 0.383 0.459 0.328	0.206 0.902 0.099 0.079 Joint(0.1106)	0.3163 Df.=320 $\chi 2$ =331.57
Model B: Lag optimal(4)	LR	FPE	AIC	SC	LM-test	NORM	HETRO
1 2 3 4	1024.2 47.295 22.580 31.892	3.45e-12 2.76e-12 2.95e-12 2.75e-12	-15.04 -15.26 -15.20 -15.28	-14.490 -14.273 -13.770 -13.407	0.107 0.238 0.574 0.473	0.177 0.931 0.812 0.000 Joint(0.000)	0.1598 df =320 $\chi 2$ =345.146
Model B: Lag optimal(2)	LR	FPE	AIC	SC	LM-test	NORM	HETRO
1. 2 3. 4.	1166.08 133.379	3.59e-15 1.01e-15	-21.908 -23.183	-21.356 -22.189	0.053 0.601	0.002 0.845 0.349 0.861 Joint(0.048)	0.0003 Df=160 $\chi 2$ =229.8