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Is Financial Development A Factor to the Leading Growth Profile of the South African Economy in the Sub-Saharan Continents? Uncovering the Hidden Secret

Abdulkadir Abdulrashid Rafindadi
Corressponding author's email: aarafindadi@yahoo.com

Zarinah Yusof
Faculty of Economics and Administration, Department of Economics, University of Malaya

Abstract

This paper investigates the factors contributing to the formidable growth rate of the South African economy. Specifically, we determine whether the leading role of the South African economy in the Sub-Saharan African region is a result of its sophisticated and resilient financial sector development. If not, the paper tries to identify the possible explanations for the country's economic growth profile in recent times. From a series of empirical findings, the paper assesses the factor(s) that could impede the overall growth profile of the country's economy in both the long-run and the short-run. To do this, we measure the short-run and long-run impacts of financial development on economic growth of the South African economy, and we also investigate whether the relationship between financial development and economic growth is monotonic or not. The study employs time series data from 1980 to 2011. Using the ARDL bounds-testing approach to cointegration and the U test of Mehlum and Sasbuchi, the study reveals that trade openness and the ratio of credit issued to the private sector by banks to GDP have fuelled South Africa's economic growth in both the long-run and the short-run. Similarly, the U test also discovered that the relationship between financial development and GDP growth in the country is non-monotonic. Surprisingly, M3 has a short-run negative influence on GDP while the greatest and most crucial long-run factor that has impeded the accumulated growth profile of the South African economy is the low productive contribution of the country's population to GDP.

JEL Codes: N27, O16, O47, G29
Keywords: Financial development, ARDL bounds test, Economic growth.

1.1 Introduction

South Africa is Africa's leading industrial economy. It has an agile, mechanized, and highly diversified economic system that is comparable to none within the Sub-Saharan African region. According to the Industrial Development Corporation (IDC) Economic Overview (2013), in 2002-2008, the country witnessed a consistent average growth rate of 4.5%, seeing it supersede its regional counterparts and making it one of the leading economies in the region. It was further noted by the IDC that, from 1993 to 2013, the country's GDP growth rate averaged 3.19% per annum, reaching an all-time high of 7.60% per annum in March 2009, when the growth rate then plummeted to a record low of -6.30%. A series of economic events culminated in this poor economic outcome. These included, as a result of the recent financial crisis, a range of economic challenges facing the South African economy. Examples include dwindling economic growth, low business confidence, reduced capital spending on machinery and equipment, a 3.1% contraction of mining output between 2011 and 2012, production stoppages due to industrial action, and a significant reduction in platinum production, which accounts for the bulk of the country's foreign exchange earnings. Additional factors negatively affecting the South African economy included tumbling exports, which resulted in a R118 billion trade deficit in 2012, and unfavorable domestic demand. Between October and December of 2012 alone, there was a 6.1% reduction in mining output, a 26.3% contraction in gold production, a 17.3% reduction in iron ore production, and a 4.2% reduction in platinum production. These factors have caused significantly high levels of unemployment, widening inequality, poverty, and crime. It has also been reported that agricultural output declined after the financial crisis, while the current account deficit (CAD) widened. Household indebtedness also reached worrying levels in a low-interest rate environment and inflationary pressures mounted. Moreover, there were severe energy shortages (inducing blackouts) and a tense political climate that resulted in President Mbeki's resignation. In addition to this, declining global demand as a result of the financial crisis contributed significantly to the stagnation of the country's export sector; this in turn led to deterioration in the value of the country's currency, which strongly impeded the ability of the national currency to counter the declining CAD and enormous domestic debt profile. These strong negative economic features were manifested in a serious economic downturn in South Africa's financial sector.

It is against this backdrop that this research investigates whether the historical leading role of the South African economy in the Sub-Saharan African region is a result of its resilient financial sector development. If not, the question is asked as to what might be the possible explanatory variables for the leading growth rate of the South African economy in Sub-Saharan Africa. The study also investigates empirically, in addition to the effects of the financial crisis, what are the explanatory variable(s) responsible for the overall declining growth rates of the South African economy in both the long run and the short run.

The rest of this paper is organized as follows. Section 2 provides an overview of recent theoretical and empirical investigations linking financial development and economic growth. Section 3 provides the theoretical framework for the study. Section 4 is the methodology section, and introduces the data, the model specification, and the model estimation procedure. Section 5 contains the results and discussion. Section 6 presents conclusions and recommendations for policy.

2.1 Theoretical review

For decades, it has been argued that financial development is a strong and significant element in promoting economic growth. Early economic growth theorists argued that the mechanism of the economic growth process is critically dependent on the degree of innovation a society or nation can exhibit in its transformation of resources, its local and international market attractiveness, the product innovation in the country, and the quality of real sector entrepreneurial activities. These factors are driving forces for dynamic economic growth, but they in turn are dependent upon the sophistication, diversification, and resilience of existing financial institutions.

There is also a burgeoning body of modern empirical and theoretical literature that reveals the ways in which financial intermediation makes a contribution to economic growth, allocates resources, mobilizes savings, and diversifies risks (Jbili, Enders, & Treichel, 1997; Greenwood & Jovanovic, 1990). For example, according to the new growth theory, financial intermediaries and markets emerge in an endogenous fashion as a response to incomplete markets and thereby make a contribution to long-term growth. Endogenously emerging financial markets and institutions offset the impacts of frictions in transactions and information costs. They also have a bearing upon investment decisions by first assessing the merits of potential entrepreneurs and then channeling funds to those who appear the most likely to succeed. It is assumed in all of this that financial intermediaries have the ability to evaluate and monitor such matters in a way that is more efficient than would be the case were individuals only to be involved. Several researchers maintain the existence of a relation between economic growth and finance, but there is disagreement about whether the direction of causality runs from economic growth to finance or from finance to economic growth. Some authors, such as

McKinnon (1973), King and Levine (1993a), Levine et al. (2000), and Christopoulos and Tsionas (2004), maintain the existence of causality running from financial development to economic growth. By contrast, authors such as Gurley and Shaw (1967), Jung (1986), and Goldsmith (1969) argue that economic growth leads to financial development because, as the economy grows, demand for financial services also grows, and thus the financial sector expands.

