Full Length Research Paper

Finance and economic growth nexus: Complementarity and substitutability between the banking sector and financial markets in Africa, using South Africa as a case[1]

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The paper empirically examines the dynamic relationship between financial development and economic growth in South Africa in terms of financial intermediaries and financial markets based structure. A time series analysis using the VAR Model provided evidence for the dynamic relationship. The paper provides empirical evidence on the causal impact of the financial market on economic growth in South African. The results suggest that financial intermediaries and financial markets have different impacts on economic growth given their different roles in the economy. In particular, there is bidirectional causality between stock market and economic growth. Also, a unidirectional causality from the bond market to economic growth was established. However, as for financial intermediaries, causality runs from economic growth to financial intermediaries. This suggests the importance of the financial market in economic development in South Africa.

Key words: Financial markets, financial intermediaries, economic growth, vector auto-regression, Granger causality.

INTRODUCTION

African countries have lagged behind in terms of growth when compared with Western and Asian countries (Easterly and Levine, 1997; Collier et al., 2004). There are a number of reasons attributed to this predicament. The 2009 NEPAD-OECD African Investment Initiative on deepening African Financial Markets for Growth and Investment indicates that African countries have largely relied on commodity prices and external finance to support growth, channels which are highly vulnerable to a downturn as witnessed during the Global financial crisis

(Dahou et al., 2009). At the height of the crisis, African economies witnessed a collapse of export revenues due to the decline in the world's demand for minerals and fossil resources.

The report further suggests that, of importance to many African countries is to channel existing resources to productive investments so as to stimulate growth on the continent. One of the ways to achieve this is the development of efficient financial markets[2]. There are however a number of problems affecting the development

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of financial markets in Africa. These include inadequate regulatory framework, the banking sector that fails to exercise its role of financial intermediation, under-developed capital markets and lack of innovative financial instruments in most African financial markets (Dahou et al., 2009). The focus of this study is to analyze the structure of the financial system, mostly, the extent to which development of the financial system impacts on economic growth in Africa. Previous studies on this subject have focused much on the banking sector or stock market, leaving the bond market unattended to due to under-development and non-existence of this market in some African economies. The three sectors have emerged as the major engines for growth as documented in a number of studies (Green and Jovanovic, 1990; Bencivenga and Smith, 1991; Saint-Paul, 1992; Pagano, 1993; Levine, 1997; Fink et al., 2003). However, conclusions vary.

Dailami and Atkin (1990: 38 and 39) note that the dominants of banking in the financial system of most developing countries in conjunction with severe insolvency problems affecting much of the banking sector have tended to crowd out formal consideration and analysis of capital market issues. However, it is suggested that the prevailing problems of the banking sector originate from unbalanced capital structures at the corporate level and the lack of development of financial markets.

The element of complementarities between the banking sector and the securities markets deserves attention, taking into account that most African financial systems are disintegrated and inefficient and in the past banks have played the major role of raising and channelling funds to productive sectors of the economy. However, the United Nations Economic Commission for Africa (UNECA) (2006) suggests that a characteristic of most African countries' banking sectors is the high concentration ratio with large share of assets held by the top three largest banks whose average market share is about 73%. The report suggests that this leads to excessive liquidity and risk aversion. It is also argued that such an oligopolistic banking sector has negative consequences such as high interest rate spreads which crowd out credit to the private sector by making loans too costly. Also, banks are said to favour government assets, resulting in low intermediation rates and a smaller share of credit allocated to the private sector.

Establishing the link between the growth of the financial system and economic growth dates back to the time of Adam Smith (1776), who noted that the establishment of a bank in Scotland resulted in an improvement in trade and industry .In the same vein, Bagehot (1873) and Schumpeter (1912) noted that there is a positive relationship between financial development and economic growth. However, there has been a lot of debate with regards to the extent to which the financial structure (composition of financial intermediaries and financial markets) matter as far as economic growth is concerned. Some researchers advocate for the banking sector[3] whilst others suggest the stock market[4] with a few supporting the development of the bond market (Wachtel, 2001; DeBondt, 2002; Fink et al., 2003). Nevertheless, most of the studies on this area have been done in developed countries with less being done in Africa due to underdevelopment of most African financial systems. This study seeks to add an African flavour by analysing the impact of all the three important sources of capital on economic growth in Africa.

The paper is structured as follows: Following section 1 which is the introduction is section 2 which focuses on the overview of the South African financial sector; Section 3 looks at the literature review and theoretical framework; Section 4 focuses at methodology, data and estimation and Section 5 concludes with interpretation and conclusion.

Overview of the financial system in South Africa

Van Zyl et al. (2003) show that the South African Finan-cial Sector has undergone a lot of change in the past years. This was made possible by both the public authorities and private financial services sector as neces-sitated by the global liberalisation of financial markets.

A number of developments have taken place in the South African Financial system. These include the transformation approach towards the implementation of monetary policy, the emergence of new financial instruments and products, new financial intermediaries and brokers, changes in supervision of markets and institutions and substantially higher levels of activity in the financial markets.

South Africa's banking sector compares favourably with those of industrialised countries. Foreign banks are well represented and electronic banking facilities are extensive, with a nationwide network of automated teller machines (ATMs) and internet banking facilities available. The Financial Services Board oversees the regulation of financial markets and institutions, including insurers, fund managers and broking operations but excluding banks, which fall under the South African Reserve Bank.

