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FINANCE–GROWTH NEXUS: EMPIRICAL EVIDENCE FROM SOUTH AFRICA

In this paper we investigate the long-run relationship between financial development and economic growth in South Africa for the period 1970-2003. The empirical investigation is carried out in a vector autoregression (VAR) framework based on the theory of cointegration and error-correction representation of cointegrated variables. The results of the cointegration analysis provide evidence of the existence of a long-run relationship between financial development and economic growth. The empirical findings in the paper show a two-way causality between financial development and economic growth.
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1. Introduction

The relationship between financial development and economic growth has been a subject of great interest and debate among economists for many years. The debate has traditionally revolved around two issues. The first relates to whether development in the financial system results in a faster economic growth, and the second relates to how financial development affects economic growth. A large body of literature has emerged, both at the theoretical and empirical level, attempting to answer the above questions. Although many empirical studies have investigated the relationship between financial depth, defined as the level of development of financial markets and economic growth, the results are ambiguous (see Pagano, 1993; and Levine, 1997, 2003 for a survey of the literature).

On the one hand, cross country and panel data studies find positive effects of financial development on output growth even after accounting for other determinants of growth as well as for potential biases induced by simultaneity, omitted variables and unobserved country-specific effect on the finance-growth nexus[2]. On the other hand, time series studies give contradictory results. Demetriades and Hussein (1996) find little systematic evidence in favor of the view that finance is a leading factor in the process of economic growth. In addition they found that for the majority of the countries they examine, causality is bidirectional, while in some cases financial development follows economic growth. Luintel and Khan (1999) used a sample of ten less developed countries to conclude that the causality between financial development and output growth is bidirectional for all

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[2] See for example King and Levine (1993a,b), Khan and Senhadji (2000) and Levine et al. (2000).

countries. Ghirmay (2004) study the causal link between the level of financial development and economic growth in 13 sub-Saharan African countries. The results of the cointegration analysis provide evidence of the existence of a long-run relationship between financial development and economic growth in almost all (12 out of 13) of the countries. With respect to the direction of long-term causality, the results show that financial development plays a causal role in economic growth, again in eight of the countries. At the same time, evidence of bidirectional causal relationships is found in six countries. All these results show that a consensus on the role of financial development in the process of economic growth does not so far exist.

As a matter of fact, the role of the financial sector has been well recognized in the development literature. The seminal work of Patrick (1966) has resulted in widespread investigations into the role of the financial sector as an engine for economic growth. Patrick points out two possible relationships between financial development and economic growth. First, as the economy grows, it generates demand for financial services, which he calls a 'demand-following' phenomenon. According to this view, the lack of financial institutions in developing countries is an indication of lack of demand for their services. Second, the establishment and the widespread expansion of financial institutions in an economy may actively promote development, which Patrick called 'supply-leading' phenomenon. This latter view, which has been dubbed the 'financial-led' growth hypothesis, has been popular among governments in several developing countries as a means to promoting development (Habibullah and Eng, 2006).

Moreover, there are two views in which the financial system can be manipulated for enhancing economic growth. The Struturalist School recommends an expansion in the structure of the financial system, such as an increase in the number of financial institutions. This school also encourages an increase in the array of financial instruments made available to the public (Goldsmith, 1969; Patrick, 1966). Neo-liberals on the other hand, advocate the liberalization of the financial system, by which they mean the relaxation of controls imposed on the financial systems by the monetary authorities (McKinnon, 1973; Shaw, 1973). Neo-liberals believe that administratively-determined (as opposed to market-determined) low rates of interest may not encourage savings. Without savings there cannot really be any investment. Thus, according to Neo-liberals, the freeing of interest rates is the key to capital formation and growth.

Several theoretical and empirical studies have suggested that the role of financial development in the economy may vary across countries because of differences in institutional and economic structures (see LaPorta et al., 1997; and Bell and Rousseau, 2001, among others).

