MASTER OF MANAGEMENT IN FINANCE AND INVESTMENTS

Analysis of the Relationship between financial development and economic growth in South Africa

A research submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in Finance and Investments

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DECLARATION

I, **Simphiwe Jacob Zimu (967866)**, declare that this dissertation titled "Analysis of the Relationship between financial development and economic growth in South Africa" is my own work, all other information derived from published or other sources has been acknowledged in the text and through the reference list. It is submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in Finance and Investments.

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ABSTRACT

Using 1980 - 2018 annual data, this study investigates the relationship between financial development and economic growth using country-specific time series data. Focusing on South African economy, the study attempts finding out if South Africa displays its own peculiar /specific finance–growth nexus. To address the use of single variable, this paper uses the financial development index recently developed as a broad measure of financial development released by the International Monetary Fund. This index captures several multidimensional aspects of the financial system. Given the numerous advantages over previously used cointegration tests, the Autoregressive Distributed Lag (ARDL) approach is used in this paper to examine both the long run and short run relationship between financial development and economic growth. The results of this study show evidence that the impact of financial development (financial institutions and financial markets) on economic growth is mixed and sensitive to variables used as measures of financial development. However, this study finds that the causal relationship flows from financial institutions and financial markets development to economic grow, though financial institution development predominates.

Keywords: Financial Development Index, Financial institution index, Financial Markets Index

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1. INTRODUCTION

1.1 Background

According to World Bank, Financial development contributes significantly to growth, is crucial to alleviating poverty and is connected to immersive increases in income distribution (World Bank, 2001). This assertion has been in contest by researchers for decades. Since the introduction of both finance-led growth and growth-led finance theories, the finance-growth nexus has been subject to considerable debate in the literature of development and growth. Earlier literature neglected the role of financial development in stimulating the economic growth rate. In their essays collection, “the pioneers of development economics” who included three Nobel laureates have totally excluded the discussion of financial development in growth process (Meier and Seers, 1984). Furthermore, Stern (1989) as cited in Levine (1997) does not address the contribution of financial development on growth in his review and Lucas (1988) claimed financial markets are less significant and over-stressed.

While Goldsmith (1959) argued that differences in the financial organization and customs of a country influence not only the course of economic development, but also the pace of this growth. This influence and speed hinges on how efficiently a financial system pools savings and allocates to deserving projects. A financial system ultimately decides who gets to use society’s savings thus impacting the growth level and livelihoods of the people. It should be noted though that there are cross country studies that came with a rather opposing view that the direction of the relationship is bi-directional and differs from country to country. The differences in the countries observed were explained by institutional characteristics, policies, and difference in the implementation (Demetriades and Hussen, 1996). The argument that financial development spurs economic growth is also supported by Ohiomu and Oligbi (2020) for Nigeria; yet Opoku et al. (2019) suggest that financial development and economic growth evolve independently and caution against making universal suppositions about the causal relationship between financial development and economic growth.

Since transitioning to democracy, the South African democratic government has made considerable strides toward improving the wellbeing of its citizens, however progress is slowing down with real GDP showing a sluggish performance between 2009 and 2019. The real GDP in 2010 recovered strongly to 3.0% from -1.5% in 2009. Although in 2011 there was a slight increase to 3.3% of real GDP, the country could not maintain this growth as noted in the decline to 2.2% in 2012. Real GDP recovered to 2.5% in 2013 but later declined in 2014 to 1.8% and further declined in 2015 and 2016 to 1.2% and 0.4% respectively. It however, recovered in 2017 to 1.4% but that recovery was followed by declines in 2018 and 2019 to 0.8% and 0.2% respectively. Unemployment remains a key challenge standing at 29.1% in the last quarter of 2019 (Statistics South African, 2020). This increasing inequality in the presence of developing financial markets can somehow be linked to the interconnectedness of the banking system in the country that does not efficiently allocate savings (Rapapali and Simbanegavi, 2020; Odhiambo, 2014; Beck, Demirguc-Kunt and Levine, 2005).

This picture does not seem to be improving, with the World Bank Macro Poverty outlook (2020), predicting that the economic growth will remain muted, and the economy is expected to contract by 3.5% in 2020 as COVID-19 weighs on global demand, and domestic activity coming to a halt. The Bureau for Economic Research's (BER) business confidence index (BCI) declined sharply from 18 index points in Q1 2020 to just 5 in Q2, indicating that 95% of the respondents are not satisfied with current business conditions. Investment has remained static and curbed by the moderate pace of changes to improve the business condition and strengthen infrastructure services. The report continues to mention that while the South African economic outlook is gloomy the financial sector remains one of only a handful of development drivers in the economy.

Banks have a vital role in the economy, they intermediate between agents of the economy with excess cash (savers) and agents who require to borrow cash (Rapapali and Simbanegavi, 2020; Demirguc-Kunt and Maksimovic, 2002). Godspower-Akpomiemie and Ojah (2017) assert that the key functions of a commercial bank are to seek deposits from lenders, transform them into loans and provision them to borrowers. The South African banking system is relatively "well developed and effectively regulated, comprising a central bank (SARB), a few large commercial banks, investment institutions, a few smaller banks, as well as lending and savings organisations" (Moyo, 2018).

According to SARB (2020) BA900 forms, see also (Rapapali and Simbanegavi, 2020) there are 36 banks in South Africa, encompassing 33 commercial banks and 3 mutual banks. Of the 33 commercial banks, 15 are registered banks and 18 are local branches of foreign banks. Total assets of the banking sector (domestic and foreign) reached R5.5 trillion in 2018, up from R3.2 trillion in 2008. Although there are 36 operational banks in South Africa, the sector can best be characterized as a 4-firm oligopoly with a competitive fringe. Among the oligopolists (Amalgamated Bank of South Africa (Absa), Nedbank, First National Bank (FNB) and Standard Bank), market shares have changed marginally over the period between 2008 and 2018. The four banks (Absa, FNB, Nedbank and Standard Bank) jointly controlled 85.6% of the market share by assets in 2008 and this has marginally declined to 82.4% in 2018.

The South African capital market is vigorous, liquid and well developed (Odhiambo, 2010). South Africa has three exchanges; the Johannesburg Stock Exchange (JSE) being the largest and oldest with a history dating back to 1887, A2X was founded 2014, primarily positioning itself as an alternative secondary market, at the time of writing this report, had 33 listed companies making up R 2.1 trillion market capitalization (A2X, 2020) and lastly ZARX was granted full stock exchange licence in 2016.

As the global health crisis (COVID-19) deepened in mid-March 2020, emergence of liquidity strains commenced in some domestic funding markets. The South African Reserve Bank (SARB) consequently introduced a range of changes to money market liquidity management operations. These measures were intended to make it simpler for banks to acquire cash and lend to agents of the economy that needed funds. Furthermore, the SARB also purchased government bonds in the secondary market, which expanded liquidity and moderated sudden shifts in government bond yields (SARB, 2020). Rapapali and Simbanegavi (2020) argue that the banking sector and the financial sector are positioned more generally as the crucial drivers of the economy, providing efficient risk pricing, and promoting the distribution of scarce capital throughout the economy. At abstract level, banks are a channel for monetary policy, allowing the South African Reserve Bank (SARB) to influence the economic activity and thus economic output.

1.2 Problem Statement

The South African financial markets are consistently lauded as the most advanced in Africa and with the financial regulatory system tipped to have been at the centre to shield South African economy from the devastating impact of 2007/8 global financial crisis (Baxter, 2009). These markets continue to be elevated to the international standards (JSE, being judged as being one of the best in the world) (World Economic Forum, 2019).

King and Levine (1993) empirically show that better financial systems stimulate faster productivity growth by funnelling pooled savings to promising productivity-enhancing projects. This view is supported by Anayiotos and Toroyan (2009) for Sub-Saharan Africa.

Many pioneering studies have found that financial development supports growth, which has produced adequate proof supporting the view that money-related improvement is useful for development. Goldsmith (1969) as cited in Arcand, Berkes and Panizza (2012) was the first to show the presence of a positive correlation between the size of the financial system and long-run economic growth. He contended that this positive relationship was driven by the way that financial intermediation improves the productivity instead of the volume of investment. However, Cecchetti and Kharroubi (2015) suggest the existence of a threshold beyond financial development has a diminishing effect on growth. Secondly, on their use of sectoral data, they examined the distributional nature of this effect and found that credit booms harm what is normally thought of as the engines for growth – innovation driven sectors. Evident also in their earlier work (Cecchetti and Kharroubi, 2012) that because the financial sector competes with the rest of the economy for scarce resources, financial booms are not, in general, growth enhancing.

The threshold argument is supported by Arcand, Berkes, and Panizza, (2012) on their assessment of financial depth and economic growth, that at an intermediate level of financial depth, there is a positive nexus between the size of the financial system and economic growth. They also show that at high levels of financial depth, more finance is associated with less growth. This threshold effect is dismissed as not being relevant for sub-Saharan Africa (IMF, 2016).

It is not very clear whether finance-growth nexus positively stimulate growth in the developing countries, including South Africa. A lot of studies have shown that financial development can help drive the overall economic growth, but the lingering question has always remained “what happens to the livelihoods of the people in the country?” Research on this area has also found that financial development reduces poverty by exerting a disproportionately positive effect on the poor (Beck, Demirguc-Kunt and Levine, 2005).The World Bank suggests that such poverty reduction happens through the facilitation of investments in their health, education, and businesses.

Perhaps in South Africa’s case, the postulated finance-growth nexuses should be viewed with conditions, while we accept as conversational wisdom that finance can lead to growth, however other conditions must be in place first. Perhaps the financial sector charter must come to the party, that while profitability is maintained, it must efficiently contribute to the social and economic development and transformation of the country. Despite being an economic hub for Southern African countries on the continent, home to the deepest financial markets, and having implemented several economic and financial sector reforms, South Africa has experienced sluggish and volatile economic growth at times on the brink of recession. It is for this reason this research aims to investigate the postulated link between financial development and economic growth in South Africa.