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[3] Singh (1992) argues that "the modern theories of finance provide strong theoretical reasons for banks as suitable vehicles for achieving economic growth as compared to stock markets. The author suggests that an ordinary shareholder does not have the incentive or ability to obtain necessary information, which is costly, to monitor management activities, thus leading to the shareholder eschewing commitment to the organisation and prefer liquidity. The banks, on the other hand, have both the means and the incentive to collect such information and take a long-term view of firm's prospects- a perspective which is vital for industrialisation in developing countries."

[4] Drake (1986) suggests that equity finance is free from adverse selection and oral hazard effects whilst debt finance is subject to it, in the presence of asymmetric information.

Table 1. Classification of South African Financial Intermediaries.

Deposit Intermediaries	Non-deposit Intermediaries
South African Reserve Bank (SARB)	Contractual Intermediaries
Corporate for public Deposits (CPD)	Long-term insurers
Land and Agricultural Bank (LAB)	Short-term Insurers
Private Banks	Pension and provident funds
Mutual Banks	Public Investment commissioners (PIC)
Postbank	
	Portfolio Intermediaries
	Unit trusts
	Property unit trusts
	Participation mortgage bond schemes
	Development finance intermediaries (DFIs)
	Development Bank of Southern Africa (DBSA)
	Industrial Development Corporation (IDC)
	National Housing Finance Corporation (NHFC)
	Khula Enterprise Finance (KEF)
	Infrastructure Finance Corporation (INCA)

Source: *Van Zyl et al. (2008).*

Table 2. South African banking Industry.

Banking	2002	2003	2004	2005	2006
Bank assets/ GDP (%)	94.1	109.4	107.2	109	120.1
Loans and advances as a % of GDP	68.4	69.5	67.3	73.6	82.7
Mortgage assets/total banking sector assets (%)	25.4	23.4	27.1	31.1	32.8
Bank deposits/GDP (%)	79.5	81.9	81.4	88.3	98.1

Source: Van Zyl et al. (2008).

The South African banking sector

Financial intermediaries issue financial liabilities that are acceptable as investments to the ultimate lenders, and use the funds to acquire the claims that reflect the requirements of the borrowers. In illustrating the size of South Africa's financial institutions, the sector maybe classified into two broad categories, that is deposit and non-deposit intermediaries. This is illustrated in Table 1.

However, there are a number of institutions and funds that border on being classified as financial intermediaries. These institutions are termed quasi-financial intermediaries and are not included in the classification above.

Van Zyl et al. (2009) show that the size of the banking industry in South Africa can also be measured by the size of its assets. Bank assets have exceeded GDP every year from 2003, and by 2006 represented 120% of GDP as indicated in Table 2.

This indicates that the financial intermediary sector has gained more weight in terms of its GDP contribution.

The South African financial market

Apart from a vibrant bank sector, South Africa has a sound financial market system. The economic function of financial markets is to provide channels for transferring the excess funds of surplus units to deficit units. The South African financial market is composed of the money market, bond market, equity market, foreign exchange market and the commodities market. In this study the focus shall be on the Johannesburg stock exchange and bond market.

The Johannesburg Stock Exchange Limited is the 18th largest exchange in the world by market capitalisation of R3.3-trillion as of September 2005 with approximately 400 listed companies and a market liquidity of 31.2%. The JSE is an essential component in the functioning of South Africa's economy, providing an orderly market for dealing in securities and thereby creating new investment opportunities in the country. The market has been on a positive growth path until the 2008 global financial crisis as indicated in Table 3.

Table 3. Growth of the South African Financial Markets in relation to GDP.

	2001	2006	2007	2008	Average 2001-2008
GDP/Capita percentage growth rate	0.78	4	3.8	1.9	2.6
Capital market percentage change in value of equity	31.7	21.2	47.9	-13.5	20.6
Percentage change in value of bonds	70.7	40.8	18.4	29.5	14.1
Percentage change in future contracts	138.1	67.1	68.2	-53.7	41.2

Source: Adelagan (2009).

Table 4. Size of securities markets at the end of 2006 (Billions of US dollars).

Country	International debt securities			Domestic debt securities market			Equities market
	Issuer			Issuer			
	Government	Financial Institutions	Corporate	Government	Financial Institutions	Corporate	
Australia	10.6	371.9	16.9	97.1	215.4	144.8	1095.9
Denmark	258.6	2221.8	110.7	1222.7	881.8	143.2	1637.6
Germany	1.3	326.6	9.0	111.3	98.2	13.8	1212.4
Switzerland	6.4	1749.9	255.4	835.1	379.4	23.1	3794.3
United Kingdom	8.0	12.2	5.6	69.8	25.3	14.3	711.2
South Africa	44.9	28.9	19.8	169.1	112.5	27.4	348.3
Mexico	55.3	2.3	3.9	60.4	4.9	11.4	51.2
Argentina	3.7	22.4	6.0	59.2	33.9	53.0	235.6
Malaysia	33.8	6.1	0.4	129.5			148.8
South Korea	7.7	64.9	28.2	459.9	291.9	258.2	834.4

Source: Van Zyl et al. (2009).

The JSE's main function is to facilitate the raising of capital by re-channelling cash resources into productive economic activity, thus building South Africa's economy while enhancing job opportunities and wealth creation. In addition, from a derivatives perspective, the JSE provides an effective and efficient price determination facility and price risk management mechanism.

Apart from developments in the stock market and the banking sector, the growth of the bond market in South Africa has been outstanding as well. Table 3 shows that the bond market grew averagely by 14.1 percent between 2001 and 2008. For the same period, GDP per capita appreciated by 2.6 percent. Also the underlying value of equities and futures contracts experienced an average increase of 20.6 and 41.2 percent, respectively.