2.2 Empirical review

Hassan *et al* (2011) examined the panel regressions of 168 countries using both cross-sectional and time-series approaches. The authors aimed to study the linkages between financial development and economic growth in low-, middle-, and high-income countries as classified by the World Bank. In their study, they developed various multivariate time-series models using vector autoregression (VAR) analysis, forecast error variance decompositions, impulse response functions, and Granger causality tests to document the direction and relationship between finance and growth in these countries with the objective of documenting the progress in financial liberalization and exploring some policy implications. The finding of the study show that a low initial GDP per capita level is associated with a higher growth rate, after controlling for financial and real sector variables. The authors also found strong long-run linkages between financial development and economic growth. They were able to establish that domestic credit to the private sector is positively related to growth in East Asian and Pacific countries, as well as Latin America and Caribbean countries, but that it is negatively related to growth in high-income countries. Using Granger causality tests to study the direction between finance and growth, they discovered that, in the short run, there is two-way causality between finance and growth in all regions other than Sub-Saharan Africa and East Asia the Pacific. In Sub-Saharan Africa and East Asia and the Pacific, causality runs from growth to finance. They then hypothesized that in developing countries, growth leads to finance because of the increasing demand for financial services. Sub-Saharan Africa and East Asia and the Pacific have the lowest levels of GDP per capita in the sample used, and, not surprisingly, their underdeveloped financial systems do not Granger-cause growth. There was, however, a long-term association between finance and growth, as shown in the authors' regression.

In contrast to the direction of the above research findings by various researchers, other prominent studies have argued that it is economic growth that facilitates the creation of the natural incentives for mobilizing financial development to attain an efficient peak. For instance, Demetriades and Hussein (1996), in an effort to determine the relationship between financial development and economic growth, used time series data to analyze the effects of this relationship in 16 countries using data from 1960 to 1990. The authors used the proportion of bank deposit liabilities to GDP and the proportion of bank lending in the private sector to GDP as indicators of financial development. The result of their study showed how the causal effect between the dependent variable (financial development, FD) and long-run growth moves in a different direction for the respective countries surveyed. Zang and Kim (2007) examined data pertaining to 74 countries from 1961 to 1995. They used the proportion of liquid liabilities to GDP and the proportion of commercial bank deposits to domestic assets plus central bank domestic assets and credit liabilities issued to productive sectors of the economy. Surprisingly, the outcome of their study was the same as Demetriades and Hussein (1996) in that economic growth was found to precede financial development. Other supporters of this line of argument who have used panel data research are Khan (1999), Abu-Bader and Abu-Qarn (2006), Lucas (1988), and Mohamed (2008).

Gondo (2009) examined the impact of financial development on economic growth using evidence from South Africa from 1970 to 1999. The author used time series data and applied standard instrumental variables methodology with robust standard error and introduced an additional variable to account for tax and political and economic polarization. He found that credit to institutional entities statistically significantly predicted the performance of the overall economic system of South Africa. The author found also, however, that liquid liabilities have negative impacts on economic growth. The paper concluded with the assertion that a strong stock market and an efficient banking sector significantly drive the growth prospects of South Africa.

Some authors, however, have found mixed results. For example, Esso (2009) used an Auto Regressive Distributed Lag (ARDL) model to investigate the causal effects between financial development and growth. The author used data from Economic Community of West African States (ECOWAS) countries from 1960 to 2005. In an attempt to make valid and robust findings, he used in his research the proportion of M2 to GDP as the key and only indicator of financial development. The author established a statistically significant long-run association between financial development and economic growth in Cote d'Ivoire, Guinea, Niger, and Togo, and a negative long-run association in Sierra Leone and Cape Verde. The results of the causality test showed how financial development causes economic growth only in Cote d'Ivoire and Guinea. The author concluded that the relationship between financial development and economic growth is not generalizable considering key un-generalizable elements inherent in an individual country.

In a more recent development, Acaravci et al (2009) used panel co-integration and panel generalized method of moments (GMM) to determine the association between financial development and economic growth for some selected Sub-Saharan African (SSA) countries from 1975 to 2005. The outcome of the research showed a negative long-run association between financial development and economic growth. As a result of this, the authors then investigated the bi-directional causal relationship between the growth of real GDP per capita and domestic credit provided by the banking sector for the panel. Here, the findings indicated that the selected SSA countries could enhance their growth prospects by devising a mechanism that could enable them to have an efficient and effective financial system, and *vice versa*.

Abdullahi (2010), in his study of the linkages between financial liberalization, financial development, and growth, used panel data of 15 SSA countries from 1976 to 2005. The finding of the study reveals the existence of a long-run equilibrium relationship between financial development and economic growth. In order to confirm this finding, he undertook a country-by-country time series investigation and the evidence from this still showed that the direction of causality ran from financial development to growth. Supporting the work of Abdullahi (2010), Rachdi, (2011) investigated the causal relationship between financial development and economic growth in Middle East and North African (MENA) and OECD countries. He used a panel data cointegration and GMM systems approach. His findings established that financial development is positively and strongly correlated with real GDP. This evidence suggests that the financial sector and real sector entities have some degrees of association in OECD and MENA countries. After conducting robustness tests and using the error correction approach, however, the author found bidirectional causality for the OECD countries and unidirectional (economic growth-financial development) causality for the MENA countries. The latter result was explained to be due to the weak financial systems of these countries.

Ndambiri, *et al* (2012), using a panel of 19 SSA countries from 1982 to 2000, investigated the determinants of economic growth in the selected countries. The authors applied the GMM methodology. Their research established that physical capital formation and human capital formation are the most significant contributors to the economic growth prospects of the SSA countries. They found, however, that government expenditure, the nominal discount rate, and foreign aid significantly led to negative economic growth.