1.3 Research Motivation

Firstly, post transition to democracy, the South African government has been under immerse pressure to work towards improved economic growth. South Africa’s economy has rapidly become smaller and poorer, with potential social tensions due to relatively high levels of unemployment and increasing inequality. While the financial sector has increased in modernization and sophistication, the economic performance has continued to stutter adding to the confusion on the nature of the relationship between financial development and economic growth.

Secondly, Odhiambo (2008), argues that majority of finance-growth nexus studies have focused on Asia and Latin America, affording sub-Saharan African countries little coverage and even so the previous studies have relied mainly on the cross-sectional data, thus, failing to address country specific issues. This lapse in country specific study is supported by Ehigiamusoe (2014). This study investigates the relationship between financial development and economic growth in South Africa using country specific data. Lastly, we use the recently developed broad measure of financial development which captures several multidimensional aspects of the financial system.

1.4 Research Objectives

Based on the problem statement reviewed, and motivation of this research, the objective of this study is therefore to examine the link between financial development and economic growth using country-specific time series data. Focusing on South Africa, the study intends to find out if South Africa will display its own peculiar /specific finance–growth nexus.

1.5 Research Questions

To achieve the research objectives, this research seeks to answer the following questions:

i) What is the impact of financial institutions based financial development on economic growth?
ii) What is the impact of financial markets based financial development on economic growth?
iii) What is the casual relationship between financial institutions based financial development and economic growth?
iv) What is the casual relationship between financial markets based financial development and economic growth?

1.6 Significance of the Research

This study examines the relationship between financial development and economic growth in South Africa. Looking at this topic during this tough economic period (of slow real economic growth of 0.2% in 2019 and 29.1% of unemployment in the same year) is with the intent to have it add to the critical debate that may:

i) lead to consideration to reform the financial sector policies
ii) have policy implications and shape future policy-oriented research
iii) highlight the urgent need for research on the regulatory, and policy determinants of financial development
iv) Most importantly, with anticipation that its findings will be essential in enhancing the economy for the benefits of its people.

1.7 Paper Outline

Section one of this study as envisaged above details the introduction and background of the study, as well as the problem statement, objectives, and significance of the study. The rest of the paper is organized as follows: Section two gives the theoretical and empirical underpinnings of the finance-growth connection, while section three details the methodology deployed in this study. The presentation of the data analysis along with findings are the focus of section four of this report. Section five concludes the study and provide recommendations and suggestions for future studies.

2. LITERATURE REVIEW

2.1 Introduction

Theoretical relations between finance-growth can be traced as far back as 1911, where Schumpeter's contribution established that innovation promotes economic growth. The role of financial institutions is further highlighted in stimulating innovation, determine and support productive investments that encourage future growth (Fagiolo, Giachini, and Roventini, 2017; Meierrieks, 2014). Mollaahmetoğlu and Akçalı (2019), echoes that in an efficient financial system, attributed to new technologies and entrepreneurs, in a greater number of increased financial instruments and product diversity with financial institutions and organizations. The widespread use of financial instruments and its channels, deployment of improving resources through savings and ensuring the efficiency trigger of investments and the realization of economic growth and increase in productivity in the real sector. Also echoed by Guru and Yadav (2019) when they put forward that, increasing financial access instils dynamic effectiveness in the system by bringing about structural change through innovation and welfare gain to the entire economy.

While a growing body of work is reflective of positive impact of financial development and economic growth, alternative views still exist. Robison (1952) as cited in Choong and Chan (2011); Levine (1997) declared that "Where enterprise leads, finance follows". Cecchetti and Kharroubi (2012) contribution is that, while it is accepted that financial development spurs economic growth, but "Too Much" finance has a diminishing effect on economic growth. While, Nyasha and Odhiambo (2018) opined, "the argument that financial development always leads to economic growth should be taken with extreme caution".

The contributions to this literature of financial development and economic growth have diverse channels of transmission and explaining the association between financial development and growth, but all in harmony that there is a significant and positive relationship between these two variables. Goldsmith (1969) cited by Mohieldin, Hussein and Rostom (2019), for example, focused on the relationship between financial development and the efficiency of investment. While McKinnon (1973) and Shaw (1973) cited in Mohieldin et al.(2019) demonstrate the importance of financial liberalization in promoting domestic savings and hence investment. Through this work we have been able to point to evidence supporting the view that financial development is good for growth. Guru and Yadav (2019) put forward that economic development is gingered up by the financial sector. They further assert, financial sector development occurs during the process of establishing and growing institutions, instruments and markets that sustain the huge investments and growth which help in reducing poverty.

2.2 Theories on financial development and economic growth

According to Nyasha and Odhiambo (2018), the financial development and economic growth nexus is highly complex; and depends on multiple factors, namely: country specific conditions, the empirical model used, the proxy used to capture the level of financial development; and the data-analysis method used. The issue of whether more finance implies more growth, however, has not been settled yet. In literature, there are three potential causality associations explored connecting the financial development and economic growth that are worth exploring.

2.2.1 Supply-leading hypothesis

This hypothesis believes that financial development positively affects economic growth. This postulation holds that increases in capital accumulation, savings, and investments rate, deepens financial development, and this is closely tracked by an increase in economic growth. Developed financial system, provides better financial resource allocation and monitoring of productive borrowers (Guru and Yadav, 2019). Levine (1997), also argued that financial systems assist in trading, diversification, hedging as well as risk betterment and also facilitate transaction of goods services. Puryan (2017), argues that proponents of this hypothesis suggest that government policies should be directed to improve financial system, because well-functioning financial systems have substantial influence on economic growth, hence, the causality direction is from financial development towards economic growth. While Levine (2005), pronounced that theory and evidence make it difficult to conclude that financial development is a minor add-on to the process of economic growth. This hypothesis is also supported by Ojah and Kodongo (2015) in their study of financial markets development in Africa: Reflections and the Way Forward and also by Odhiambo (2010).

2.2.2 Demand-Following hypothesis

This supposition is on the premise that demand for using money is motivated by improvements in the economy and consequently the increase in the demand for the services of operators in the financial markets stimulates developments in the financial sector (Kolapo, Oke, and Olaniyan, 2019). Ndlovu (2013), opined that financial system development is a passive reaction to economic growth; it comes as a pressure for institutional development and introduction of modernized financial instruments brought by economic growth. The proponents of this view argue that government policies concentrating to improve financial systems have low effect on economic growth because financial development is a result of economic growth (Puryan, 2017).

2.2.3 The feed-back hypothesis

This hypothesis suggest that there is no strong or stable causality relation between financial development (variables of financial development) and economic growth. Nyasha and Odhiambo (2018) assert this hypothesis assumes a bi-directional causal relationship which ascribes equal importance to both financial and real sectors of the economy.

2.3 Financial development

Financial development can be defined as the financial sector's ability to defuse acquired information, enforce contracts, facilitate transactions, and create incentives for the emergence of particular variant of financial products, markets, and intermediaries and all these lowered costs. This process of reducing the costs of acquiring information, enforcing contracts, and making transactions resulted in the emergence of financial contracts, markets, and intermediaries. While Guru and Yadav (2019) define development of financial system as the development of the size, efficiency and stability of financial markets along with increased access to the financial markets that can have multiple advantages for the economy.

The crucial role of financial systems in fostering technological innovation and economic growth can be traced back to 1911, where Schumpeter as cited by Meierrieks (2014); Mollaahmetoğlu and Akçalı (2019), argued this happens through the basic services rendered by financial system such as, savings mobilization, governance, evaluation of investment projects, managing and pooling risks and transaction facilitation. McKinnon (1973), and Shaw (1973) on their popular "McKinnon-Shaw" hypothesis as cited by Adeniyi and Egwaikhide (2013); Guru and Yadav (2019); Nyasha and Odhiambo (2018) supported Schumpeter's insistence of promoting the development of the financial sector, to ensure economic growth. McKinnon and Shaw as cited by Nyasha and Odhiambo (2018), lead the financial repression criticism of governments in the developing countries and argued that the government restrictions on the financial system hinder financial development and reduce the growth of output.

Rajan and Zingales (1996) assert, the fundamental role of the financial sector is to facilitate the reallocation of funds through collection from agents' savings as deposits and provide loans to agents (firms) with shortage of funds. This view is supported by Fagiolo et al. (2017) in their Agent-based approach. Which suggests, appropriation and diffusion of knowledge is a costly exercise, the agents with insufficient internal funds will require inexpensive external funding as patient funds. Rajan and Zingales proceeded to argue that financial development brings; firstly, through reducing the transaction costs of saving and investing, it lowers the overall cost of capital in the economy in general. Secondly, to the extent that financial markets and institutions help firms overcome problems of moral hazards and adverse selection, it should reduce the cost of external finance vis a vis the cost of internal funds. Supported by (Demirgüç-Kunt and Maksimovic, 2002).

The functions listed by Schumpeter resonated with Khan and Senhadji (2000) and Levine (1997) work, who then differentiated them into five channels through which financial development, as Mollaahmetoğlu and Akçalı (2019) assert, its widespread use can ginger up economic growth. These are: (i) the facilitation of risk management; (ii) information production and the allocation of capital; (iii) the monitoring of managers and control over corporate governance; (iv) the mobilization of savings; and (v) easing the exchange of goods and services.