Adelegan (2009) suggests that the growth in the bond and equity markets has contributed to the growth of the future market in South Africa by facilitating the introduction of a number of equity and bond market related instruments.

The South African bond market's performance has been outstanding relative to other emerging markets. Van Zyl (2009) show that the South African bond market is a leader in terms of the number of bonds listed and turnover. Table 4 shows the sizes of the foreign debt and domestic debt securities market in a few countries at the end of 2006.

Table 4 shows that the size of the bond market in South Africa is relatively large, even compared to some of the developed countries. As far as emerging economies are concerned, only South Korea has a larger domestic government bond market than South Africa.

The above analysis shows that the growth of the South African financial system has also mirrored growth in GDP. In addition, apart from developments in the banking sector and the equity market, the South African bond market has been identified as being relatively large in terms of size of the domestic market. As far as emerging economies are concerned, only South Korea had a larger bond market than South Africa as of 2005. Several factors were identified as contributing to the development of the South African bond market. Amongst them are a healthy banking sector, properly regulated framework and macroeconomic stability. This is contrary to what is found in many of the African countries.

REVIEW OF RELEVENT LITERATURE

Of the available literature on the link between   the

financial structure and economic growth, Beck (2003) points out that banks and financial markets play different roles in fostering economic development. The author argues that the better the financial system fulfils the crucial role of mobilisation and allocation of savings efficiently, the higher the economic growth will be.

However, based on the information of asymmetric models, Beck (2003) suggests four reasons explaining why information and transaction friction prevents savers from entrusting their savings to entrepreneurs and firms. Firstly, it is argued that acquiring and processing information on firms and prospective investment projects is costly for individual investors and also results in duplication of effort. Secondly, it is proposed that individual investors face high costs of monitoring and controlling borrowers once money has changed hands. This may result in the free-ride problem by small investors on large investors who have a greater incentive to pay the cost of screening, assessing, monitoring, and controlling firms. Thirdly, due to the liquidity risk, there is a mismatch between lenders and borrowers as many investments require long-term commitment of resources whilst investors are reluctant to give up control over their savings over a longer time period. Finally, it is suggested that investors face idiosyncratic risk of individual investments. Without proper procedures to diversify these risks, investors might be reluctant to give up control over their savings. All these frictions may result in investors withholding their funds which if invested may result in technological advancement and hence economic growth.

However, the existence of an efficient financial system may help mitigate the frictions discussed above. An efficient and stable financial system will be composed of a stable banking sector and deep financial markets.

Role of the banking sector in the economy

Diamond (1984) and Boyd and Prescott (1986) suggest that by specialising in the assessment of potential borrowers, banks can reduce the cost of acquiring and processing information about firms and potential projects, thus avoiding the problem of duplication and of free-riding. Beck (2003) also suggests that through easing information frictions between savers and borrowers, banks may increase saving and capital accumulation in the economy. Also, by identifying the most worth projects and firms, banks foster innovation and efficient resource allocation. Besides, banks can also specialise in monitoring and controlling borrowers, avoiding the duplication and free-riding of individual investors (Beck, 2003).

Diamond and Dybvig (1983) and Bencivenga and Smith (1991) propose that banks can lower liquidity risk. The authors argue that by pooling savings and by investing both in short-term securities and long-term investments, banks can transform the maturity of savings

and thus facilitate the commitment of long-term resources to investment projects.

It is also argued that through the reduction of transaction costs, banks allow the pooling and sharing of risk (Beck, 2003). Banks are in a position to provide vehicles for pooling and diversifying idiosyncratic risk. This allows a shift to higher-return, higher risk projects. Allen and Gale (2000) also argue that banks can facilitate inter-temporal risk diversification. The authors also argue that systematic risks, which cannot be diversified away at a specific point in time, can be diversified across generations by long-living banks. It is proposed that banks having a long-term perspective, can buffer shocks by offering a relatively lower return during good times and a relatively higher return during bad times.

Role of financial markets in the economy

Regarding the role of financial markets, Holmstrom and Tirol (1983) put forward that more liquid markets give investors higher incentives to invest in the acquisition and processing of information since they are more likely to realise a return on the investment by trading in the market. At the same time, firms can rely on long-term resources raised through the bond market.

Jensen and Meckling (1976) suggest that financial markets, especially stock markets can help in corporate control by facilitating takeovers and tying managers to companies' performance. Scharfstein (1998) and Stein (1988) further point out that through easing takeovers of poorly managed firms, liquid stock markets foster corporate control and efficient resource allocation. In addition, as stock markets have the incentive of tying manager's compensation to stock performance, Jensen and Murphy (1990) point out that this will align their interest with shareholder's interest resulting in more resources being made available to facilitate economic growth.

Levine (1991) in another view suggest that markets can also easy liquidity risk by allowing investors to sell rapidly in more liquid markets. The author argued that if investors can rapidly convert their securities into cash, usually in the secondary market, they will be more willing to provide resources for investment projects that require long-term commitment of resources.

Also markets have the edge to facilitate risk diversification (Saint-Paul, 1992). Developed markets, both larger and deep, allow investors to construct diversified portfolios and thus hedge against idiosyncratic risk. Also the bond market is considered as a safe haven, as good as commodities such as gold.

The literature above clearly shows that through operating in different ways, both banks and markets can reduce the acquisition and processing of information, allowing control over borrowers (investments) and

facilitate risk diversification. Through this both these sectors will foster economic growth.