There are those who argue that, in a given economy, it is the sector with high economies of scale that benefits more from financial development (Kletzer and Pardhan, 1987; Beck, 2002), implying that financial development is much more effective in promoting economic growth in more industrialized economies than in less industrialized or agricultural economies. On the other hand, there are those

who contend that countries at their early stage of development benefit more from financial development (see McKinnon, 1973; Fry, 1995). Moreover, it is argued that the effectiveness of financial intermediaries and markets in promoting economic growth depends on the institutions set up to implement financial transactions. For example, LaPorta et al. (1997, 1999) find that the legal system plays a crucial role in determining the financial development and growth relationships. They argue that secure property and contract rights is key for banks and financial institutions to work properly, while weak contract enforcement creates incentives for default by debtors and decreases willingness to lend. On the other hand, corruption in the banking system or political interference may divert credit to unproductive or even wasteful activities, again implying that economies with developed institutions are likely to benefit more from financial development.

The growing body of empirical research, using different statistical procedures and data sets, produces remarkably consistent results. First, countries with better-developed financial systems tend to grow faster—specifically, those with (i) large, privately owned banks that funnel credit to private enterprises and (ii) liquid stock exchanges. The levels of banking development and stock market liquidity each exert a positive influence on economic growth. Second, simultaneity bias does not seem to be the cause of this result. Third, better-functioning financial systems ease the external financing constraints that impede firm and industrial expansion. Thus, access to external capital is one channel through which financial development matters for growth because it allows financially constrained firms to expand (Levine, 2003).

The present paper addresses the empirical relationship between financial development and economic growth for South Africa over the period 1970–2003. In Section 2, we present a literature review and brief information about South African economy. The methodology and data are presented in Section 3. The empirical results are discussed in Section 4. The paper concludes with a summary and policy implications.

2. Literature Review and South African Economy

2.1. A Review of Literature on the Relationship Between Financial Development and Growth

An extensive amount of empirical investigations have been conducted, aimed at testing the conflicting theoretical developments using different techniques. These empirical investigations can be classified into two major groups. The first group consists of those that used cross-country growth regression methods in which the average growth rate of per capita output over some period is regressed on some measure of financial development and a set of control variables (see King and Levine, 1993a, b; Levine and Zervos, 1998; De Gregorio and Gudotti, 1995; Ndikumana, 2000, among others). The second group consists of those that used time series data of individual countries to investigate the causal relationship between the two variables. The problem with the pure cross-country studies is well documented in the literature. In particular, the method fails to explicitly address the

potential biases induced by endogeneity of the explanatory variables and the existence of cross country heterogeneity. These problems may lead to inconsistent and misleading estimates (see Quah, 1993; Casselli et al., 1996). In the light of these problems recent empirical studies have used dynamic panel data methods, such as the first differenced generalized methods of moments (GMM), as a way to control for the potential sources of biased coefficient estimates in cross-country regressions (see Levine et al., 2000; Benhabib and Spiegel, 2000). The results of these studies provide evidence of strong connection between the exogenous component of financial development and long-run economic growth. This is more or less consistent with the classical view on the relation between growth and financial development.

On the empirical side, King and Levine (1993a) use IMF data and various financial indicators to conclude that there is a positive relationship between financial indicators and growth, and that financial development is robustly correlated with subsequent rates of growth, capital accumulation, and economic efficiency. They correctly emphasize that policies which alter the efficiency of financial intermediation exert a first-order influence on growth. This is a standard implication of models of endogenous growth with financial intermediation. Atje and Jovanovic (1993) examine the role of stock markets on development, and conclude that there is positive effect on the level as well as on the growth. They could not, however, establish a significant relationship between bank liabilities and growth. Levine and Zervos (1996) use various measures of stock market development, and conclude that there is a significant relationship. When they include banking depth variables in their regressions, those turn out to be non-significant. They emphasize that their results are indicative of partial correlation only, and more research would be needed in the area. Arestis and Demetriades (1997) use time series analysis and Johansen cointegration analysis for the US and Germany. For Germany, they find an effect of banking development on growth. In the US, there is insufficient evidence to claim a growth effect of financial development, and the data point to the direction that real GDP contributes to both banking system and stock market development.