2.3.1 The facilitation of risk management

Levine (1997) and Beck (2003) assert, the costs of acquiring information and making transactions creates incentives for the emergence of financial markets and institutions. Financial markets and institutions may arise to ameliorate the problems created by information and transactions frictions. He further asserts that in arising to ameliorate transaction (Liquidity and idiosyncratic risk) and information costs, financial systems serve one primary function: they facilitate the allocation of resources, across space and time, in an uncertain environment. Portfolio diversification is the best means to minimize risk, with cross-sectional diversification of risk. Levine (2005) opined that financial systems may moderate the risks associated with individual projects, firms, industries, regions, countries. Financial institutions and financial markets all provide channels for trading, pooling, and diversifying risk. The financial system's ability to provide risk diversification services can affect long-run economic growth by altering resource allocation and savings rates. This view supported in Ngwu, Ogbechie, and Ojah (2019) where they argue that diversification enables banks to be less exposed to shocks emanating from single markets, especially where individual countries' business cycles are not synchronized.

2.3.2 Information production and the allocation of capital

Firm managers are generally the custodian of the firm specific information, information asymmetry becomes a cost, but this cost can be extended to market conditions before making an investment decision. According to Levine (1997), individual investors may not have the ability to collate and defuse information on possible investments. Investors will be hesitant to invest in novice activities which there is petite reliable information, high information costs may keep capital from flowing to its highest usage. Levine (2005) asserts that there are large costs associated with evaluating firms, managers, and market conditions before making investment decisions. Thus the fundamental role played by the financial sector is to facilitate the reallocation of funds from agents (individuals) with an excess of capital given their investment opportunities (Rajan and Zingales, 1996). The presumption is that the allocation is efficient and allocated to profitable firms, and this contention by Rajan and Zingales presupposes that the financial sector has better information about the firms, managers, and market conditions. This view is supported by Guru and Yadav (2019) when they contend that the emergence of financial institutions help curtail cost of collating information and efficiently implements contracts and executes transactions. Abel, Nyamutowa, Mutonhori, and le Roux (2019) add that financial development stretches the range of financial services available, advances the accessibility of financial services to the public and improves the efficiency and competitiveness of the sector. Also, financial sector development through its connections with other sectors empowers the economy with accumulated savings and some borrowed funds to start micro-enterprises, hence reduces unemployment and increases incomes.

2.3.3 The monitoring of managers and control over corporate governance

According to Levine (2005), corporate governance is fundamental to comprehending economic growth in general and the role of financial factors in particular. The extent to which the providers of capital to a firm can successfully monitor and influence how firms use that capital has consequences on both savings and allocation decisions. Tirole (2006) contends that to the extent that which shareholders (extended to stakeholders to account for all other key stakeholders other than owners of funds) and creditors successfully monitor agency problem and persuade managers to maximize firm value, will improve efficiency and allocate resources and make investors more willing to finance production and innovation. The role of financial system on governance is supported by (Beck, 2003; Ngwu et al., 2019).

Ojah and Kodongo (2015) opined the corporate legal form of business allows separation of ownership from actual operation of the business; subsequently, it permits firms to access funds with contracts of relative maturity. The separation of ownership from operation raises agency problems which usually require effective corporate governance, effective governance structure and in turn enhance efficiency of firms' operations. Levine (2005) argues that ineffective corporate governance controls impacts firm's performance directly with potential intense ramification to the economy and by extension to economic growth, while Čihák, Demirgüč-Kunt, Feyen, and Levine (2013) suggest that, by improving the firms governance, well-functioning financial markets and institutions lessen waste and fraud, thereby enhancing the efficient use of scare resources. Also, the effectiveness of corporate mechanisms can ease the financing of high-yielding investments, by pooling society's savings.

2.3.4 The mobilization of savings

Odhiambo (2009) asserts that, savings are fundamental in the process of economic development. He further articulates, this is particularly critical in developing countries, where the demand for loanable funds is assumed to exceed the savings available, and where the constraint on investment is the supply rather than the demand for loanable funds. The argument by the author, is that when savings increase, investment and economic growth also increases.

However, Levine (2005), argues that the mobilization and pooling is a costly process which involves: (a) overcoming the transaction costs associated with collecting savings from different individuals and (b) overcoming the informational asymmetries associated with making investors feel comfortable in relinquishing control of their savings. Considering the transaction and information costs associated with agglomerating savings from many agents, numerous financial arrangements may arise to mitigate these frictions and facilitate pooling. According to Sirri and Tufano (1995) as cited in Levine (2005), without access to multiple investors many production processes would be restricted to economically inefficient scales. Financial sector makes it possible to pool these savings from multi savers because they can create products and services, chequing account, internet banking and the use of credit cards which offers an opportunity of diversifying investments, these solutions increase liquidity in the economy.

Supported by Beck (2003), because banks ease information frictions between savers and borrowers, they may increase saving and capital accumulation in the economy.

Odhiambo (2009) asserts that rapid development in many developed economies has been because of an increase in investments, caused by appropriate increase in savings. Kazmi (2004) in Odhiambo (2009) suggests that the level of economic growth over a period is determined by the level of savings. Supported by Amusa and Moyo (2013) in (Mongale, Mashamaite, and Khoza, 2018) and by (Moyo, 2018), domestic savings are essential for attaining a sustained level of economic growth and play a crucial role in promoting strong and sustained economic growth if channelled towards profitable, sound and appropriate investment opportunities. Amusa (2014) asserts, a low national savings rate increases resource constraint pressure and impedes investments that could potentially enhance growth. Aron and Muellbauer (2000) as cited by Amusa (2014), savings-wise, when compared to other emerging market economies, South Africa ranks poorly compared to other emerging economies and the low domestic saving rates may hinder investment-driven growth in the medium term in South Africa.

2.3.5 Easing the exchange of goods and services

Trade was relatively expensive during the bartering period due to inefficiencies and the cost of transacting, the creation of money as a unit of exchange simplified trade. The drop in transaction and information costs is not necessarily a one-time fall when economies moved to money, however, transaction and information costs may continue to fall through financial innovation. Khan and Senhadji (2000) suggest, if markets are less than perfect, then economic exchange is costly, and if it is sufficiently costly, it may not occur at all. They argue that the involvement of financial intermediaries makes these exchanges affordable, thus offsetting the underlying market imperfections and frictions. Financial arrangement that lower transaction costs can promote specialisation, technological innovation and growth (Levine, 2005).

It is accepted as conventional knowledge that transaction facilities, specialization and innovation are positively related to improvement of the productivity of goods and services. Thus, specialization and innovation improve with greater levels of transactions. Some literature, Greenwood and Smith (1996) as cited in Levine (2005) have attempted to model the connection between exchange, specialization and innovation. The idea was that since each transaction cost is expensive, financial arrangements that would lower the cost will ideally facilitate greater specialization. That way, markets that promote exchange encouraged productivity gains and feedback from the productivity gains will spur on an increase in financial markets development. Levine (2005) argues however, that this model does not stimulate the invention of new and better production technologies, instead, lower transaction costs expands the set of "on the shelf" production processes that are economically attractive. There remains ambiguity on the link of what feature of economic environment encourages the emergence of financial arrangements and in turn influence economic activity.

2.4 Measure of financial development

Financial development is generally defined as a combination of depth (size and liquidity of markets), access (ability of individuals to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustained revenues, and level of activity of capital markets) (Sahay et al., 2015; Svirydzenka, 2016). Initially, the empirical studies focused on the ratio of different types of monetary aggregates (such as M1, M2 and M3) to nominal GDP as the financial sector indicators because the variables are widely available following most of the literature, financial development is measured as the ratio of monetary survey to GDP (Choong and Chan, 2011). Under this assumption, many researchers use this measure as financial depth (Goldsmith, 1969; McKinnon, 1973; King and Levine, 1993; Ram, 1999; Schich and Pelgrin, 2002) as cited by (Choong and Chan, 2011).

Table 2.1: Summary of 4x2 framework to measure financial development

Dimension	Financial Institutions	Financial Markets
Depth	• Private Sector Credit to GDP • Financial Institutions' asset to GDP • M2 to GDP • Deposits to GDP • Gross value added of the financial sector to GDP	• Stock market capitalization and outstanding domestic private debt securities to GDP • Private Debt securities to GDP • Public Debt Securities to GDP • International Debt Securities to GDP • Stock Market Capitalization to GDP • Stocks traded to GDP
Access	• Accounts per thousand adults (commercial banks) • Branches per 100,000 adults (commercial banks) • % of people with a bank account (from user survey) • % of firms with line of credit (all firms) • % of firms with line of credit (small firms) •	• Percent of market capitalization outside of top 10 largest companies • Percent of value traded outside of top 10 traded companies • Government bond yields (3 month and 10 years) • Ratio of domestic to total debt securities • Ratio of private to total debt securities (domestic) • Ratio of new corporate bond issues to GD
Efficiency	• Net interest margin • Lending-deposits spread • Non-interest income to total income • Overhead costs (% of total assets) • Profitability (return on assets, return on equity) • Boone indicator (or Herfindahl or H-statistics)	• Turnover ratio for stock market • Price synchronicity (co-movement) • Private information trading • Price impact • Liquidity/transaction costs • Quoted bid-ask spread for government bonds

		• Turnover of bonds (private, public) on securities exchange • Settlement efficiency
Stability	• Z-score • Capital adequacy ratios • Asset quality ratios • Liquidity ratios • Others (net foreign exchange position to capital etc)	• Volatility (standard deviation / average) of stock price index, sovereign bond index • Skewness of the index (stock price, sovereign bond) • Vulnerability to earnings manipulation • Price/earnings ratio • Duration • Ratio of short-term to total bonds (domestic, int'l) • Correlation with major bond returns (German, US)

Source: Worldbank: https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-development

Generally indicators do not come without criticism, Adnan (2011) describes financial development as the "policies, factors and institutions that lead to efficient intermediation and effective markets". Čihák et al. (2013) express discomfort that there are shortcomings with regards to measuring of financial development. More particularly access to good cross-country and cross-time data. Then research should not exclusively be about the size of banking industry. Banking sector size is being dismissed as measure of quality, efficient and or stability(Čihak et al., 2013). It is noted in section 2.6, that the direction of the causal relation defers depending on the proxies used.