However, Beck (2003) suggests that there is debate as in should economies either be bank based or markets based; and at the heart of the debate is the question of whether one system is better than the other at acquiring and processing information, corporate control, and risk diversification; and based on this whether one system outperforms the other in efficiently mobilising and allocating savings resulting in sustained economic growth.

Weinstein and Yafeh (1998) and Morck and Nakamura (1999) point out that Japanese firms with close bank links tend to follow more conservative, slow-growth strategies, use more capital-intensive processes, and produce lower profits than other firms. This is consistent with Wenger and Keserer (1998)'s propositions that there is a close relationship between banks and corporate management in Germany and banks fail to effectively control their borrowers. Nevertheless, Porter (1992) suggests that Japan's bank-based system is credited with partly explaining the country's rapid economic development over the last 50 years. In the same vein, Hoshi et al. (1991) propose that Japanese firms with close ties to banks tend to be less credit-constrained than other firms.

Overall, the financial services view which is a functional approach emphasises the services that financial intermediaries and markets provide rather than who provides them. However, if the services which are provided matter much irrespective of who offers them, implying that financial structure is irrelevant, why are African countries still lagging behind considering that banks have dominated in the past years? Or is the argument of complementarities more appealing?

There is no general consensus as regards the composition of the financial system and contribution to economic growth. Of the available studies, Atje and Jovanovic (1993) looked at the relationship between stock market development and economic growth for 94 countries using annual data from 1960 to 1985, applying the Ordinary Least Squares (OLS) method. Empirical evidence revealed that stock markets have both positive levels and growth effects on economic growth. However, the authors could not find the same effect for the bank lending variable. The empirical results emphasised the importance of stock markets therefore over the banking sector as the major engines for economic growth. This result is supported by Thangavelu and Ang (2004); using the VARs and Granger causality, the authors concluded that the banking sector is reactive to economic growth. The study revealed that financial markets are essential in fuelling economic growth as indicated by the stock markets indicators. Caporale et al. (2005) and Ang and McKibbin (2007) using VARs and Johansen cointegration tests respectively also support the idea that stock markets are essential for economic growth.

In supporting the importance of the stock market as an important engine for economic growth, Ayadi et al. (2013) examined the link between financial development and economic growth in the Mediterranean countries from 1985 to 2009; they employed the panel data model. Credit to the private sector, bank deposits, stock market capitalization as a percentage of GDP, Stock market turnover were employed to measure financial development. Empirical results reveal that credit to the private sector and bank deposits are negatively related to economic growth, whilst, stock market capitalization and turnover are positively related to economic growth.

Contrary to the Atje and Jovanovic (1993)'s observation, Harris (1997), using the same annual data for 39 countries from 1980 to 1988, applying the Two stage least squares, found little evidence for supporting the assertion that stock market activity helps to explain growth in per capita output. However, the effect of the stock market was found to be weak for developing countries compared to developed countries. This is consistent with Choe and Moosa (1999) using the time series approach. For the empirical results, causality tests showed that financial development leads to higher economic growth and financial intermediaries are more important than capital markets for the Korean experience.

In another view, Levine and Zervos (1998), using annual data for 47 countries over the period from 1976 to 1993, found out financial development leads to higher economic growth. The authors assert that stock market liquidity and banking sector development both positively affect real per capita GDP growth, capital accumulation and productivity growth. It was also found that stock market size, volatility and international integration are robustly related to economic growth. This is consistent with Rajan and Zingales (1998), who used panel data effects for 41 countries from 1980 to 1990 and found that countries with better-developed financial intermediaries and financial markets companies can access finance easily to expand their operations, hence economic growth.

Arestis et al. (2001), using the Johansen approach and VECM, concur with Levine and Zervos (1998) and Rajan and Zingales (1998). However, the authors point out that contributions from stock markets are relatively small compared to that of banks. Beck and Levine also using a panel data set on 40 countries also found that both stock markets and banks contribute to economic growth. The authors found both the stock market and banks to be positively and highly significant, suggesting that the two segments provide different financial services.

From 1998, there has been a proliferation of studies emphasising the importance of the legal system as an ingredient supporting the link between the financial sector and economic growth. At the vanguard there is Demirguc-Kunt and Maksimovic (1998) who using annual data for 30 developing and developed countries from 1980 to 1991, using the OLS method found that in

countries with better and more efficient legal systems more firms use long-term external finance. The authors argue that a larger banking sector, a more active stock market and a well-developed legal system enable firms to obtain external funds more easily, which in turn facilitates firms' growth and hence economic growth. This result is consistent with Levine (1998), Levine et al. (2000) and Beck and Levine (2002).

These studies were not of either the bank based or financial markets based view but emphasised the role of the legal system, as an important ingredient as investors want security as far as their investments are concerned. This is important for African countries in which politicians engage in sentiments which are likely to create uncertainty such as laws on nationalisation in South Africa and 51 per cent empowerment in Zimbabwe.