From the foregoing evidence, this study aims to contribute to the extant literature about financial development and economic growth by examining the South African economy by taking note of the shortcomings of earlier research and doing the following things:

1. First, this research determines whether there is a monotonic or non-monotonic relationship between financial development and economic growth and the impacts of shocks on this relationship. The aim is to ascertain whether, as a result of economic shocks, long-run or short-run changes can affect the direction of causality to have mitigating effects on the dependent variables so as to alter the observed relationship between financial development and GDP as theoretically and empirically established. This is done in the case of South Africa using the latest methodology of the Sasabuchi-Lind-Mehlum (2011) SLM test. The test enables the researchers to explore whether the marginal impact of financial development is positive at a certain point and whether, after a certain point, financial development no longer contributes to boosting economic growth or even has a negative outcome as a result of shocks.

2. This study applies the long-run structural modeling approach of Pesaran and Shin (2002), which uses the ARDL bounds-testing approach to cointegration; this allows the researchers to use modern economic methodology to investigate the long-run relationship between financial development, economic growth, and other determinants of growth. It will equally help to correct for Johansen (1988, 1992) and other conventional cointegration tests, which are *theoretical* in nature, particularly as they impose restrictions arbitrarily on key variables based on the scale of data rather than making use of feasible econometric tools and theory.

3. Moreover, this study follows Ang and McKibbin (2007) in generating a single indicator of financial development through applying principal component analysis (PCA). This is expected to yield more robust findings in contrast to the old-fashioned VAR analysis.

4. Finally, the majority of previous studies have mainly used either the residual-based cointegration test associated with Engle and Granger (1987) or the maximum likelihood test based on Johansen (1988) and Johansen and Juselius (1990). It is now well known, however, that these cointegration techniques may not be appropriate when the sample size is too small (see Nerayan and Smyth, 2005; Odhiambo, 2009). Second, some of the previous studies relied too heavily on cross-sectional data, which may not satisfactorily address country-specific issues. The problem associated with using a cross-sectional method is that, by grouping countries together, some vital elements of the variables may be lost.

3.1 Conceptual Framework

This study relies heavily on the Solow growth model and we try to link how variables of concern in this study constitute the main determinants of GDP growth. The Solow growth model (1956) starts by showing how Y $= F(K, AL)$. Y= GDP, K=capital (financial development and fixed capital formation are regarded as proxies for capital) and L= labor (replaced by population). Following Romer (2006), it is assumed that the labor of African countries can be referred to as effective labour (AL) since, due to trade liberalization, modern technologies have become readily available. Note that the initial levels of capital, labor, and knowledge are taken as given. Romer (2006) further assumes that labor and knowledge grow at constant rates:

$$\dot{L}(t) = nL(t), and\ \dot{A}(t) = gA(t)$$

$$\text{Where}\ \dot{L}(t) = \frac{dL(t)}{d(t)} \text{ and } \dot{A}(t) = \frac{dA(t)}{d(t)}$$

That means that labor and technology grow at the rates n and g respectively. The author continued to assert that output is divided between consumption and investment. The fraction of output devoted to investment, s, is exogenous and constant. One unit of output devoted to investment yields one unit of new capital. In addition, existing capital depreciates at the rate δ. Thus, $\dot{K}(t) = sY(t) - \delta K(t)$. With this, we can derive output per unit of labor by dividing by AL:

$$\frac{Y}{AL} = F(\frac{K}{AL}, \frac{AL}{AL}) = F(\frac{K}{AL}, 1)$$

Here,

$\frac{Y}{AL} = Output\ per\ unit\ of\ effective\ labor, \frac{K}{AL} = capital\ per\ unit\ of\ effective\ labor$

$$\text{Define } k = \frac{K}{AL}, y = \frac{Y}{AL}, and\ f(k) = F(k, 1).$$

The whole equation can be rewritten as $y = f(k)$. This means that output per unit of effective labor is a function of capital per unit of effective labor. This function demonstrates that when a unit of labor consumes zero amount of capital then total production will be zero [f(0)=0]. Since $F(K, AL)\ equals\ ALf\left(\frac{K}{AL}\right)$, it follows that the marginal product of capital, $\frac{\partial F(K,AL)}{\partial K}$, equals $ALf'\left(\frac{K}{AL}\right)\left(\frac{1}{AL}\right)$, which is just $f'(k)$. Thus, the model assumes that $f'(k) > 0\ and\ f''(k) < 0$, which indicates that the marginal product of capital is positive but that it declines as the capital-labor ratio passes a certain point. In contrast to the marginal product of capital, labor productivity rises with a rise in the K/L ratio. In the case of less developed countries (LDCs), labor consumes less capital and hence the marginal product of capital is higher than the marginal product of labor. Moreover, the problem is aggravated as K/AL decreases over time due to the inclusion of more labor, more technology, and depreciation of existing capital. From this theoretical discussion, the dynamics of k=K/AL as the economy grows over time can be shown; hence, it will be easier to focus on the capital stock per unit of effective labor, k, than the unadjusted capital stock. Through the chain rule, it can be shown that:

$$\dot{k}(t) = \frac{\dot{K}(t)}{A(t)L(t)} - \frac{K(t)}{[A(t)L(t)]^2}[A(t)\dot{L}(t) + L(t)\dot{A}(t)]$$

$$= \frac{\dot{K}(t)}{A(t)L(t)} - \frac{K(t)}{A(t)L(t)}\frac{\dot{L}(t)}{L(t)} - \frac{K(t)}{A(t)L(t)}\frac{\dot{A}(t)}{A(t)}$$

$$\dot{k}(t) = \frac{sY(t) - \delta K(t)}{A(t)L(t)} - k(t)n - k(t)g$$

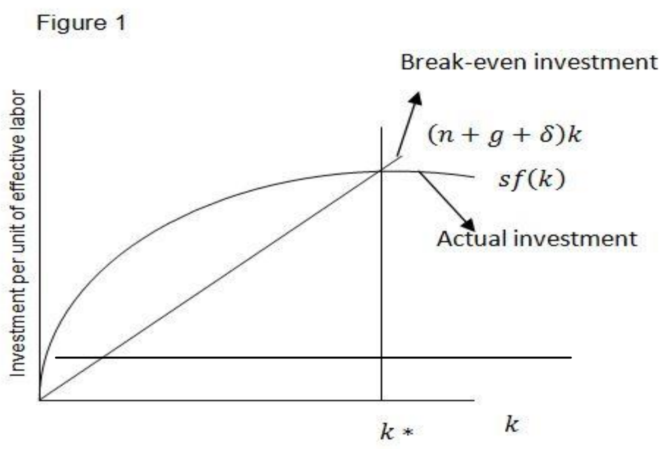
$$= s\frac{Y(t)}{A(t)L(t)} - \delta k(t) - nk(t) - gk(t)$$