Table 1 is the brainchild of Čihak et al. (2013) developed as a 4x2 matrix of financial system characteristics which was developed at the backdrop of researchers using insufficient means to measure financial system development.

2.5 Theories on Economic Growth

2.5.1 The Neoclassical growth Model

Neoclassical growth model is regarded as the starting point for any study of economic growth (Aghion and Howitt, 2009). The authors continue to assert that the model assumes growth is acquired by: (i) a production function that expresses the current flow of output as a function of the current stock of capital and labour. (ii) a law of motion that shows how capital accumulation depends on investment and capital depreciation. Paun et al. (2019) opined, capital is an important production factor. Its importance is due to its role in any production process, the factor that connects all the others (natural resources, labour, and entrepreneurship).

The Solow Growth Model is an economic tool in macroeconomics developed by Nobel Laureate economist, Robert Solow. It is an exogenous model that analyses changes in the level of output in an economy over time because of changes in the population (Van, 2020). The Solow model assumes that GDP is produced according to an aggregate production function technology which relates output to the levels of capital and labour inputs. The Solow model can be used to explain the elements that affect the economic growth, and it is generally specified in the case where production function takes the Cobb-Douglas form:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} \quad \text{and } 0<\alpha<1 \qquad (2.1)$$

Where K_t is capital input and L_t is labour input. This model assumes the existence of a parameter of productivity – A_t - in the aggregate production function. An increase in this parameter leads to higher output without having to alter the inputs. Macroeconomists tend to call this incorporate parameter –A_t- the technological progress and it measures productiveness of other factors. In the empirical language it is referred to as *total factor productivity* (TFP).

This model maintains that growth is due to capital accumulation, then, according to the model, when countries first begin to accumulate capital then growth will be strong and will slow down as the process of accumulation continues, because of diminishing returns of capital (steady state). Van (2020) argues that in this twenty-first century, economic growth through physical capital accumulation is clearly old-fashioned. The utilization of technology has become the principal tool by which economic development occurs in developed and developing countries nowadays. Because In the presence of technological advancement, the long run growth rate of output and capital is determined by the growth rate of technological advancement, which however is exogenous in the Solow growth model.

2.5.2 The Endogenous Growth Model

According to Romer (1994), the phrase endogenous growth embraces diverse bodies of theoretical and empirical work that emerged in the 1980s. It distinguishes itself from the neoclassical growth theories through emphasizing that economic growth is an endogenous outcome of an economic system, not the result of exogenous elements. Hence, the theoretical work does not invoke exogenous technological change to explain why income per capita has increased by an order of magnitude since the industrial revolution.

The endogenous growth theory contests the neoclassical view by proposing channels through which the rate of technological progress, and hence the long-run rate of economic growth, can be influenced by economic factors. The endogenous growth models assume that the level of investment and productivity growth are the channels of transmission from financial intermediation to economic growth (Mohieldin et al., 2019). It starts from the Schumpeterian view that technological advancement takes place through innovations, in the form of new creations, processes and markets, many of which are the result of economic activities. Among them, Greenwood and Jovanovich (1990) as cited in Djoumessi (2009) to represent a model in which both capital accumulation and growth rate are endogenously determined. Human capital plays a special role in a number of models of endogenous economic growth. Romer (1990) argued that technological advancement incentivises for continued capital accumulation, and together, capital accumulation and technological change account for much of the increase in output. Secondly, the model of endogenous rather than exogenous technological change suggests technological change arises in large part because of deliberate actions taken by people who respond to market incentive and lastly, developing new and better instructions is equivalent to incurring a fixed cost.

2.6 Empirical and Conceptual Issues

King and Levine (1993) developed an endogenous growth model featuring connections between finance, entrepreneurship, and economic growth. They found support for the core idea advanced in their model: better financial systems stimulate faster productivity growth and growth in per capita output by funnelling society's resources to promising productivity enhancing project.

Odhiambo (2008) looking at Kenya found a causality between financial development and economic growth depends on the choice of measure of financial development and that the demand following response predominates; concluding the argument that financial development leads to economic growth should be taken with a pinch of salt. Looking at South Africa for the period 1950-2005. Odhiambo (2009) found that on the balance, the study finds growth-led savings predominates in South Africa. Odhiambo (2010), studied South Africa in the 1971-2007 data set. The study findings were consistent with the conventional supply-leading response in which the financial sector is expected to precede and induce the real economic growth. Guru and Yadav (2019) looked at the emerging economies (BRICS) for period 1993 to 2019, reported a strong and positive association between financial development and economic growth of selected economies. Also, concurrent development of bank and stock market activities are integral to an economy's growth process and their study concluded that financial development is the engine of economic growth.

Bist (2018) used data from 16 African and non-African low-income countries and found unidirectional causality from economic growth to financial development in the short run, supporting demand following analysis. Peia and Roszbach (2015) looking at 22 advanced economies, found that stock market development tends to cause economic development, while a reverse causality is mostly present between the banking sector development and output growth.

Cecchetti and Kharroubi (2012) used a sample of developed and emerging economies and established that the there is a point at which financial development switches from propelling real growth to holding it back. Swamy and Dharani (2019) used a fully balanced panel of 31 years for period 1983 to 2013 for 24 economies and found evidence of financial development threshold which suggests if surpassed the threshold would cost the entire countries instead of furthering economic growth. They proceed to assert that the relationship between financial depth and economic growth depends on whether finance is used to fund investment in productive assets or to feed speculative bubbles.

2.7 Chapter Summary

In this chapter the literature for the examination of the relationship between financial development and economic growth in South African was explored. It has looked at the theories on financial development and economic growth along with how the key functions of financial development can stimulate the real sector. This chapter also looked at the discussion on the measures of financial development. Lastly, it explored the empirical work done on the relationship of financial development and economic growth, where contrasting findings on the deemed nexuses of financial development and economic growth is evident.

3. METHODOLOGY

3.1 Introduction

This chapter gives details of data used in this study along with the justification of the methods proposed to achieve the objective of this study. Some research has been carried out to examine the link between the economic growth and financial development using economic and financial variables. In this study, we used the real gross domestic product as a proxy for economic growth. This proxy has been used extensively in the literature (Nyasha and Odhiambo, 2015; Tunji, Romanus, and Ifeanyi, 2020). The principal indicators of financial development in this study include variables representing both the development of financial institutions as well as financial markets of an economy.

3.2 Research Design

This research project adopts a quantitative method, which looks at the representative sample as a whole and identifies norms and ranks of observations by which to predict, explain, or understand phenomena concerning the deduction of generalizability to individuals within the larger population (Coy, 2019). Leedy and Ormrod (2015), opine the statistics derived from quantitative research can be used with intent to establish the existence of relationship between variables. The objective of this study is to examine the link between financial development and economic growth using country-specific time series data. Previous studies relating to this research topic deployed quantitative research design (Amusa, 2014; Mohieldin, Hussein, Rostom, 2019; Nyasha, Gwenhure, Odhiambo, 2016; Nyasha, Odhiambo, 2019). For this study, quantitative research design has been adopted.

3.2.1 Sampling

Following Muyambiri and Odhiambo (2018) this study adopts time series modelling techniques for a single country to avoid losing individual country specific characteristics that are usually lost in panel regression. Therefore, this research focuses only on South African financial sector, using annual time series data covering period 1980 to 2018. By the time of writing this report, data for 2019 and 2020 was not available.

Nyasha and Odhiambo (2015) describe South Africa to have a well-developed and highly sophisticated financial sector with a wide range of financial institutions and instruments. They suggest this is due to the reforms that started in the 1990's that gave rise to a developed and well-regulated financial system in South Africa. Yet, as noted on sections 1.1 and 1.2, South Africa has experienced a sluggish and volatile economic growth at times on the brink of recession, thus the focus on South Africa for this study.

3.2.2 Data Sources and Data Collection

The study used the new dataset on financial development indexes introduced by Svirydzenka (2016) obtained from IMF dataset (https://data.imf.org). Also used the annual growth rate of real gross domestic product (RGDP) obtained from the OECD stat dataset (https://stats.oecd.org). All the data that has been used is secondary data and is publicly available.

3.2.3 Variable Description

3.2.3.1 Financial Development

A classic empirical study proxies financial development with either one or two measure of financial depth (Private credit by deposit money banks and other financial institutions as a ratio of GDP, broad money stock and the stock market capitalisation ratio). Ohiomu and Oligbi (2020) argue that the use of one component of the financial sector variable like money market indicators or capital market indicators as a representative of the entire financial development is inadequate and inappropriate. This is because the major function of the financial sector, which is intermediation cannot solely be performed effectively by only one subsector of the financial system like capital market. Neither can it be handled by money market alone. This argument is supported by Svirydzenka (2016), that financial development is a multidimentional process. There is a clear appreciation that there is a need to use variables other than the variation of the tradional variables.

With an understanding, that it is not always feasible to track all variables of financial development, Svirydzenka (2016) created a number of indices that overcome this shortcoming of using a single indicator as proxy of finanial development. Svirydzenka's argument is that the use of these sub-indices and the final index allows for a comprehensive assessment of a particular feature of financial systems and the overall level of financial development. Svirydzenka, continued to opine that the indices allow to pin down where deficiencies in financial development lie or which aspects of financial development affect macroeconomic performance. This could then be explored in more prominent detail utilizing the disaggregated data from FinStats or Global Financial Development Database (GFDD).

Financial development index (see Svirydzenka (2016)) is composed of financial institutions index and financial markets index. These indices are developed with the understanding that financial development is a combination of size and liquidity of markets(depth), ability of individuals and companies to access financial services(access), and ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets(efficiency) (Svirydzenka, 2016).