Levine et al. (2000), using a sample of 74 developed and less developed countries over the period 1960–1995. They found that the strong positive relationship between financial development and output growth can be partly explained by the impact of the exogenous components like finance development on economic growth. They interpreted these results as supportive of the growth-enhancing hypothesis of financial development. Goldsmith (1969), McKinnon (1973), Shaw (1973), Fry (1988) and more recently King & Levine (1993a, 1993b) are among others who have provided evidence that financial development is a prerequisite for economic growth.

Levine (1998) using a sample of 44 developed and less developed countries during the period 1975–1993, examines the links between banking development and long-run economic growth. The usual GMM estimation procedure is used to account for simultaneity bias. The degree to which legal codes emphasize the rights of creditor and the efficiency of the legal system in enforcing laws and contracts are

considered as instruments. The empirical evidence is supportive of a strong positive relation between the exogenous component of banking development with output growth, physical accumulation and productivity growth. Demirguc-Kunt and Maksimovic (1998) estimate a financial planning model to find that financial development facilitates the firm's growth. In this context an active stock market and a well-developed legal system are crucial for the further development of the firms.

Neusser and Kugler (1998) and Levine et al. (2000) represent two different poles in the literature. Neusser and Kugler focus on time series properties of the data ignoring the simultaneity issue, while Levine et al. (2000) deal with simultaneity without accounting for the time series properties of the data.

In a simple endogenous growth model, Pagano (1993) uses the AK model to conclude that the steady state growth rate depends positively on the percentage of savings diverted to investment, so one channel through which financial deepening affects growth is converting savings to investment. Berthelemy and Varoudakis (1996) use a theoretical model with banks acting as Cournot oligopolists to find that, in the stable equilibrium, the growth rate depends positively on the number of banks, or the degree of competitiveness of the financial system. Their results show that educational development is a pre-condition of growth, and financial underdevelopment is an obstacle when the educational system is not successful. Greenwood and Jovanovic (1990) consider a model that allows examining the relation between growth and income distribution, as well as between financial structure and economic development. The fundamental reason for a positive effect of financial structure on growth is the more efficient undertaking of investment, and more efficient capital allocation because agents can have better information about the nature of shocks that hit particular projects.

The theoretical work linking the financial sector to economic growth was provided in later years, among others by Greenwood & Jovanovic (1990), Levine (1991), Bencivenaga & Smith (1991) and Saint-Paul (1992), Pagano (1993), King & Levine (1993a, 1993b) indicate that efficient financial markets improve the quality of investments and promote economic growth. Bencivenga & Smith (1991) contend that banks as liquidity providers permit risk-averse households to hold interest-bearing deposits and the funds obtained are then channeled to productive investment. By eliminating self-financed capital investment by firms, banks also prevent the unnecessary liquidation of such investment by firms who find that they need liquidity. In other words, financial intermediaries permit an economy to reduce the fraction of its savings held in the form of unproductive liquid assets, and to prevent misallocations of invested capital due to liquidity needs. This suggests that financial intermediaries may naturally tend to alter the composition of savings in a way that is favorable to capital accumulation, and if the composition of savings affects real growth rates, financial intermediaries will tend to promote growth.

Levine (1991) demonstrates that stock markets help individuals manage liquidity and productivity risk and, as a result, stock markets accelerate growth. According to Levine, in the absence of financial markets, firm-specific productivity shocks may discourage risk-averse investors from investing in firms.

The more resources are allocated to firms, the faster economic growth will be. Saint-Paul (1992) relates the relationship between the financial sector and economic growth by emphasizing the complementarity role between financial markets and technology. According to Saint-Paul, an economy that possesses highly developed financial markets, that allows the spreading of risk among economic agents through financial diversification, will be able to achieve a higher level of development than an economy in which financial markets are not well developed.