Finally, the model will be

$$\dot{k}(t) = sf\big(k(t)\big) - (n + g + \delta)k(t)$$

Hence, for ensuring steady growth, (n+g+δ) amount of capital has to be invested. In the case of LDCs, the researchers believe that if the capital-labor ratio falls below the point k*, then the ratio will be falling due to depreciation of existing capital and inclusion of new effective labor. Diagrammatically, the above propositions can be shown as follows:

Figure-1. Actual and break-even investment



The vertical axis of the diagram is a representation of total investment per unit of efficient labor that needs to be committed in a country to produce a given steady state of output. The horizontal

axis, on the other hand, represents total capital per unit of effective labor (K/AL) employed. At this juncture, it should be noted that sf(k) is the representation of total actual investment that accrues as a result of the unit of labor and capital employed, i.e., f(k), while the fraction of that output that is invested is s. Then, $(n+g+\delta)k$ will yield a break-even point of the investment required. As a result of this, it represents the expected level of investment that must be committed in order to ensure k remains at the steady state. With respect to this analysis and in order to keep K from depreciating, consistent capital replacement must be ensured, particularly in Africa; this is in line with the theory of creative destruction. Similarly, where the quantity of labor is accelerating due to population growth, in this case sufficient investment must further be committed to keeping the capital stock (K) constant. This may not, however, be enough to keep the capital stock per unit of effective labor (k) constant.
In addition to the above, Wurgler (2000) shows how financial development could help in enhancing the allocative possibilities of investment in a bid to promote economic growth:

$$\delta s_t = f(FD_t) = a_0 + \alpha_1 \left(FD_t\right) + \mu_t ....1$$

$$g_{\vartheta t} = f(FD_t) = \beta_0 + \beta_1 (FD_t) + \eta_t ....2$$

thus

$$g_y = f(FD_t) = \lambda_0 + \lambda_1 (FD_t) + \varepsilon_t ....3$$

Where g_y is growth in per capita: $\lambda_0 = a_0 + \beta_{0;} \lambda_1 = a_1 + \beta_1; FD$ is financial sector development and ε_t is the error term with the usual properties.

4.1 Methodology, data, and model specification

This study employs annual time series data of South Africa from 1980 to 2011. The data were extracted from the World Development Indicators (WDI) dataset. The explanatory variables are GDP per capita (GDP at constant 2000 values), economic growth, fixed capital formation (FCF), trade openness (TRADE), the population growth rate (POP), and financial development (FD). Moreover, this study adopts three measures of financial development: (1) the ratio of liquid liabilities to nominal GDP (M3); (2) the ratio of commercial bank assets to central bank assets (BASSET); and (3) the ratio of credit issued to the private sector by banks to GDP (PRIVATE). All variables are in logarithms.

The study will also follow Ang and McKibbin (2007) in using the PCA of the financial development variables. This method has two distinct advantages. First, it overcomes the multicollinearity issue that is likely to be common with time series data, particularly in the PCA of the financial development variables. Second, it shows the gross effect of FD on GDP growth. The traditional approaches used are mainly aimed at exploring the cointegration relation among respective variables, as most research in the field has used Engle and Granger and Johansen. These two approaches have some severe limitations. First, Engle and Granger can only be applied to bivariate tests; as a result, this approach does not consider more than two variables at a time. Second, the Johansen test is only applicable to variables of the same order of integration. Also, Johansen is very sensitive to the selection of the optimal number of lags (Ganzalo, 1994). Bearing these criticisms in mind, this study applies the ARDL bounds-test technique of Pesaran et al. (2001). This technique has the following key important characteristics. First, after selecting the optimum lag, a cointegration relationship can be estimated using the OLS technique. Second, it furnishes the long- and short-run relationship coefficients simultaneously. Third, in contrast to the Engle-Granger and Johansen methods, this test provides consistent results even in an existing mix order of I(0) or I(1) or a mutually integrated order of variables. This test procedure will not, however, be applicable if an I(2) series exists in the model. Fourth, notwithstanding the incidence of an endogeneity problem, the ARDL model provides unbiased coefficients of explanatory variables along with valid t statistics. In addition, the ARDL model corrects omitted lag variable bias sufficiently (Inder, 1993). Finally, this test is remarkably efficient and consistent when dealing with small and finite sample sizes.