The Financial Institutions Index (FI) is an aggregate of the following three subindexes:

(i) The Financial Institutions Depth Index (FID) - which gathers data on bank credit to the private sector, pension fund assets, mutual fund assets and insurance premiums (life and non-life) as a percentage of GDP;

(ii) The Financial Institutions Access Index (FIA) - which gathers data on the number of bank branches per 100,000 adults and the number of automatic teller machines per 100,000 adults; and

(iii) The Financial Institutions Efficiency Index (FIE) - which collects data on the banking sector net interest margin, the lending-deposits spread, the ratios of non-interest income to total income, overhead costs to total assets and the returns on assets and equity.

The Financial Markets Index (FM) is an aggregate of the following three sub-indexes:

(i) The Financial Markets Depth Index (FMD) - which composes data on the ratios of stock market capitalization, stocks traded, the value of the international debt securities of the government, and the value of the total debt securities of financial and nonfinancial corporations to GDP

(ii) The Financial Markets Access Index (FMA) - which gathers data on the per cent of market capitalization outside of the top 10 largest companies and the total number of issuers of debt (domestic and external, nonfinancial and financial corporations) per 100,000 adults; and

(iii) The Financial Markets Efficiency Index (FME) - which collects data on stock market turnover ratio (the ratio of stocks traded to capitalization).

3.2.3.2 Economic Development

Economic growth of a country can be defined as an increase in the market value of goods and services produced by an economy. An indicator of economic health, whose importance can be traced to its long-term positive impact which increases the citizen's average standard of living.

According to world Economic Outlook, people are interested in knowing whether the economy is growing or shrinking. However, because the indicator of growth (Gross domestic product) is collected at nominal prices, one cannot compare two periods without making adjustment for inflations. The price deflator is used to adjust nominal gross domestic product to constant prices. So that it allows one to see whether the value of output has increased due to more is being produced or rather because of increase in prices.

Gross domestic product (GDP) is critical because it gives information about the size of the economy and how an economy is performing. The growth rate of real GDP (RGDP) is often used as an indicator of the general health of the economy (Nyasha, Gwenhure and Odhiambo, 2016). Thus, an increase in real GDP is generally interpreted as an indication that the economy is doing well. When real GDP is growing strongly, employment is likely to be increasing as companies hire more workers for their factories and people have more money in their pockets (World Economic Outlook). Real GDP growth move in cycles over time, periods of boom, periods of slowdown, stagnation, sometimes periods of recession and periods of recovery.

South Africa's economy has presented a mixture of economic performance over the observed period of this study. South Africa is faced with increasing unemployment rate and growing inequality and stuttering economic growth. Pérez de la Fuente (2016) asserts, economic growth has proven to be a powerful force in the fight against poverty across the world. This study acknowledges that economic growth is a complex process that is influenced by multiple factors other than financial development. But for the purpose of this study we focus only on financial development variables and economic growth.

Table 3.1: Summary of Variables, Symbols and sources

Variable	Symbol	Source
Dependent Variable		
Economic Growth	RGDP	stats.oecd.org
Independent Variables		
Financial institutions variables		
Financial Institutions Access Index	FIA	data.imf.org
Financial Institutions Depth Index	FID	data.imf.org
Financial Institutions Efficiency Index	FIE	data.imf.org
Financial markets variables		
Financial Markets Access Index	FMA	data.imf.org
Financial Markets Depth Index	FMD	data.imf.org
Financial Markets Efficiency Index	FME	data.imf.org

Mohieldin et al (2019) argue that while there is no disagreement over whether financial development is good for economic growth. The transmission channels through which financial development affects economic growth are still contested. The choice of financial development variables that has been used in this study has largely influenced by the need to use multiple variables to assess the link between financial development and economic growth. Also, by the crucial role played by each variable (Levine, 2005).

Based on the variable description above, the model takes the following general form:

$$RGDP = f\,(FIE, FID, FIA\ FME, FMD, FMA) \qquad (3.1)$$

Where RGDP, annual growth rate of real gross domestic product a proxy for economic growth. *FIE, FID, FIA, FME, FMD, FMA* defined above as proxies for financial development (FIE, FID and FIA are for financial institution efficiency, depth, and access. While FME, FMD and FMA are for financial markets efficiency, depth, and access). This gives us the empirical model for estimation as:

$$\mathrm{RGDP} = \beta_0 + \beta_1\mathrm{FIE}_t + \beta_2\mathrm{FID}_t + \beta_3\mathrm{FIA}_t + \beta_4\mathrm{FME}_t + \beta_5\mathrm{FMD}_t + \beta_6\mathrm{FMA}_t + \varepsilon_t \qquad (3.2)$$

Dependent and independent variables are as defined in equation 3.1 and Table 2, while β_0 is the constant and (β_1, β_2, β_3, β_4, β_5 and β_6) are respective coefficients.

3.3 Data Analysis

In this study a time series analysis has been deployed, to establish a relationship of financial development and economic growth. Time series data is a sequence of observations of the defined variables at an undeviating interval over a period uninterrupted. According to Shrestha and Bhatta (2018), researchers need to understand and address the unique properties of economic time series data such as clear trends, high degree of persistence on shocks, high volatility over time and meandering and correlation with other series. The behaviour of variables, interactions, and integrations overtime should be understood prior to analysis. Shrestha and Bhatta (2018) also suggest this behaviour is found in the properties of time series data, which are (i) Autoregressive nature of time series (times series data having relationship with previous values). (ii) Stationarity and non-stationarity series (time series in the long run reverting to its average or on the contrary not reverting to its long run average). (iii)Trend, cycle, and seasonality.

According to Brooks (2014), many time series are non-stationary yet move together overtime. This means, there is presence of some influence on the series. Which implies that a set of variables are bound by some relationship in the long run. Brooks continues to argue that a cointegrating relationship may be seen as a long-term or equilibrium phenomenon, since it is possible that cointegrating variables may deviate from their relationship in the short run. However, their association would return in the long run.

This study made use of cointegration technique to establish the existence of long run relationship among the variables of interest. However, the possibility of the presence of non-stationary variable(s) would mean that variables might need to be differenced. Differencing variables might mean losing long-run information on variables. Kargbo (2012) suggests that the cointegration technique must be accompanied by an error correction model (ECM), as it integrates the short run dynamic with the long-run equilibrium without losing long run information and avoids issues of spurious relationship resulting from non-stationary time series data (Brooks, 2014; Nkoro and Uko, 2016).

3.3.1 Determining Stationarity of Time Series

Determining whether a series is stationary or not is very important, for the stationarity or otherwise of a series can strongly influence its behaviour and properties. If a series is non-stationary, the basic prerequisite is to ascertain the number of times a variable has to be differenced to achieve stationarity. Y_t (variable observed) must be differenced (d) times before it becomes stationary, then it is said to be integrated of order (d). This would be written $Y_t \sim I$ (d). So, if $Y_t \sim I$ (d) then differencing order d $Y_t \sim I$ (0). This implies that applying the differencing, d times, leads to an I(0) process, that is a process with no unit roots. In fact, applying the difference operator more than d times to an I(d) process will still result in a stationary series (Brooks, 2014). Kargbo (2012), argues that because macroeconomic variables are generally found to be non-stationary or integrated order 1, econometrics models would be used to difference non-stationary variable(s) prior estimations (see also, Brooks, 2014). This differencing practice has been criticized to be non-standard because of the loss of long-run information on the variables observed. Mohieldin, Hussein, and Rostom (2019), assert that to account for this non stationarity, increasingly standard techniques of cointegration, and error correction mechanism to estimate time series relationships are used (Kargbo, 2012).

Economic analysis proposes that there is a long-run relationship between variables, and that the means and variance are constant and not dependent on time (Mohieldin et al, 2019). In this study, just like other time series data, the variable(s) of interest were tested for stationarity. Variables were examined for stationarity using the unit root methods (Augmented Dickey Fuller test, Phillips-Perron test, and Kwiatkowsky, Phillips, Schmidt, and Shin test). Where it is found that the variables are not stationary at level, the non-stationary variables were corrected using differencing order.

3.3.2 Time Series Analysis Method

Shrestha and Bhatta (2018) argued that applying the fitting methodology for the time series data is the most crucial part of the time series analysis, as wrong specification of the model or using wrong method provides biased and unreliable estimates. They also posit that, primarily, the method of selection for the time series examination is based on the unit root test results which determine the stationarity of the variables. This is because methods commonly used to examine time series data cannot be used to analyse nonstationary series.

In literature, there are three commonly used methods to detect cointegration; they are the Engle-Granger approach (1987), Johansen approach (1990) and Autoregressive Distribution Lag (ARDL) approach (2001). According to Pesaran et al. (1999), the Granger (1987) and Johansen (1990) approach require that the underlying variables to be integrated same order I (1). Pesaran et al continue to argue that this implies a certain level of pre-testing is involved, as a result introducing a further degree of uncertainty on analysis long-run relations. Whereas ARDL does not require pre-testing to examine this long-run relationship. This study utilized ARDL (2001) approach to examine the relationship between financial development and economic growth. The use of this approach is motivated by the numerous advantages it has over previously used cointegration tests.

The advantages of ARDL model as discussed in Nyasha and Odhiambo (2015); Kargbo (2012); Nkoro and Uko (2016) include; firstly, as opposed to other conventional approaches to cointegration, the ARDL bounds testing avoids the problem of order of integration because it can be applied irrespective of whether regressors are I(0) or I(1). Amusa (2014) asserts that the use of ARDL bounds test is therefore deemed suitable where the stationarity of a variable(s) is questioned. Secondly, as stated by Odhiambo (2010) while other cointegration techniques are sensitive to the size of the sample, the ARDL method does not have the same issues as it is still suitable even with small samples. Thirdly, the ARDL technique generally provides unbiased estimates of the long-run model and valid t-statistics, even when some of the regressors are endogenous (Nyasha and Odhiambo, 2015). Finally, while conventional cointegration approaches estimate the long-run relationship within the context of a system of equations, the ARDL method employs only a single reduced form equation.