The role of the financial sector as the engine of growth or supply-leading one in enhancing growth goes far back to the work of Schumpeter (1934). Schumpeter argues that the financial sector leads economic growth by acting as a provider of funds for productive investments and therefore could lead to accelerating economic growth. The theoretical argument by Bencivenga & Smith (1991), Levine (1991), and Saint-Paul (1992) support the proponents of the supply-leading hypothesis proposed by Schumpeter (1934) and Patrick (1966). In addition, most of the models argue that the process of growth has a feedback effect on financial markets by creating incentives for further financial development, which means that the two variables are endogenously determined. Goldsmith (1969) and a great number of the endogenous growth models reviewed above (Greenwood and Jovanovic, 1990; Saint Paul, 1992; Berthelemy and Varoudakis, 1996; Greenwood and Smith, 1997; Blackburn & Hung, 1998; and Harrison et al. 1999), show a two-way relationship between financial development and economic growth. According to these models, economic growth reduces the importance of fixed costs associated in joining the financial market thereby facilitating the creation and expansion of more financial institutions.

On the other hand, Harrison et al. (1999), and Blackburn & Hung (1998) argue that financial intermediation encourages economic growth because it reduces the cost of project appraisal. As the number of projects increases in a growing economy, more banks enter the markets as the activity and profit of banks increase. This entry reduces the average distance between banks and borrowers, promotes regional specialization and reduces the cost of intermediation. Goldsmith (1969), McKinnon (1973), Shaw (1973), Fry (1988), Jung (1986), Gupta (1984) and King & Levine (1993a, 1993b) are among those who have provided evidence that financial development is a prerequisite for economic growth. Nevertheless, other researchers are skeptical with respect to the financial-led growth hypothesis.

Demetriades & Hussein (1996), Arestis & Demetriades (1996), Murinde & Eng (1994) and Thornton (1996) are among the few studies that have tested the financial-led hypothesis on several Asian countries. Using annual data from 1965 to 1992, Demetriades & Hussein found that among the Asian countries covered under the study, only in the case of Sri Lanka did evidence support the financial-led growth hypothesis. For Pakistan, their result indicates that economic growth causes financial development. Furthermore, Demetriades & Hussein's study suggests that bidirectional causal relationships are evident for India, South Korea and Thailand. In another related study, Arestis & Demetriades (1996) further support the evidence that the relationships between financial development and

economic growth for India and South Korea are bidirectional. Murinde & Eng (1994) test the financial-led hypothesis on Singapore using quarterly data for the period 1979 to 1990. Using an array of financial indicators, they found that the results strongly support the financial-led hypothesis for Singapore. On the other hand, Thornton (1994) provides some empirical evidence on the supply-leading hypothesis in several Asian countries. Using annual data as far back as 1950s to 1990s, Thornton found that the financial-led hypothesis was supported by monetary data of Nepal, Malaysia, Philippines and Thailand. The demand-following hypothesis was supported by Myanmar and Korea monetary data. However, a bidirectional relationship between the monetization variable and economic growth is evident for Malaysia.

On a sample of six Asian countries, Luintel & Khan (1999) examine the long-run causality between financial development and economic growth employing the multivariate VAR framework. They found bidirectional causality between financial development and economic growth in all six countries, namely India, Korea, Malaysia, Philippines, Sri Lanka and Thailand. In another study on Asian economies, Al-Yousif (2002) found that Philippines and Korea support the financial-led hypothesis; Sri Lanka and Pakistan support the demand-following hypothesis, while Malaysia and Singapore show a two-way causal effect between financial development and growth, but the result for Thailand suggests finance is irrelevant for growth. Habibullah's (1999) study on seven Asian developing countries suggests that only the Philippines support the financial-led growth hypothesis. The cases of demand-following growth hypothesis are supported by Malaysia, Myanmar, and Nepal. On the other hand, a bidirectional causality between growth and finance are evident for Indonesia, Sri Lanka and Thailand.