4.2 Model specification

Following Ang and McKibbin (2005), Khan and Qayyum (2005), and Fosu and Magnus (2006), the ARDL version of the vector error correction model (VECM) can be specified as:

Model 1: Equation (1)

$$\Delta \ln GDP = \beta_0 + \beta_1 \ln GDP_{t-1} + \beta_2 \ln FCF_{t-1} + \beta_3 POP_{t-1} + \beta_4 TRADE_{t-1} + \beta_5 \ln FD_{t-1} + \Sigma_i^p \gamma_i \Delta \ln GDP_{t-1}$$
$$+\Sigma_1^q \varphi_1 \Delta \ln FCF_{t-1} + \Sigma_m^q \varphi_1 \Delta POP_{t-m} + \Sigma_r^q \psi_1 \Delta TRADE_{t-r} + \Sigma_n^q \eta_m \Delta FD_{t-n} + \varepsilon_t ....(1a)$$

Model 2: Equation (2)

$$\Delta \ln GDP = \beta_0 + \beta_1 \ln GDP_{t-1} + \beta_2 \ln FCF_{t-1} + \beta_3 \ln POP_{t-1} + \beta_4 \ln M3_{t-1} + \beta_5 \ln PRIVATE_{t-1} + \beta_6 \ln BASSET_{t-1}$$
$$+\Sigma_i^p \gamma_i \Delta \ln GDP_{t-1} + \Sigma_j^q \delta_j \Delta \ln FCF_{t-j} + \Sigma_1^q \varphi_1 \Delta POP_{t-1} + \Sigma_m^q \eta_m \Delta \ln M3_{t-m} + \Sigma_n^q \theta_n \Delta \ln PRIVATE_{t-1}$$
$$+\Sigma_p^q \vartheta_p \Delta \ln BASSET_{t-m} + \varepsilon_t ....(1b)$$

4.3 Estimation procedure

We begin the estimation of Equation (1) using the OLS approach and then proceed to conduct the Wald test or F-test for joint significance of the coefficients of lagged variables. This will enable us to examine the existence of a long-run relationship among the variables. The null hypothesis is (H_0): $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$, which means that there is no cointegration among the variables. The alternative hypothesis is (H_a): $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$. Then, the calculated F-statistic is evaluated with the critical value (upper and lower bound) given by Pesaran et al. (2001). If the F-statistic is above the upper critical value, the null hypothesis of no cointegration is rejected as this indicates that a long-run relationship exists among the variables. Conversely, if the F-statistic is smaller than the lower critical value, the null hypothesis cannot be rejected, thus implying that there is no cointegration among the variables. If the F-statistic lies between the lower and upper critical values, however, the test is inconclusive. In the second step, after establishing a cointegration relationship among the variables, the long-run coefficient of the ARDL model can be estimated:

$$\ln GDP = \beta_0 + \Sigma_{j=1}^{q1} \gamma_i \ln GDP_{t-1} + \Sigma_{j=0}^{q2} \tau_j \ln FCF_{t-j} + \Sigma_{j=0}^{q3} \varphi_j \ln POP_{t-1} + \Sigma_{j=0}^{q4} \psi_j \ln TRADE_{t-j} + \Sigma_{j=0}^{q5} \eta_m \ln FD_{t-1}$$
$$+\varepsilon_t ....(2a)$$

$$\ln GDP = \beta_0 + \Sigma_{i=1}^{p} \gamma_i \ln GDP_{t-1} + \Sigma_{j=0}^{q1} \psi_j \ln TRADE_{t-j} + \Sigma_{k=0}^{q2} \delta_j \ln FCF_{t-k} + \Sigma_{l=0}^{q3} \varphi_1 \ln POP_{t-1} + \Sigma_{m=0}^{q4} \eta_m$$
$$\ln M3_{t-m} + \Sigma_{n=0}^{q5} \tau_n \Delta \ln PRIVATE_{t-1} + \Sigma_{s=0}^{q6} \omega_s \ln BASSET_{t-s} + \varepsilon_t ....(2b)$$

In this process, we use Schwarz Information Criterion (SIC) for selecting the appropriate lag length of the ARDL model for all the variables under study. Finally, we use the error correction model (ECM) (Equations 3a and 3b) to estimate short-run dynamics:

Equation (3a)

$$\Delta \ln GDP = \beta_0 + +\Sigma_{i=1}^{p} \gamma_i \Delta \ln GDP_{t-1} + \Sigma_{j=0}^{q} \tau_j \Delta \ln FCF_{t-j} + \Sigma_{l=0}^{q} \varphi_l \Delta \ln POP_{t-l} + \Sigma_{n=0}^{q} \psi_j \Delta \ln TRADE_{t-J} + \Sigma_{m=0}^{q} \eta_m$$
$$\Delta \ln FD_{t-m} + \vartheta emc_{t-1} + \varepsilon_t ....(3a)$$

Equation (3b)

$$\Delta \ln GDP = \beta_0 + +\Sigma_{i=1}^{q} \gamma_i \Delta \ln GDP_{t-1} + \Sigma_{j=0}^{q} \tau_j \Delta \ln TRADE_{t-j} + \Sigma_{k=0}^{q} \delta_k \Delta \ln FCF_{t-k} + \Sigma_{l=0}^{q} \varphi_l \Delta \ln POP_{t-l}$$
$$+\Sigma_{m=0}^{q} \eta_m \Delta \ln M3_{t-m} + \Sigma_{n=0}^{q} \theta_n \Delta \ln PRIVATE_{t-1} + \Sigma_{p=0}^{q} \vartheta_s \Delta \ln BASSET_{t-m} + \vartheta emc_{t-1} + \varepsilon_t ....(3b)$$

CUSUM and CUSUMSQ (Stability test)

We performed two tests of stability on the long-run coefficients together with the short-run dynamics, following the suggestion by Pesaran (1997), to check the stability of short- and long-run parameters of the selected ARDL model by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests.

5.1. Empirical results and discussion

Table-1. Unit root test

Variables	DF OLS		DF OLS
	In level		First difference
	Intercept	Intercept & trend	Intercept
LGDP	-0.872	-1.376	-3.166**
LFCF	-0.426	-2.067***	-2.967***
LPOP	-1.480*	-0.850	0.382
TRADE	-1.832	-2.355	-5.335***
M3	-2.047**	-3.597***	-4.049***
PRIVATE	1.097	-2.810	-3.523***
BASSET	2.158	-2.953*	-5.766***

Before proceeding to ARDL estimation, this study conducts a unit root test to check the properties of the data, specifically the stationarity of each variable. This is done in order to ensure that no variable is I(2), so as to avoid spurious results. The unit root test still would be important to make sure no variable exceeds the integrated order I(1). This applied unit root test, however, considers both the constant and the trend, and Table 1 shows that all the variables are stationary at I(1) but that LPOP and M3 are stationary at I(0). The presence of a mixed order of integration allows for the use of the ARDL cointegration approach rather than the Johansen and Juselius approach.