This approach is considered suitable to examine the relationship of financial development and economic growth and it has increasingly been used in empirical research in recent years for country specific analysis (Nyasha, Gwenhure, Odhiambo, 2016; Nyasha, Odhiambo, 2019; Mohieldin et al, 2019).

3.3.3 Cointegration Test

The cointegration relationship between the variables of financial development and economic growth was examined using the ARDL model in EViews. A cointegrating relationship may be seen as a long-term or equilibrium phenomenon, since it is possible that cointegrating variables may deviate from their relationship in the short run, but their association would return in the long run (Brooks, 2014). In this section, the long-run relationship between the variables was examined using the ARDL bounds testing procedure.

3.3.3.1 Selecting the Optimal Orders of ARDL Lag Order

Nkoro and Uko (2016) posit that the issue of finding the appropriate lag length for each of the underlying variables in the ARDL model is very important. Because standard normal error terms that do not suffer from non-normality, autocorrelation and heteroskedasticity.

This step was used to obtain the order of lags on the first differenced variables. To select the optimal lags, this study made use of the information criteria as suggested by Brooks (2014). The information criterion considered by this study were Akaike's (1974) information criterion (AIC), Schwarz's (1978) Bayesian information criterion (SBIC) and the Hannan–Quinn criterion (HQIC). Brooks, argues that overall, no criterion is superior to others. Because SBIC is strongly consistent (but inefficient) while AIC is not consistent but is generally more efficient. For these reasons, this study selected a criterion that provides a more parsimonious ARDL model.

3.3.3.2 Bounds Testing

At this stage, the study first examined the existence of the long-run relationship between the variables under investigation by using the bounds F-statistic. The asymptotic distributions of this F-statistics are non-standard, irrespective of whether the regressors are I (0 or 1) (Pesaran et al.,1999). The bounds test was carried out by making each variable in equation (3.3) a dependent variable, one at a time.

$$\Delta RGDP_t = \beta_0 + \sum_{t=1}^{n} \beta_1 \Delta RGDP_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta FIE_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta FID_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta FIA_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta FME_{t-i} + \sum_{i=0}^{n} \beta_6 \Delta FMD_{t-i} + \sum_{i=0}^{n} \beta_7 \Delta FMA_{t-i} + \delta_1 RGDP_{t-i} + \delta_2 FIE_{t-i} + \delta_3 FID_{t-i} + \delta_4 FIA_{t-i}\ \delta_5 FME_{t-i} + \delta_6 FMD_{t-i} + \delta_7 FMA_{t-i} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots..(3.3)$$

Where RGDP, annual growth rate of real gross domestic product a proxy for economic growth. *FIE, FID, FIA, FME, FMA, FMD* defined above as proxies for financial development (FIE, FID and FIA are for financial institution efficiency, depth and access. While FME, FMD and FMA are for financial markets efficiency, depth, and access). β_0 is the constant and (β_1, β_2, β_3, β_4, β_5, β_6 and β_7) are respective short-run coefficients. δ_1 to δ_7

respective long run coefficient, Δ is the difference operator; and n is the lag length. In this study the F-statistic was carried out on the joint hypothesis.

- Null hypothesis (H_o): the long run relationship does not exist
  $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$
- Alternative (H_1): the long run relationship exists
  $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$

The calculated F-statistic was compared to the critical values (1%, 5% and 10%). The F-Statistic critical values have a lower bound and upper bound. The upper bound assumes that all variables are I (1), and the lower bound assumes that they are all I (0). If the calculated F-statistic for each instance of the test appears to be above the upper critical bound, then the Null (H_o) hypothesis is rejected, suggesting cointegration between variables without needing to know whether they are I(0) or I(1). If the F-statistic is below the lower bound, the Null (Ho) hypothesis of no cointegration cannot be rejected. However, if the F-statistic falls inside the critical bounds (the lower and upper bounds), the inference would be inconclusive.

This study used the sample size of 38 years for periods between 1980 and 2018. According to Narayan (2005) in Nkoro and Uko (2016), the existing critical values in Pesaran et al. (2001) cannot be applied for small sample sizes as they are based on large sample sizes. Hence, Narayan (2005) provides a set of critical values for small sample sizes, ranging from 30 to 80 observations. Thus, this study adopts Narayan (2005) critical values.

3.3.3.3 Error-Correction Model

After establishing the cointegration relationship, we specified the long run and error-correction estimates of the ARDL model. This has been done so that we determine the speed of adjustment to long run equilibrium as represented by φ. The error-correction representation of the series is specified as follows:

$$\Delta RGDP_t = \beta_0 + \sum_{t=1}^{n} \beta_1 \Delta RGDP_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta FIA_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta FIA_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta FID_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta FME_{t-i} + \sum_{i=0}^{n} \beta_6 \Delta FMA_{t-i} + \sum_{i=0}^{n} \beta_7 \Delta FMD_{t-i} + \varphi_1 ECM_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

ECM is the error correction term, φ the coefficient of ECM, it is the speed of adjustment to long run equilibrium. To ensure convergence to long run equilibrium, this coefficient is expected to be negative and statistically significant. All other terms are as defined in equation 3.3.

3.3.4 Causality Test

According to Brooks (2014), causality test seeks to answer a simple question of the type, do changes in variable “Y_1” cause changes in variable “Y_2”. While, Shrestha and Bhatta (2018) posit, if two variables for instance Y and X are cointegrated, then there exist any of the 3 possible. (a) X affects Y, (b) Y affects X and (c) X and Y affect each other. Shrestha and Bhatta continue to argue that if variables do not affect each other and are deemed independent. The causality patterns in this study are examined through the significance of the coefficient of the lagged error-correction term and the joint significance of the lagged differences of the explanatory variables using the F-statistic.

3.4 Validity and Reliability

All data used in this study is secondary and obtained from reputable sources. The financial development index data all is sourced from the IMF dataset while the economic growth data is from OECD dataset (stats.oecd.org).

The data analysis methods used in this study have been used in previous studies of the relationship between financial development and economic growth for country specific analysis. The stationary procedures have been used by Amusa (2014); Nyasha and Odhiambo (2015, 2019) and Odhiambo (2010). The ARDL model for country specific analysis has been used by Kargbo (2012); Mohieldin et al (2019); Nyasha, Gwenhure, Odhiambo (2016). The Granger causality test to test financial development and economic growth has been used in country specific analysis by Nyasha, Gwenhure, Odhiambo (2016); Nyasha and Odhiambo (2015).

3.5 Chapter Summary

This chapter has outlined the quantitative research methodology considered in this research study. The key variables to be used in this study are financial development indicators as independent variables, while the annual growth rate of real gross domestic product is used a dependent variable. The Secondary data used is from the IMF and OECD datasets. It also was an attempt at seeking out the best way to ensure validity of the potential results and ensure that the results would be credible. This chapter is an attempt to inform how the research was executed and how the results were interpreted. The next chapter will look at the presentation of results.

4. DATA ANALYSIS AND FINDINGS

4.1 Introduction

Using the models and methodology discussed in the preceding chapter, this chapter presents the econometric analysis and findings of these models executed using EViews 11. The analysis includes the preliminary and descriptive analysis. Time series analysis was also carried out using ARDL model (bounds testing) to analyse the nexus between financial development and economic growth.

4.2 Descriptive Analysis

Table 4.1: Summary Statistics

	RGDP	FIA	FID	FIE	FMA	FMD	FME
Mean	2.280	0.233	0.731	0.674	0.189	0.486	0.215
Median	2.485	0.186	0.697	0.694	0.184	0.478	0.226
Maximum	6.621	0.430	0.883	0.848	0.447	0.831	0.502
Minimum	-2.137	0.146	0.616	0.519	0.044	0.197	0.040
Std. Dev.	2.262	0.100	0.094	0.087	0.114	0.192	0.147
Skewness	-0.208	1.066	0.476	-0.053	0.666	0.180	0.133
Kurtosis	2.251	2.394	1.603	1.851	2.500	1.609	1.580
Jarque-Bera	1.192	7.987	4.647	2.164	3.289	3.354	3.390
Probability	0.551	0.018	0.098	0.339	0.193	0.187	0.184
Sum	88.91	9.092	28.49	26.29	7.389	18.95	8.369
Sum Sq. Dev.	194.3	0.379	0.334	0.290	0.494	1.394	0.821
Observations	39	39	39	39	39	39	39

Source: Author's Analysis based on data described in section 3 of this report ***Note:*** *Descriptive statistics are calculated on all available annual data for the 1980–2018 period*

Table 4.1 presents descriptive statistics for all variables used in the estimation during the period of observation. The mean level of RGDP is 2.280 and has a wide range reflected by the minimum (-2.14) and maximum (6.62). On the financial development variables. FID has a highest average at 0.73, range reflected by minimum of 0.62 and maximum of 0.88. Followed by FIE with mean level of 0.67, minimum (0.52) and maximum (0.85). FMD with average of 0.49 and minimum of 0.20 and maximum of 0.83. The average of FIA being 0.23 and, with minimum (0.15) and maximum (0.43) as the range. FME having an average of 0.22 and a minimum of 0.04 and 0.50 as the maximum. FMA coming last with an average of 0.19, minimum of 0.45 and maximum of 0.18.

Also, the deviation of the observed variables, the standard deviation of 2.26 for RGDP. Financial markets variables (FMA, FME and FMD) show the most variation amongst the financial development variables. FMD having the most variation of 0.192, followed by FME at 0.147, FMA at 0.114. On the financial institution variables, most variation is from FIA at 0.100, followed by FID at 0.094 and lastly FIE at 0.087 standard deviation. Apart from RDGP and FIE all other variables are positively skewed. Kurtosis values for all observed variables are confirming that data set is not normally distributed. Jarque-Bera statistic as a measure of normality also confirms that the data set is not normally distributed.