Further evidence on the financial-led hypothesis is documented by Fase & Abma (2003). Using pooled data on Bangladesh, India, Malaysia, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, and Thailand. They conclude that financial development matters for economic growth and that causality runs from the level of financial intermediation and sophistication to growth. The supply-leading hypothesis is also supported by more recent studies by Calderon & Liu (2003) on 109 developing and developed countries, and Christopoulos & Tsionas (2004) on 10 developing countries. Both studies conclude that the supply-leading hypothesis is the dominant force behind the relationship between finance and the sources of growth; in particular, financial depth contributes more to the causal relationship in developing countries.

2.2. Overview of South African Economy

In 2005, South African economy experienced GDP growth of 4.9 per cent (4.3 per cent in 2006), its highest since the end of apartheid and strong GDP growth. Although this good performance is due in part to a favourable international environment, it also reflects the sound economic policies that have been carried out since 1996 in accordance with the Growth and Employment and Redistribution (GEAR) strategy. Responsible monetary policy has paid off in the form of stable

inflation, just 5 per cent in 2005, and low short-term interest rates. Similarly, the government's conservative fiscal strategy has controlled the deficit, which is now expected to amount to only 0.5 per cent of GDP for the 2005/06 fiscal year. These sustained responsible monetary and fiscal policies have entailed substantial increases in international reserves and raised the confidence of foreign investors in the economy and the rand. Several credit-rating agencies upgraded South African ratings in 2005, decreasing the cost of capital for South African borrowers by reducing sovereign spreads to historic lows. The falling cost of capital and sustained economic growth have allowed the South African government to increase development expenditure and easily finance a domestic demand-driven and widening current-account deficit, which reached 5.2 per cent of GDP in 2006. The financial industry led the way, growing at a rate of 8.4 per cent in 2005, due to the expansion of real-estate finance and retail banking supported by the Mzansi[3] bank accounts initiative, aimed at enlarging the access of the poorest to banking services (African Economic Outlook, 2006).

The financial sector plays an important role in mobilizing long-term savings and channelling these into productive investment. In The Southern African Development Community (SADC) commercial banks are the most significant financial intermediaries. Foreign and state ownership within the sector is very strong, though in recent years the domestic private sector has made significant inroads. Also following the financial sector reforms introduced in the 1980s and 1990s as part of the overall structural adjustment programmes, significant liberalization of the sector has occurred. In addition, a number of South African banks have made significant inroads into the region, concentrating mainly on financing trade and investment as opposed to retail banking.

There is a strikingly wide dispersion of stock market capitalization relative to GDP across African markets, and in terms of company listings. However, there has been some growth since the late 1990s, and more than half of the markets have market capitalization in excess of $1 billion. It is clear that within the region and in Africa, the South African stock market is by far the most developed, with market capitalization worth more than 214 per cent of GDP. SADC stock markets also tend to be more heavily concentrated in a few sectors. South Africa shows the most diversification among the industrial sectors, with 13 per cent of total market capitalization accounted for by mining, 24.5 per cent by the manufacturing sector and 38 per cent by the financial sector. Therefore, taken as a region, the SADC markets do offer a good degree of diversification among sectors, although the South African market offers good diversification prospects on its own. Nevertheless, stock exchanges within the region have a long way to go before they reach the maturity of the South African stock market. They suffer from poor trading systems, low liquidity and low economies of scale. If regional equity markets are to serve as an important element for exercising market discipline to strengthen the

[3] Mzansi is the South Africa's low-cost national bank account, launched in October 2004, extending banking to low-income earners and those living beyond the reach of banking services. According to Colin Donian, the Banking Association South Africa's Mzansi Initiative director, over 1.5-million Mzansi accounts had been opened by the end of August 2005, with the great majority of new accounts opened by South Africans who had never banked before.

soundness of the financial system, then a lot needs to be done to develop and strengthen equity markets across the entire region. At the national level, the most promising avenues for achieving such a goal are by opening up capital accounts, developing a sound regulatory framework and providing stock exchanges with fair, internationally consistent and well-enforced rules by which to operate. At the regional level, it will be necessary to deepen financial and market integration (see a detailed survey in Mlambo, 2005).