Table-2. VAR model for lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-21.20435	NA	4.19e-06	1.807196	2.042937	1.881027
1	148.9562	269.9099	1.94e-10	-8.203877	-6.789433	-7.760891
2	196.9655	59.59777*	4.70e-11	-9.790726	-7.197579	-8.978585
3	232.8031	32.13025	3.64e-11*	-10.53815*	-6.766296*	-9.356850*

* indicates lag order selected by the criterion

Prior to estimating the ARDL bounds test, this study develops a standard VAR model, selecting the optimum lag. This study follows the Schwarz Bayesian Criterion (SC), which reveals that the optimum lag is 3.

Table 3a reports the results of the calculated F-statistics when each variable is considered as a dependent variable (normalized) in the ARDL-OLS regressions. The calculated F-statistic F_{GDP}(GDP| TO, POPG, GOV, FD) = 3.12 is higher than the upper-bound critical value of 3.00 at the 5% level, which means that cointegration exists in the model. When population growth and fixed capital formation are normalized, however, the F-statistic indicates that the results are inconclusive. Moreover, when financial development and trade openness are normalized, the F-statistic falls within the lower bound, meaning a cointegration relationship exists.

Table-3a. Results from bounds-test: Model 1:
GDP=F(POP, TRD, FCF, FD)

Dep. Var.	SIC Lag	F-statistics	Probability	Outcome
F_{GDP}(GDP|POP, TRD, FCF, FD)	3	3.12*	0.045	Cointegration
F_{POP}(POP|GDP, TRD, FCF, FD)	3	2.308	0.104	Inconclusive
F_{TRD}(TRD| GDP, POP, FCF, FD)	3	1.719	0.199	No cointegration
F_{FCF}(FCF| GDP, POP, TRD, FD)	3	2.638	0.074	Inconclusive
F_{FD}(FD| GDP, POP, TRD, FCF)	3	0.506	0.766	No cointegration

Notes: Asymptotic critical value bounds are obtained from Table F in Appendix C, Case II: intercept and no trend for k = 5 (Pesaran and Pesaran, 1997, p. 478). Lower bound I(0) = 2.08 and upper bound I(1) = 3.00 at the 5% significance level.

Table-3b. Results from bounds test: Model 2:
GDP=F(POP, TRD, FCF, M3, PRIVATE, BASSET)

Dep. Var.	SIC Lag	F-statistic	Probability	Outcome
F_{GDP}(GDP|POP, TRD, FCF, M3, PRIVATE, BASSET)	3	4.235***	0.022	Cointegration
F_{POP}(POP|GDP, TRD, FCF, M3, PRIVATE, BASSET)	3	6.504***	0.005	Cointegration
F_{TRD}(TRD| GDP, POP, FCF, M3, PRIVATE, BASSET)	3	6.775***	0.004	Cointegration
F_{FCF}(FCF| GDP, POP, TRD, M3, PRIVATE, BASSET)	3	3.227**	0.025	Cointegration
F_{M3}(M3| GDP, POP, TRD, FCF, PRIVATE, BASSET)	3	3.522**	0.045	Cointegration
F_{PRIV}(PRIVATE| GDPC, POP, TRD, FCF, M3, BASSET)	3	3.444**	0.041	Cointegration
F_{BASS}(BASSET| GDP, POP, TRD, FCF, M3, PRIVATE)	3	2.381	0.108	No cointegration

Notes: Asymptotic critical value bounds are obtained from Table F in Appendix C, Case II: intercept and no trend for k=5 (Pesaran and Pesaran, 1997, p. 478). Lower bound I(0) = 2.39 and upper bound I(1) = 3.38 at the 5% significance level.

Table 3b reports the results of the calculated F-statistics when each variable is considered as a dependent variable (normalized) in the ARDL-OLS regressions. The calculated F-statistic F_{GDP}(GDP| TO, POPG, GOV, FD) = 3.235 is higher than the upper-bound critical value of 3.38 at the 5% significance level, which means that cointegration exists in the model. Likewise, when all the variables are considered as dependent variables one by one, the respective F-statistics fall within the upper bound of the Pesaran critical values, which reveals that they are cointegrated. In the case of BASSET, however, cointegration does not hold.

Table-4a. The estimated long-run coefficients for model 1
ARDL (2, 0, 2, 1, and 0) selected based on Schwarz Bayesian Criterion (SIC)

Regressors	Coefficient	Standard Error	T-Ratio[Prob]
TRADE	0.006	0.004	1.3110[.205]
LPOP	-0.317	0.135	-2.342[.030]
FCF	0.184	0.077	2.386[.028]
FD	0.005	0.022	0.250[.805]
C	9.015	2.388	3.775[.001]

Table 4a shows the long-run impact of each independent variable on GDP growth. It shows that the South African economy has not benefited significantly from the overall impacts of financial development since the coefficient is positive but insignificant. Likewise, trade does not have any significant impact on long-run GDP. Similarly, population growth negatively influences long-run per capita GDP growth. Conversely, fixed capital formation has a strong positive association with long-run GDP.

Table-4b. Estimated long-run coefficients for model 2
ARDL (1,0,1,0,0,0) selected based on Schwarz
Bayesian Criterion (SIC)

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
TRADE	0.008	0.001	4.121[.000]
LPOP	-0.636	0.183	-3.478[.002]
M3	-1.180	0.374	-3.174[.004]
BASSET	-0.624	0.689	-0.905[.375]
PRIVATE	1.060	0.309	3.422[.002]
C	19.452	3.199	6.079[.000]

Unlike Table 5a, Table 5b shows that trade openness fosters GDP in the long run. Population growth, however, consistently shows negative and statistically significant impacts in both models. Nevertheless, credit in the private sector has a positive and significant impact on GDP. Surprisingly, M3 has a negative and significant influence on GDP. Finally, whether bank assets have any influence on GDP is inconclusive as the coefficient is negative but statistically insignificant.