4.2.1 Graphic Presentation of Data

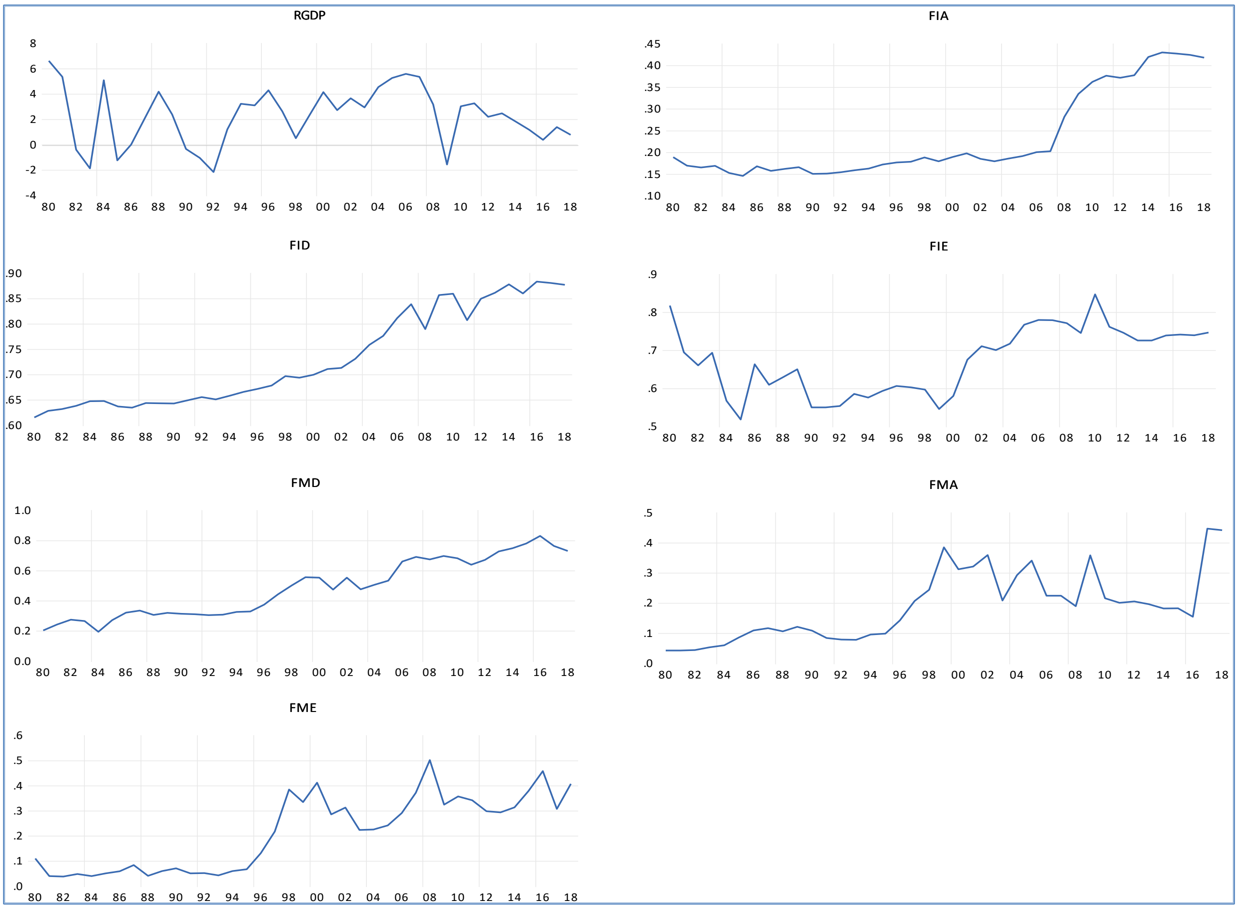

Figure 4.1:Graphic presentation of variables

Source: Author's computation based on data described in section 3 of this report

Figure 4.1 shows the variations in the financial development variables as shown in Table 4.1. There is more variation in the financial market development variables than financial institution development variables. The efficiency indexes of financial market and financial institutions development seems to move in line with RGDP. These findings suggest that financial institutions efficiency and financial markets efficiency contribution can be traced to the movement of the economic output more than the other financial development variables.

4.2.2 Correlation Analysis of Data

Table 4.2: Correlations

Correlation Probability	RGDP	FIA	FID	FIE	FMA	FMD	FME
RGDP	1.0000						

FIA	-0.1080	1.0000					
	0.5129	-----					
FID	0.0345	0.8940	1.0000				
	0.8347	0.0000	-----				
FIE	0.3451	0.6179	0.6862	1.0000			
	0.0314	0.0000	0.0000	-----			
FMA	0.1047	0.4331	0.6092	0.3275	1.0000		
	0.5259	0.0059	0.0000	0.0419	-----		
FMD	0.0337	0.8460	0.9594	0.6128	0.6902	1.0000	
	0.8385	0.0000	0.0000	0.0000	0.0000	-----	
FME	0.1405	0.6830	0.8067	0.5528	0.7172	0.9066	1.0000
	0.3935	0.0000	0.0000	0.0003	0.0000	0.0000	-----

Note: Correlations are computed on all available annual data for the 1980–2018 period. Source: Author's computation based on data described in this text.

Table 4.2 depicts the correlation of financial development variable and economic growth. Except for financial institutions access (FIA), all Indexes of financial markets development and financial institutions development are positively correlated with economic growth. Similarly, indexes of financial institutions development and financial market development are positively correlated with each other. Suggesting that financial development involves both larger banks and larger markets (Demirguc-Kunt, Feyen, Levine, 2011).

4.3 Unit Root Tests

Prior to the analysis, consideration for the series stationarity is essential. Brooks (2014) lists the reasons for the test of stationarity in time series data, which include firstly, the stationarity of the series can strongly influence its behaviour and properties. Secondly, the use of non-stationary series can lead to unreliable regressions and, lastly, for non-stationary series, the standard assumption of asymptotic analysis would not be valid.

Before analysis was carried in this study, all variables were subjected to stationarity test, using multiple unit root tests, that is; (i) Augmented Dickey Fuller test (ADF). The Null hypothesis for ADF is that the series tested has a unit root. (ii) Phillips-Perron test (PP) which is similar with ADF in logic and, (iii) Kwiatkowsky, Phillips, Schmidt and Shin test (KPSS) whose logic is the opposite of ADF and PP as it tests whether the series is stationary. While ARDL modelling does not require pre-testing of variables and deemed ideal to work with variables whose stationary is questioned, it is, however, significant to conduct the unit root test, to ascertain that none of the regressors is integrated of order more than I(1). This is critical because the ARDL procedure assumes that all variables are either I(0) or I(1). Where a variable is found to be I(2), then the computed F-statistics, as produced by Pesaran et al (2001) and Narayan (2005), can no longer be valid (Odhiambo, 2010). The results for these tests are reported in Tables 4.3 to 4.5.

Table 4.3: ADF Unit root test results

	Augmented Dickey-Fuller				
	Level		1st Difference		
Variables	Constant	Trend and Intercept	Constant	Trend and Intercept	Decision
RGDP	-4.434648 (0.0011)**	-4.449698 (0.0056)**	-7.284060 (0.0000)**	-7.191302 (0.0000)**	I(0)
FIA	-0.068499 (0.9456)	-1.702497 (0.7300)	-4.046242 (0.0033)**	-4.159264 (0.0118)**	I(1)
FID	0.789246 (0.9925)	-2.46728 (0.3415)	-6.932606 (0.0000)**	-7.148105 (0.0000)**	I(1)
FIE	-2.266297 (0.1877)	-3.971088 (0.0184)	-7.402120 (0.0000)**	-7.373836 (0.0000)**	I(1)
FMA	-1.761836 (0.3931)	-2.931580 (0.1645)	-7.906316 (0.0000)**	-7.840126 (0.0000)**	I(1)
FMD	-0.908239 (0.7748)	-2.846124 (0.1907)	-5.940269 (0.0000)**	-5.853956 (0.0001)**	I(1)
FME	-1.260767 (0.6376)	-3.204918 (0.0987)	-7.636619 (0.0000)**	-7.527158 (0.0000)**	I(1)

*Note: ***,** and * denotes significance at 1%, 5% and 10%, respectively. P-values in parentheses. Maximum lags are automatically selected by Schwarz information criterion. Source: Author's computation based on data described in this text.*

Table 4.4: PP unit root test

	Phillips-Perron Test				
	Level		1st Difference		
Variables	Constant	Trend and Intercept	Constant	Trend and Intercept	Decision
RGDP	-4.445399 (0.0011)**	-4.449698 (0.0056)**	-9.365430 (0.0000)**	-8.993386 (0.0000)**	I(0)
FIA	0.514313 (0.9851)	-1.718026 (0.7236)	-4.055738 (0.0032)**	-4.193179 (0.0109)**	I(1)
FID	0.023061 (0.9549)	-2.343445 (0.4017)	-8.898190 (0.0000)**	-9.143461 (0.0000)**	I(1)
FIE	-2.381787 (0.1534)	-4.006958 (0.0168)**	-7.521168 (0.0000)**	-7.482847 (0.0000)**	I(0)
FMA	-1.579237 (0.4832)	-2.913035 (0.1699)	-7.906316 (0.0000)**	-7.840126 (0.0000)**	I(1)
FMD	-0.806620 (0.8058)	-2.815543 (0.2008)	-6.515392 (0.0000)**	-6.363639 (0.0000)**	I(1)
FME	-1.090915 (0.7095)	-3.186872 (0.1023)	-7.559381 (0.0000)**	-7.455162 (0.0000)**	I(1)

*Note: ***,** and * denotes significance at 1%, 5% and 10%, respectively. P-values in parentheses. Source: Author's computation based on data described in this text.*

Table 4.3 and Table 4.4 provide results for the ADF and PP unit root testing. The Null (H_0) hypothesis of unit root for the ADF test (Table 4.3) cannot be rejected on all variables of financial development at level (Without differencing). Yet rejected for RGDP at level, implying that RGDP is integrated of order 0 [I(0)]. Using PP approach, the results as reported in Table 4.4 were mixed at level. The Null (H_0) hypothesis of unit root could not be rejected for variables of financial development except for FIE that is integrated order 0 [I(0)]. RGDP is still consistent with the ADF result (Table 4.3) that rejected the Null hypothesis at level. The decision criterion is based on the arbitrary significance of 5%. Having established non-stationarity at level for both approaches. The next step is to difference the non-stationary variables once. On each Table (4.3 and 4.4), the results on first difference are reported and conclusively confirm stationarity I(1). These results support the decision on the use of the ARDL modelling technique.