However, there are a number of studies which questioned the strength of the relationship between finance and economic growth (Robinson, 1952; Lucas, 1988; Watchel, 2003; Manning, 2003). These studies suggest that the link between these two variables has been too much emphasised. In a similar study, Rousseau and Wachtel (2011) examined the link between financial development and economic growth for 84 countries from 1960 to 1989. The authors employed three measures of financial development, Liquid liabilities M3 as a percentage of GDP; Liquid liabilities less narrow money (M3 less M1); Credit allocated to the private sector. The authors argue that M3 at a percentage of GDP is an indicator of the overall size of financial intermediary activity in cross-country studies. M3 less M1 removes the pure transactions asset and the credit measure isolates the intermediation to the private sector from the credit allocated to government or state enterprises. Empirical evidence revealed that financial deepening has a strong impact on growth throughout the sample period as long as the country can avoid a financial crisis. During a crisis, the benefits of a crisis disappear. Also the authors established that the effect of financial deepening does not weaken when liberalizations occur. The authors also note that the absence of equity markets was not found to be important in explaining growth; however the authors note that data on market capitalization of equity markets were not available for many of the countries concerned. Authors concluded that the link between finance and growth is complex and deepening should be accompanied by appropriate policies for financial sector reform and regulation. This suggests that financial development has an impact on economic growth; however the presence of crisis periods can interrupt the effectiveness of finance in promoting economic growth.

Also, Sunde (2013) examined the impact of the financial sector on the Namibia economy from 1990 to 2011 using quarterly data. The author employed the Johansen Cointegration Technique and Granger causality. The author employed three measures of financial develop-ment, credit to the private sector; M1, M2 and M3. Empirical results revealed that financial sector development does not affect economic growth. The author attributes this result to lack of financial depth and competition in the Namibian financial sector. Also, financial development is granger caused by economic growth, thus financial development follows development of the economy. However, the measures of financial development employed by the author (M1, M2 and M3) have been criticised in that they do not show how the financial system allocates capital.

The review of literature indicates that there is no consensus as regards the direction of causality between financial development and economic growth. At the same time there is no agreement regarding the importance of either the financial markets, stock markets in almost most of these studies, or the banking sector. Also, most of the studies reviewed did not include the bond market in their regression analysis even though it is a market for long-term capital and has been found to be one of the safe havens in the event of a financial crisis compared to the stock market. Thus, this study incorporates the bond market in the analysis and employs more rigorous estimation techniques to establish the contribution of financial markets and financial intermediaries to economic growth in South Africa.

DATA AND METHODOLOGY

The study will benefit from the model developed by Thangavelu and Ang (2004). Real GDP will be used as a measure of economic growth (Y). In addition, bank credit to the private sector is used to measure bank activity in the economy. This is contrary to using the stock of broad money (M2) divided by GDP as a measure of financial depth used by a number of studies. The study does not consider this measure as it does not indicate whether the liabilities are those of banks, the central bank, or other financial intermediaries (Levine and Zervos, 1998). The author further indicates that the measure also does not indicate where the financial system allocates capital.

As a measure of financial market development, the study will use stock (S) and bond (B) market capitalization. Capitalization measures the size of the market and equals the value of listed domestic securities on domestic exchanges divided by GDP. However, it is argued that large markets do not necessarily function effectively and taxes may distort incentives to list on the exchange. Despite this assertion, capitalization is still used as an indicator of market development.

To take into account the efficiency of the stock market efficiency the study shall use the turnover ratio (TR) which is a measure of market liquidity. It is calculated by dividing value of trades of domestic shares on domestic exchanges by the value of listed domestic shares. Also, real interest rate (R) will be included in the model as a control variable. This variable is important in our analysis because it influences the propensity to save in the economy.

The study will utilise yearly data for all the variables involved from 1960 to 2012. Data for GDP and real interest rate are obtained from the South African reserve bank. Data on Stock market capitalization and Bond market capitalization are obtained from the Johannesburg

Stock Exchange (JSE). The rest of the data is obtained from the World Bank development indicators. The data will be transformed into natural logarithms save interest rate.

Time series methodology

As with all time series analysis, the study will begin with unit root analysis. Two tests will be utilised to check the time series properties of the variables. These are the Augmented Dickey Fuller (ADF) and Phillips Peron (PP) tests. Culver and Papell (1997) point out that the ADF is unable to discriminate well between non-stationary series with a high degree of autocorrelation. It is also argued that the ADF test may also incorrectly indicate that the series contain a unit root when there is a structural break in the series. It is also widely believed that the ADF test does not consider the cases of heteroscedasticity and non-normality frequently revealed in raw data of economic time series variables. The PP test is correct for higher order serial correlation by adding lagged differenced terms on the right-hand side; this test makes a correction to the t statistic of the coefficient γ from the AR(1) regression to account for the serial correlation in e_t.

Multivariate co-integration analysis and error correction modelling

The study will utilise the Johansen (1988) multivariate model to check if there is a long-term relationship between our variables of interest. The model is based on the error correction representation given by:

$$\Delta X_t = \mu + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-1} + \Pi X_{t-1} + \varepsilon_t \qquad 4.1$$

Where X_t is an (n×1) column vector of ρ variables, μ is an (n×1) vector of constant terms, Γ and Π represent coefficient matrices, Δ is a difference operator, and $\varepsilon_t \sim N(0, \Sigma)$. The coefficient matrix Π is known as the impact matrix, and it contains information about the long-run relationships. Johansen's methodology requires the estimation of the VAR equation 4.1 and the residuals are then used to compute two likelihood ratio (LR) test statistics that can be used in the determination of the unique cointegrating vectors of X_t.