Table-5a. Error correction representation for
the selected ARDL model

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLGDP1	-0.340	0.163	-2.075[.051]
dTRADE	0.001	0.567	3.113[.005]
dLPOP	-0.408	0.565	-.722[.478]
dLPOP1	-1.197	0.531	-2.253[.036]
dLFCF	0.250	0.052	4.783[.000]
dFD	-0.001	0.006	-.194[.848]
dC	2.655	1.647	1.611[.123]
ecm(-1)	-0.299	0.150	-1.993[.060]
ecm = LGDP -.0058968*TRADE + .42074*LPOP -.26764*LFCF + .0040184*FD -8.86 67*C			

Table 6a reports that trade openness (TRADE) and fixed capital formation (LFCF) have positive and significant impacts on GDP, but that population growth has a negative and significant impact in the short run but with a lag. On the other hand, financial development (FD) has a negative and insignificant impact on GDP in the short run. The error correction coefficient is negative and significant, which means after any economic shock it adjusts 29% per year towards the long-run equilibrium.

Table 5b reports that TRADE still has a positive and significant impact on GDP, whereas population growth has a negative and significant impact in the short run. M3 and BASSET negatively influence short-run GDP. PRIVATE, however, has a strong positive association with short-run GDP. Even though M3 is not significant, the other two indicators are quite significant, meaning that financial development contributes to South African growth; the error correction coefficient is negative and significant, which means it adjusts 30% per year towards equilibrium after any economic shock.

Table-5b. Error correction representation for the selected ARDL model

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dTRADE	0.002	0.594	4.166[.000]
dLPOP	-1.018	0.511	-1.991[.058]
dM3	-0.361	0.166	-2.167[.040]
dBASSET	-0.189	0.197	-0.961[.346]
dPRIVATE	0.322	0.125	2.568[.017]
dC	5.911	2.046	2.889[.008]
ecm(-1)	-0.303	0.081	-3.708[.001]

ecm = LGDP -.0081473*TRADE + .63690*LPOP + 1.1896*M3 + .62412*BASSET -1 .0602*PRIVATE -19.4529*C

4.1.6 Sasabuchi-Lind-Mehlum (SLM) test

The seminal work of Arcand et al (2012) discovered the existence of a non-monotonic relationship between financial development and economic growth. In view of this, we employ the same line of investigation to the case of South Africa. The main purpose of this test is to explore whether the marginal impact of financial development is positive at a certain point and whether, after a certain point, it no longer contributes to boosting economic growth or even has a negative outcome (particularly as a result of economic shocks from the recent financial crisis). The conventional procedure is to capture the non-monotonic relation, which is executed simply by taking the quadratic form of the variable of concern. According to Lind and Mehlum (2010), however, including the quadratic term does not guarantee the existence of a non-monotonic association between financial development and economic growth. Such a procedure is only confirmed by the necessary condition of the existence of an inverted U-shaped relationship, but this is not a sufficient condition. Thus, in order to make sure of the presence of an inverted U-shaped relationship, Lind and Mehlum (2010) developed and modified the Sasabuchi (1980) likelihood ratio test, which is known as the Sasabuchi-Lind-Mehlum (SLM) test. To perform the test, we have to estimate the following model:

$$GDP_t = aFD + bFD_t^2 + Z_t C + \varepsilon_t$$

Then, it is necessary to conduct a joint hypothesis test: $H_0: (a + b2FD_{min} \leq 0) \cup (a + b2FD_{max} \geq 0)$ against the alternative hypothesis $H_1: (a + b2FD_{min} > 0) \cup (a + b2FD_{max} < 0)$ where FD_{min} and FD_{max} represent t. Here, FD_{min} and $FD_{max\ represent}$ the maximum and minimum values of financial development. If the null hypothesis is rejected, this confirms the existence of a U-shaped relationship.

Table-6. U-test: The table reports the results of the Sasabuchi-Lind-Mehlum test for an inverse U-shaped relationship

South Africa	
Slope at FD_{min}	-0.019
	(0.230)
Slope at FD_{Max}	0.074
	(0.027)
SLM test for inverse U shape	0.75
P Value	0.23

From the results in Table 6, it can be seen that the lower-bound slope of FD is negative (-0.019) but statistically insignificant while the upper-bound slope of FD is positive (0.074) but significant. The SLM test in the bottom panel of Table 6 indicates that the null hypothesis is not rejected, which means that the relation between financial development and GDP in South Africa is linear or non-monotonic, which is in line with the study of Archand et al (2012).

Table-7a. ARDL-VECM model diagnostic tests for model 1

R^2=0.98, Adjusted R^2=0.98	
Serial correlation $\chi^2(1)$=1.806[0.179]	Normality $\chi^2(2)$=3.649[0.161]
Functional form $\chi^2(1)$= 4.138[0.042]	Heteroscedasticity $\chi^2(1)$=0.203[0.652]

The diagnostic test reveals that there is no serial correlation problem and no heteroscedasticity problem. It also shows that the error is normally distributed. It shows, however, that a functional error exists but it would be overlooked as R^2 is high.

Table-7b. ARDL-VECM model diagnostic tests for model 2

R^2=0.98, Adjusted R^2=0.98	
Serial correlation $\chi^2(1)$=0.127[0.721]	Normality $\chi^2(2)$ =0.401[0.818]
Functional form $\chi^2(1)$= 0.087[0.767]	Heteroscedasticity $\chi^2(1)$ =1.024[0.311]

Table 7b shows that model 2 is the best fitted model in terms of autocorrelation, heteroscedasticity, functional form, and normality. The overall goodness of fit of the estimated models is shown in Tables 7a and 7b, with an R^2 value of 98% for both of the models. Figures 1, 2, 3, and 4 present the stability test results of both the CUSUM and the CUSUMSQ. The CUSUM and CUSUMSQ remain within the critical boundaries of the 5% significance level. These statistics specify that the long-run coefficients and all the short-run coefficients in the error correction model are stable and impact upon economic growth in the in case of South Africa.