3. Data and Econometric Methodology

The empirical analysis employs annual data for South Africa over the period of 1970-2003. The data is obtained from the IMF's International Financial Statistics database and World Bank Development Indicators. Following the literature, economic growth is measured by an increase in real GDP (Y), and financial development is represented by the level of credit to the private sector by the financial intermediaries.

The empirical investigation into the long-run causal relationship between financial development and economic growth is carried out in a VAR framework. Estimation of cointegration vectors and testing for long-run causal relationships in the context of error-correction representation of cointegrated variables is conducted using the Johansen (1988) and Johansen and Juselius (JJ) (1992) procedure. Following the maximum likelihood approach of Johansen (1988), a vector error correction (VECM) representation of a VAR(p) model can be written as:

$$\Delta Z_t = \Pi Z_{t-1} + \sum_{i=1}^{p+1} \Gamma_1 \Delta Z_{t-i} + \delta\Phi + E_t \qquad (1)$$

where Zt is a n x 1 vector composed of non stationary variables, Π and Γ are n x n matrices of coefficients, Φ is a set of deterministic variables such as constant, trend, and dummy variables, and Et is a vector of normally and independently distributed error terms. The rank of the matrix Π

gives the dimension of the cointegrating vector. If its rank, r is (0<r<n), then Π can be decomposed into Π =αβ' where α, β are n x r matrices containing the adjustment coefficients and the cointegrating vectors respectively. Hence, model (1) reduces to:

$$\Delta Z_t = \alpha\beta^{'} Z_{t-1} + \sum_{i=1}^{p+1} \Gamma_1 \Delta Z_{t-i} + \delta\Phi + E_t \qquad (2)$$

This means αβ'Zt-1 contains all the long-run information on the process of Zt. Specifically, the rows of β' are interpreted as the distinct cointegrating vectors and the rows of α are loading factors which indicate the speed of adjustment of the dependent variables towards the long-run equilibrium state. A test of zero

restrictions on the α(α=0) is, therefore, a test of weak exogeneity (see Johansen, 1992) and as shown by Hall and Milne (1994) weak exogeneity in a cointegrated system is a notion of long-run causality. Hence, a bivariate causality, say between, economic growth (Y) and financial development (FD), can be seen by rewriting model (2) in the following equivalent form.

$$\begin{bmatrix} \Delta Y_t \\ \Delta FD_t \end{bmatrix} = \begin{bmatrix} \mu \\ \mu \end{bmatrix} + \sum_{i=1}^{p-1} \begin{bmatrix} \Gamma_{11} & \Gamma_{12} \\ \Gamma_{21} & \Gamma_{22} \end{bmatrix} \begin{bmatrix} \Delta Y_{t-i} \\ \Delta FD_{t-i} \end{bmatrix} + \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} \beta_1 & \beta_2 \end{bmatrix} \begin{bmatrix} Y_{t-p} \\ FD_{t-p} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{t2} \end{bmatrix} \quad (3)$$

There are three possible cases of causality testing: If the α_1 =0 is not rejected then FD does not cause Y in the long run; similarly if the null α_2 =0 is not rejected Y does not cause FD in the long run. Likewise rejection of the null α_1 =0 and α_2 =0 means there is a bidirectional causal relationship between the two variables.

4. Empirical Results

Cointegration analysis necessitates that the variables under consideration be integrated of the same order. Hence it is necessary to undertake unit root tests before cointegration analysis. In this study the Augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) tests, including a constant and a linear time trend are employed to determine the degree of integration of the data series. A number of approaches have been suggested in the literature including the Akaike Information Criterion (AIC), Schwartz's Bayesian Information criterion (SIC), and the general to specific procedure advocated by Ng and Perron (1995) to ensure that the residual in the ADF regression is white noise. In this study we use the general to specific procedure to select the lag length. Following the procedure, first the ADF regression is estimated with a sufficiently long period of lag length (kmax) and sequentially drop the last included lag if it is not statistically significant at the 10 per cent significance level. Here kmax is set at four. Similarly in the PP tests the lag length is set at four. The unit-root test results for log level of real GDP (LY) and financial development (LFD) are reported in the table 1. Based on the results, the null hypothesis of unit-root cannot be rejected.