The co-integrating rank can be determined with two statistics, the trace test and the maximal eiginevalue test. Under the maximum Eigenvalue (denoted by λ_{max}) test the null hypothesis that ranks (Π) $= r$ is tested against the hypothesis that the rank is r +1. The null hypothesis attests that there is cointegrating vectors and that there are up to r cointegrating relationships, with the alternative suggesting that there is (r +1) vector. The trace statistic considers whether the trace is increased by adding more eigenvalues beyond the rth eigenvalue. The null hypothesis in this case assumes that the number of cointegrating vectors is less than or equal to r. Just like under the maximum eigenvalue, in the event that $\hat{\lambda}_i = 0$, the trace statistic will be equal to zero as well. On the other hand, the closer the characteristic roots are to unity the more negative is the ln (1-$\hat{\lambda}_i$) term and therefore, the larger the trace statistic. The procedure to determine the presence of cointegration involves working

downwards and stopping at the value of r which is associated with a test statistic that exceeds the displayed critical value. Critical values for both the maximum eigenvalue and trace statistic are provided in Eviews.

Vector error correction model (VECM)

Having established the number of cointegrating vectors, the study proceeds with the estimation of the VECM. The VECM applies maximum likelihood estimation to VAR to simultaneously determine the long-run and short-run determinants of the dependent variable in the model.

This approach takes into account the short-term adjustments of the variables as well as the speed of adjustment of the coefficients. It therefore measures the speed at which the variables will revert to their equilibrium following a short term shock to each of them. In addition, this approach is appropriate for macroeconomics and financial data as it distinguishes between stationary variables with momentary effects and non-stationary variables with undeviating effects (Brooks 2008).

The error correction version pertaining to the five variables in our study is stated as follows:

$$\Delta Y_t = \delta_0 + \sum_{i=0}^{n} \delta_1 \Delta Y_t + \sum_{i=0}^{n} \delta_2 \Delta B_t + \sum_{i=0}^{n} \delta_3 \Delta S_t + \sum_{i=0}^{n} \delta_4 \Delta BN_t + \sum_{i=0}^{n} \delta_5 \Delta R_t + \lambda_1 ECM_{t-1} + \varepsilon_t$$
4.2

$$\Delta B_t = \varphi_0 + \sum_{i=0}^{n} \varphi_1 \Delta B_t + \sum_{i=0}^{n} \varphi_2 \Delta Y_t + \sum_{i=0}^{n} \varphi_3 \Delta S_t + \sum_{i=0}^{n} \varphi_4 \Delta BN_t + \sum_{i=0}^{n} \varphi_5 \Delta R_t + \lambda_2 ECM_{t-1} + \varepsilon_t$$
4.3

$$\Delta S_t = \phi_0 + \sum_{i=0}^{n} \phi_1 \Delta S_t + \sum_{i=0}^{n} \phi_2 \Delta Y_t + \sum_{i=0}^{n} \phi_3 \Delta B_t + \sum_{i=0}^{n} \phi_4 \Delta BN_t + \sum_{i=0}^{n} \phi_5 \Delta R_t + \lambda_3 ECM_{t-1} + \varepsilon_t$$
4.4

$$\Delta BN_t = \theta_0 + \sum_{i=0}^{n} \theta_1 \Delta BN_t + \sum_{i=0}^{n} \theta_2 \Delta Y_t + \sum_{i=0}^{n} \theta_3 \Delta B_t + \sum_{i=0}^{n} \delta_4 \Delta S_t + \sum_{i=0}^{n} \delta_5 \Delta R_t + \lambda_4 ECM_{t-1} + \varepsilon_t$$
4.5

Where ECM_{t-1} is the error correction term and ε_t is the mutually uncorrelated white noise residual. The coefficient of the ECM variable contains information about whether the past values of variables affect the current values of the variables under study. The size and statistical significance of the coefficient of the error correction term in each ECM model measures the tendencies of each variable to return to the equilibrium in the event that there is disequilibrium. A significant coefficient implies that past equilibrium errors play a role in determining the current outcomes. The short run dynamics are captured through the individual coefficients of the difference terms.

The study will also establish if there is causality between the different types of finance and economic growth. This is indicated by the following hypotheses: Bank activity (B) does not cause economic growth Granger (Y) if all $\delta_2 = 0$, and economic growth does not cause Granger Bank activity (B) if all $\varphi_2 = 0$. Stock market development (S) does not cause economic growth Granger (Y) if all $\delta_3 = 0$, and economic growth does not cause Granger Stock market activity (S) $\phi_2 = 0$. And, Bond market development (BN) does not cause economic growth Granger (Y) if all $\delta_4 = 0$, and economic growth does not cause Granger Bond market activity (BN) if all $\theta_2 = 0$.

These hypotheses will be tested using the standard F statistics

Table 5. Unit root tests (level series).

Variable	Augmented Dickey Fuller		Phillips Peron	
	Constant	Trend and constant	Constant	Trend and constant
lGDP	-0.416333	-2.370332	-0.150239	-1.752685
lBank	-0.940253	-2.491274	-1.214356	-1.116047
lStock	0.093165	-1.737891	0.093165	-1.909442
Lturnover	-1.699326	-2.170735	-2.939784	-1.129122
lBond	-2.062906	-2.854695	-2.834832	-2.645108
Interest	-1.240165	-2.996988	-1.069186	-3.206252

Notes: *** indicates significance at 1%, ** indicates significance at 5% and * indicates significance at 10%.

Table 6. Unit root tests: first difference series.