Schedule-A. present CUSUM and CUSUMSQ graph for model 1

Figure-3.

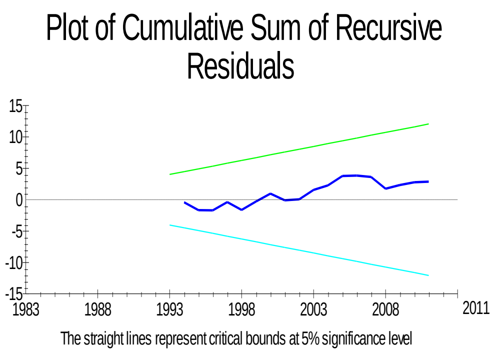
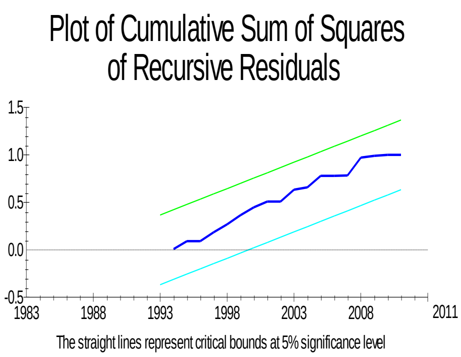


Figure-4.



Schedule-B. present CUSUM and CUSUMSQ graph for model 2

Figure-5.

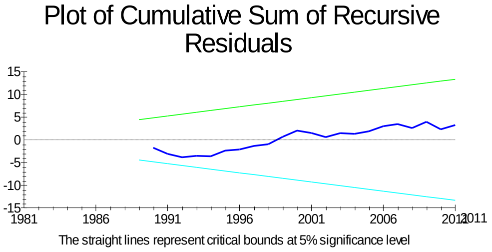
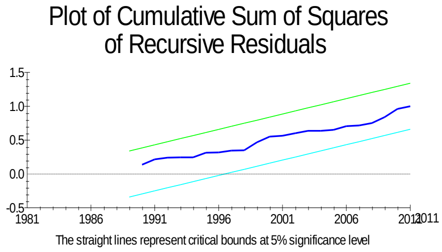


Figure-6.



6.1 Conclusion, recommendations, and policy implications

In this paper, we examined the empirical relationship between financial development and economic growth in South Africa from 1980 to 2011 using the ARDL bounds-testing approach to cointegration. The study found that the South African economy has benefited less significantly from the overall impacts of financial development in both the long run and the short run. The study further established that, although M3 is not significant, the other two indicators of financial development are quite significant but with a very weak trend. The insignificant impact of M3 may be due to weak financial policies to cushion the effects of the financial crisis and M3 is among the key variables impeding the growth prospects of the country. Furthermore, the paper found that, for both models used, population and BASSET persistently shows an insignificant impact or contribution to the country's GDP. As shown in Tables 4b and 5a, however, fixed capital formation has a positive and significant impact on GDP. Trade openness was equally found to foster South African economic growth in both the short-run and the long-run (see also Tables 4a and 4b). The research further discovered that credit to the private sector had a positive and significant impact on South Africa's economic growth.

The most startling finding of this research is that of the result of the U test in Table 6 which shows that the null hypothesis could not be rejected, indicating that the relation between financial development and GDP in South Africa is linear or non–monotonic which is in line with Arcand et al (2012). This finding suggests that too much finance prevails in the South African economy. This is evidenced by the mounting inflationary pressure in the economy which, among other things, led to the high fiscal deficit (reported at about R118 billion in 2012) facing the country. In conclusion, the study found trade openness and the ratio of credit issued to the private sector by the banks to GDP to be the most influential factors that contribute significantly to the leading growth profile of the South African economy in both the short-run and the long-run. Based on these concluding remarks, we derive some overriding policy prescriptions:

- South Africa's trade liberalization policy made the country to experience strong effects of the financial crisis. This phenomenon leads to the strongest contraction of the economy. This assertion is evidenced by the finding of the error correction model (ECM) (see Tables 5a and 5b), which showed a weak adjustment profile after a shock to be 30% and 29% in model 1 and 2 respectively. This weak trend indicates a clear reflection of the obvious economic menace faced by the South African economy and its inability for quick economic readjustment, by implication, this is the main reason for the economic stagnation of the country, particularly when policy makers were unable to determine alternative strategies to cushion the risk effects of the crisis. This phenomenon may also have been behind the negative impacts faced by other sectors, thereby, spilling over to impinge on production activities in majority of South Africa's economic subsystems.

- In our analysis of the impact of each respective variable on South African economic growth, we found that population growth had a negative impact on GDP in both models. Additionally, the ratio of commercial bank assets to central bank assets

BASSET was found to have insignificant impacts upon GDP. This finding suggests that, in a trade-based economy, when the population or labor force and the banking industry cannot significantly contribute to growth, this could lead to a persistent weakening of the economy because of significant reductions in productivity. Similarly, the persistent negative impacts of population upon GDP may be due to poor incentives for entrepreneurial activity in the country. By implication, if the problem is not addressed, this could lead to brain drain, idle human capital, and high unemployment rates, which may have continued negative consequences for the economic growth prospects of the South African economy.

From the above findings, we recommend that there should be a massive investment in the establishment of vocational training institutions and reductions in the cost of acquiring entrepreneurial knowledge. Efforts should also be made to create an entrepreneurial environment conducive to low-cost investment that will stimulate productivity. Similarly, South Africa should devise some means of reshaping its monetary policies towards creating synergies that will enable it to have a more resilient, effective, and efficient financial sector that will attract innovation and competitive activity commensurate with the best of the international financial system. Equally, it should ensure that the banking sector is geared towards supporting individual entrepreneurship. This will not only provide added value to the country's open economic system but will equally boost its financial development-GDP association. Finally, we recommend that policy makers should work to diversify the economy and its trade linkages to be wider than the European countries that were hit hardest by the financial crisis and that it should also take steps to raise internal demand.

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