Table 1

Unit Roots Tests

	ADF	**PP**
LY	-1.898(0)	-2.251
FD	-2.569(1)	-2.289

Note: The critical value for the ADF test is -3.48 and 3.40 for the PP test at the 5% significance level.

The next step is to test for the presence of long-term relationship between LY and FD in South Africa, having verified that the two variables are integrated of the same order. Table 2 reports the results of cointegration tests using the maximum likelihood approach of Johansen (1988) and JJ (1992). The maximal eigenvalue and the trace statistic tests for each of the variables are reported in Table 2. The null hypothesis is that there is no cointegrating vector, and the alternative is there is one cointegrating vector. The specification of the VAR models is made on the basis of a number of diagnostic tests. Since the validity of Johansen's cointegration estimation technique is based on an assumption of white noise errors, the selected lag lengths represent the minimum lag length for which there is no significant autocorrelation in the estimated VAR residuals. The Lagrange Multiplier (LM) technique is used to determine whether the residual of the model approximates white noise.

The results in Table 2 reveal that both the trace and maximum eigenvalue tests reject the null hypothesis of zero cointegrating vectors in favor of one cointegrating vector under investigation at the conventional 5 per cent significance level or better. These results provide evidence of a long-run equilibrating relationship between the two variables. However, although cointegration suggests the presence of Granger causality of some form between the variables, it does not provide information on the direction of causal relationships. The next task is, therefore, to identify the direction of causality using the VECMs derived from the long-run cointegrating vectors.

Table 2

Johansen Cointegration Test Results

Cointegrating Vectors	Trace statistics	Critical value at 5%	Maximum eigenvalues	Critical value at 5%	k	LM(1) p-values	LM(4) p-values
r=0	75.69	17.95	71.93	16.73	2	0.28	0.51
r≤1	5.43	8.41	5.42	8.41	2	0.28	0.51

Notes: LM(1) and LM(4) are serial correlation tests for first and fourth order autocorrelation of the VAR residuals and p-values are under the null of no serial correlation.

Table 3 presents the estimated coefficient associated with the identified cointegrating vector for South Africa. Two sets of coefficient estimates are reported; one associated with the cointegrating vector normalized on LY (with respect to β1) and the other associated on LFD (with respect to β2). The estimated coefficients carry the expected (positive) sign. This finding provides support to the theoretical predictions of the finance and growth literature that economic growth and financial development are positively related with each other. Also reported are the associated loading factors (α's) which are expected to shed light on the long-run causal relationships between LY and LFD. It is to be noted that to be meaningful a loading factor must be negative and significant. An examination of the

results show that the null hypothesis that the loading factor, the α_1 =0 is rejected at the 5 percent level of significance and the null that the loading factor, the α_2 =0 is rejected. Overall, the results provide evidence of a long-run causal relationship between financial development and economic growth in South Africa. It is found that there is a long-run bidirectional causal relationships between financial development and economic growth.

Table 3

Causality Tests and Estimated Coefficients

Cointegration	α_1	α_2
LYD = 19.74 + 0.298 LFD	-0.018	
	(0.03)	
LFD = 59.27 + 3.013 LY		-0.011
		(0.01)

Notes: Figures in parentheses are the p values of the likelihood ratio tests under the null that the loading factor is zero.

5. Conclusion

In this paper, finance-growth nexus and the direction of causality between the financial development and economic growth is investigated for South Africa for the period 1970-2003. The empirical methodology is based on the theory of cointegration and error-correction representation of cointegrated variables.

The main findings may be summarized as follows: First, financial development and economic growth were cointegrated over the sample period suggesting that the two variables cannot drift apart in the long run, and thus may not be considered independent from each other. Second, the VECMs which incorporated the cointegration effect into the causality analysis yielded evidence of bidirectional causal relationships between the financial development and economic growth. The paper suggests the need to expand and improve the efficiency of the financial system through appropriate regulatory and policy reforms in order to promote faster economic growth and imply polices for promoting growth in order to benefit more from financial development.

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