Variable	Augmented Dickey Fuller		Phillips Peron	
	Constant	Trend and constant	Constant	Trend and constant
lGDP	-3.574109***	-3.543763***	-3.641498***	-3.610444***
lBank	-1.820824**	-1.924467	-3.335587**	-3.453772**
lStock	-5.754078***	-5.738002***	-5.703455***	-5.689513***
lturnover	-2.348189	-2.581697	-9.070270***	-16.73776***
lBond	-2.558450	-2.558676	-4.198529***	-4.332243***
Interest	-3.168639**	-3.079837	-4.537409***	-4.537399***

*** indicates significance at 1%, ** indicates significance at 5% and * indicates significance at 10%.

as in Mehra (1994) and Aknlo and Egbetunde (2010).

EMPIRICAL RESULTS

The time series properties of the variables were carefully analysed using the ADF and PP tests and the results are shown in Tables 5 and 6.

The results in Table 5 indicate that all the variables are non-stationery at level series. At first differences the results of the ADF are mixed. However, much reliance was placed on the PP test which takes into account some shortcomings inherent in the ADF as discussed in the previous section. The PP tests results indicate that all variables are integrated of order one at 5 percent level of significance. Having established the order of integration of the variables the next step is to test the existence a cointegration relationship among the variables series using the Johansen-Juselius approach described in the methodology.

The first step in estimating the Johansen cointegration test will be to select the appropriate lag length. The choice of optimal lag length of the variables of interest is imperative in econometric model estimation, especially in a VAR model. This is important to avoid spurious rejection or acceptance of estimated results. If there are n variables with lag length k, for example, it is necessary to estimate n(nk+1) coefficients. The lag length also influen-ces the power of rejecting hypothesis. For instance, if k is too large, degrees of freedom maybe wasted. Moreover, if the lag length is too small, important lag dependences maybe omitted from the VAR and if serial correlation is present the estimated coefficients will be inconsistent. Table 7 presents the selection of an optimal lag length for this study.

Based on the all the information criteria, Schwarz information criterion (SIC), the sequential modified LR test statistic and Akaike Information Criteria (AIC) a lag-length of 4 is chosen. Having come up with an appro-priate lag-length, the Johansen cointegration test was conducted and the results are shown in Table 8.

The co-integration test results are reported in Table 8. The results indicate the existence of cointegration between GDP, Bank credit, Stock Market capitalization, Stock market turnover ratio, and bond market capitali-zation in South Africa. Both the maximum eigenvalue statistics and the trace statistics reject the null hypothesis of no cointegration at 5 per cent level for one cointe-grating equation.

Having established the presence of cointegration, a VECM was estimated and the results are reported in Table 9.

The cointegrating relationships are in the first panel of Table 9. Evidence from the table shows that all variables

Table 7. VAR Optimal Lag-length.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	62.26400	NA	5.98e-09	-1.907254	-1.695979	-1.824781
1	538.5576	839.5683	1.99e-15	-16.83246	-15.35354*	-16.25515
2	602.7868	100.1540	7.92e-16	-17.78938	-15.04281	-16.71723
3	630.1857	37.15116	1.17e-15	-17.49782	-13.48360	-15.93083
4	685.2961	63.51698	7.47e-16	-18.14563	-12.86375	-16.08380
5	786.9254	96.46176*	1.16e-16*	-20.37035*	-13.82083	-17.81368*

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 8. Johansen cointegration test.

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace statistic	0.05 critical value	Prob.**
None *	0.500577	85.46823	69.81889	0.0017
At most 1	0.255023	43.11577	47.85613	0.1298
At most 2	0.209368	25.15723	29.79707	0.1559
At most 3	0.133143	10.82695	15.49471	0.2223
At most 4	0.034018	2.111204	3.841466	0.1462

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-eigen statistic	0.05 critical value	Prob.**
None *	0.500577	42.35246	33.87687	0.0039
At most 1	0.255023	17.95854	27.58434	0.4986
At most 2	0.209368	14.33029	21.13162	0.3385
At most 3	0.133143	8.715742	14.26460	0.3106
At most 4	0.034018	2.111204	3.841466	0.1462

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values. Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values.

except interest rate adjust to the deviations from their long-run paths when there is disequilibrium. Nevertheless, the entries in the second panel of Table 9 indicate that the model explains a relatively proportion of the variability of the series.

An AR Roots test was estimated to test the stability of the model and the results are indicated in Figure 1.

The AR Roots Graph reports the inverse roots of the characteristic AR polynomial. The estimated VAR is stable (stationary) if all roots have modulus less than one and lie inside the unit circle. If the VAR is not stable, certain results such as impulse response standard errors are not valid. Figure 1 shows that all roots lie inside the unit circle which is an indication that our VAR is stable.

VAR Granger Causality/ Block Exogenity Test

The aim of the research is to establish the extent to which financial intermediaries and financial markets compliment or substitute each other in their contribution to economic growth in South Africa. To establish this relationship the VAR Granger Causality/ Block exogeneity Wald tests was conducted and the results are reported in Appendix 1. The results indicate evidence of bi directional causality between economic growth and bank activity, though the causality from bank activity is at a weaker level. This therefore suggests that economic growth granger causes bank activity. This result is consistent with Thangavelu and Ang (2004). This suggests that higher economic

Table 9. Summary of the reduced-form estimation: 1990:1 – 2011:4.

Test Statistics	IGDP	IBank	IStock	Itnvalue	Lbonds	Interest
Co-integration equation	-0.029493	-0.184074	-0.247565	2.602386	-9.745039	-9.745039
	(-1.27824)	(-2.64902)	(-0.36583)	(3.47624)	(-2.38942)	(-2.45283)
Goodness of fit statistics	0.528416	0.516959	0.464258	0.208654	0.327149	0.357680
Adjusted R^2 SEE	0.004237	0.012760	0.124267	0.137469	0.684533	0.729557
Correlation matrix						
	IGDP	IBank	IStock	ITurnover	IBond	IInterest
IGDP	1.000000	0.178065	0.335168	0.413371	0.136727	-0.095705
IBank	0.178065	1.000000	-0.046019	0.291768	0.615524	0.638543
IStock	0.335168	-0.046019	1.000000	0.174413	0.165524	-0.143519
ITurnover	0.413371	0.291768	0.174413	1.000000	0.276035	0.067960
IBond	0.136727	0.615524	0.168759	0.276035	1.000000	0.387749
IInterest	-0.095705	0.638543	-0.143519	0.067960	0.387749	1.000000

Notes: The model was estimated using one lag structure per equation based on the Schwarz information criterion. The cointegrating equation presents the error correction estimate 9with t-statistic in parentheses) since the model was run through Vector Error Correction method. SEE represents the standard error of the equation. Source: Author's Computation using Eviews 7 Econometric Packages.

growth may encourage more saving and lending in the economy. This may be attributed to better prospects projected by entrepreneurs when high economic growth is achieved, supporting the view that high economic growth leads to rapid financial development.

There is also evidence of bi-directional causality between stock market development and economic growth. However, the causality from stock market to economic growth is at a stronger level, (5%) unlike the banking sector (10% level). This suggests that the stock market is able to provide a number of financial services as compared to the banking sector promoting economic growth. This result is in consonance with Obsfeld (1994) and Thangavelu and Ang (2004). These authors argue that well-developed stock markets result in more mobilised capital, diversified risks and availability of useful information required for investment.

With regards to the bond market, there is evidence of a uni-directional causality running from the bond market to GDP. This suggests the presence of the supply-leading hypothesis. This result is consistent with Fink et al. (2003) as well as Kolapo and Adaramola (2012) on their study of the Nigerian economy.

From the empirical evidence it can be concluded that well developed financial markets result in better informed decisions and thereby accelerate economic growth in South Africa.

Conclusion

The paper studied the empirical relationship between the different types of finance and long-run economic growth in South Africa. Unlike the available studies which have looked at the link between economic growth and financial development only, the study has set to examine the extent to which financial markets and financial interme-diaries compliment or substitute each other. The Johansen cointegration test revealed that there are six cointegrating equations. A VECM was also estimated to examine the short-run interaction between the variables of interest. Also, Granger causality tests were conducted and there is evidence of a causal relationship between bank activity and economic growth, with the direction of causality running from economic growth to bank activity being stronger. Uni-directional causality from bond market capitalisation to economic growth was also established. However, on the part of the stock market a bi-directional causality between stock market develop-ment and economic growth was established.

The empirical results suggest that incremental flow of services by financial markets, both the stock market and the bond market, are essential for funding investment in research and development in Africa and hence economic growth. This result is consistent with Thangavelu and Ang (2004) and Schumpter (1912). Taking into account that financial markets in Africa are underdeveloped and illiquid, authorities should therefore encourage financial market development through appropriate mix of taxes, legal and regulatory policies to remove barriers to financial market operations and thus enhance their efficiency.

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APPENDIX

Granger Causality/ Block Exogenity Test.

Model	Lag	Null hypothesis	F- statistics	P-value	Causal decision
1	2	IBank Does not Granger Cause IGDP	2.16641	0.1233	Accept H_o
		IGDP Does not Granger cause IBank	3.81314	0.0275**	Reject H_o
		IStock Does not Granger cause IGDP	5.84269	0.0049***	Reject H_o
		IGDP Does not Granger cause IStock	2.56545	0.0857*	Reject H_o
		IBonds Does not Granger cause IGDP	0.45209	0.6384	Accept H_o
		IGDP Does not Granger cause IBonds	1.59849	0.2106	Accept H_o
2	3	IBank Does not Granger Cause IGDP	1.33402	0.2721	Accept H_o
		IGDP Does not Granger cause IBank	3.52426	0.0204**	Reject H_o
		IStock Does not Granger cause IGDP	3.33082	0.0256**	Reject H_o
		IGDP Does not Granger cause IStock	0.08646	0.9672	Accept H_o
		IBonds Does not Granger cause IGDP	2.01113	0.1224	Accept H_o
		IGDP Does not Granger cause IBonds	3.14035	0.0320	Reject H_o
3	4	IBank Does not Granger Cause IGDP	0.83634	0.5080	Accept H_o
		IGDP Does not Granger cause IBank	2.73357	0.0380**	Reject H_o
		IStock Does not Granger cause IGDP	3.48392	0.0132***	Reject H_o
		IGDP Does not Granger cause IStock	0.57922	0.6789	Accept H_o
		IBonds Does not Granger cause IGDP	1.75767	0.1506	Accept H_o
		IGDP Does not Granger cause IBonds	2.73193	0.0381**	Reject H_o
4	5	IBank Does not Granger Cause IGDP	1.14918	0.1233	Accept H_o
		IGDP Does not Granger cause IBank	2.94418	0.0205**	Reject H_o
		IStock Does not Granger cause IGDP	3.19414	0.0137**	Reject H_o
		IGDP Does not Granger cause IStock	0.86765	0.5092	Accept H_o
		IBonds Does not Granger cause IGDP	2.63899	0.0662*	Reject H_o
		IGDP Does not Granger cause IBonds	3.89849	0.0210**	Reject H_o

Note: *, **, and *** indicates significance level of 10%, 5% and 1% respectively