Table 4.5: KPPS unit root test

	Kwiatkowski-Phillips-Schmidt-Shin				
	Level		1st Difference		
Variables	Constant	Constant and Intercept	Constant	Constant and Intercept	Decision
RGDP	0.139225**	0.121373**			I(0)
FIA	0.591629	0.181195	0.367743**	0.075291**	I(1)
FID	0.714527	0.162434	0.155275**	0.098293**	I(1)
FIE	0.418384**	0.149603	0.27991**	0.144926**	I(0)

FMA	0.643575	0.097989**	0.071511**	0.064786**	I(0)
FMD	0.739103	0.108655**	0.161564**	0.154005	I(0)
FME	0.65972	0.084371**	0.076913**	0.066438**	I(0)

*Note: ***,** and * denotes significance at 1%, 5% and 10%, respectively. Source: Author's computation based on data described in this text.*

Table 4.5 shows that apart from two variables of financial development (FIA and FID) who are only stationary after differencing the variables once, all other variables were confirmed to be stationary without differencing. The results on Table 4.5 conclusively confirm that ARDL is an ideal methodology to use in this study, as variables are found to be integrated of order 0 [I(0)] or 1 [I(1)].

4.4 The ARDL Estimations

In this section, the ARDL bounds testing procedure is applied to present the cointegration test results. After establishing that all variables are stationary using the Augmented Dickey Fuller test (ADF), Phillips-Perron test (PP) and Kwiatkowsky, Phillips, Schmidt, and Shin test (KPSS). The use of the ARDL technique was established to be the ideal model to use as the tested variables were a mixture of I(0) and I(1) and none of the variables tested were integrated of order more than [I(1)] or order I(2).

4.4.1 Bounds Test for Cointegration

Having established that all variables used to examine the relationship between financial development and economic growth are integrated of I(0) and or I(1). The next step is to proceed to establish using the ARDL bounds test approach whether the long run relationship exist between the economic growth variable and the financial development variables. The first step in this approach is to determine the optimal lag and followed by examination of cointegration using F-statistic.

4.4.1.1 Determining Model Optimal Lags

As a first stage in ARDL bounds testing, the optimal lag length for all variables was established using the VAR lag length selection criteria with the maximum lag set at 3, as derived based on listed information Criterion in Table 4.6 and Table 4.7. These Tables (4.6 to 4.7) show the VAR optimal lag length selection by the different information criteria.

Table 4.6: Akaike information criterion (AIC) Lag Lengths

Lag	RGDP	FIA	FMA	FID	FMD	FIE	FME
0	-	-	-	-	-3.845856*	-	-
1	-	-5.104721*	-2.138416*	-	-	-3.080939*	-
2	4.208036*	-	-	-5.166692*	-	-	-2.948307*
3	-	-	-		-	-	-

*Notes: * indicates lag order selected by the criterion, each test at 5% level. AIC: Akaike information criterion. Lag being the selected lag. Source: Author's computation based on data described in this text.*

Table 4.7: Schwarz information criterion (SIC) Lag Lengths

Lag	RGDP	FIA	FMA	FID	FMD	FIE	FME
0	-	-	-	-	-3.541088*	-	-
1	-	-4.911682*	-1.786523*	- 5.86509*	-	- 2.729046*	-2.591499*
2	4.603916*	-	-	-	-	-	-
3	-	-	-	-	-	-	-

*Notes: * indicates lag order selected by the criterion, each test at 5% level. SIC: Schwarz information criterion. Lag being the selected lag. Source: Author's computation based on data described in this text.*

Tables 4.6 and 4.7 provide a summary of information criteria used to determine the order of lags. Using AIC information in Table 4.6, we determined the optimal lag length for FMD to be 0 lag, FIA, FMA and FIE to be lag 1, lag 2 for RGDP, FID and FME. However, when using SIC information criteria (Table 4.7), the appropriate optimal lag length for FMD is 0 lag and for FIA, FIE, FID, FMA, FME is lag 1, lag 2 for RGDP. Brooks (2014) argues that overall, no criterion is unquestionably superior to others. Because SIC is strongly consistent (but inefficient) while AIC is not consistent but is generally more efficient. Nkoro and Uko (2016), put forward an argument that in the process of finding an optimal lag length. The model to be considered ideal and performs relatively better, is one that has the "smallest" AIC or SIC. Kargbo (2012) brings to our attention the AIC and SIC comparison work by Pesaran and Shin (1999), where their suggestion also confirms that SIC is a more consistent criteria than AIC. Both information criteria were considered based on their strength, however, the information criterion considered the most is one that has the smallest outcome.

Table 4.8: AIC information criteria lag length Serial Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

Lag	RGDP	FIA	FMA	FID	FMD	FIE	FME
0					0.2521		
1		0.5019	0.4462			0.0365	
2	0.3476			0.0338			0.5832

Each variable tested against 5% significance level. Source: Author's computation based on data described in this text.

Table 4.9: SIC information criteria lag length Serial Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

Lag	RGDP	FIA	FMA	FID	FMD	FIE	FME
0			0.4811		0.4251		
1		0.3337		0.1605		0.3587	0.3644
2	0.3476						

Each variable tested against 5% significance level. Source: Author's computation based on data described in this text.

The selected lag lengths were subjected to the Breusch-Godfrey Serial Correlation LM Test to confirm the non-existence of serial correlation. For SIC criteria (Table 4.9), there is no evidence of serial correlation. While for AIC criteria (in Table 4.8), variables of financial institution index (FIE and FID) show that we must reject the null hypothesis of no serial correlation. To remove serial correlation, the lag length of these variables was increased. This study uses annual data from 1980 – 2018 (38 years) and an increase in lag length brings the loss of degree of freedom which potentially would bring doubt in our estimates. For these stated reasons, AIC criterion was the selection criteria of choice.

4.4.1.2 Bounds Testing

The examination of long run relationship of variables is carried out using ARDL bounds test on each of the variables on equation (3.3) as they stand as dependent variable while others are assumed as independent variables. Based on the selected SIC lag lengths, the bounds test was applied to equation (3.3). The optimal lag-length selected for Table 4.10 is based on SIC ARDL (2, 0, 0, 0, 0, 0, 0) and (1, 2, 0, 0, 0, 0, 0) for AIC ARDL.

Table 4.10: Bounds F-test for cointegration

Dependent Variables	Function		F-Statistics	Cointegration	Next Step
RGDP	F(RGDP|FIE,FID,FIA,FME,FMD,FMA)		3.788475*	Yes	ECM
Asymptotic critical values	1%		5%		10%
Narayan (2005, p. 1988, Table Case III: Unrestricted intercept and no trend)	I(0)	I(1)	I(0)	I(1)	I(0) I(1)
	3.8	5.643	2.797	4.211	2.353 3.599

*Note: ***, ** and * denotes significance at 1%, 5% and 10%, respectively. Source: Author's computation based on data described in this text*

Table 4.11 Bounds F-test for cointegration

Dependent Variables	Function	F-Statistics	Cointegration	Next Step
FIE	F(FIE|RGDP, FID,FIA,FME,FMD,FMA)	4.004063*	Yes	ECM
FID	F(FID|RGDP, FIE,FIA,FME,FMD,FMA)	3.527927	inconclusive	ARDL (Short Run)
FIA	F(FIA|RGDP, FIE,FID,FME,FMD,FMA)	4.386188**	Yes	ECM
FME	F(FME|RGDP, FIE,FID,FIA,FMD,FMA)	7.279885***	Yes	ECM
FMD	F(FMD|RGDP, FIE,FID,FIA,FME,FMA)	5.358625**	Yes	ECM
FMA	F(FMA|RGDP,FIE,FID,FIA,FME,FMD	9.676154***	Yes	ECM

Asymptotic critical values	1%		5%		10%	
Narayan (2005, p. 1988, Table Case III: Unrestricted intercept and no trend)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	3.8	5.643	2.797	4.211	2.353	3.599

*Note: ***, ** and * denotes significance at 1%, 5% and 10%, respectively. Source: Author's computation based on data described in this text.*

The calculated F-statistic was compared to the critical values (1%, 5% and 10%). The F-statistics critical values have a lower bound and upper bound. The upper bound assumes that all variables are I (1), and the lower bound assumes that they are all I (0). In this study the F-statistic was carried out on the joint hypothesis.

- Null hypothesis (H_o): the long run relationship does not exist

  $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$

- Alternative (H_1): the long run relationship exists

  $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$

If the calculated F-statistic for this joint hypothesis in Tables 4.10 and Table 4.11 is above the upper bound level I(1), the null hypothesis of no cointegration is rejected at the 1%, 5% and 10% significance level; confirming the variables are cointegrated. But, if the calculated F-statistic is below the lower-bound level I(0), the null hypothesis of no cointegration cannot be rejected; confirming variables are not cointegrated. Where the calculated F-statistic falls within the upper and the lower-bound levels, the results are inconclusive. Tables 4.10 and 4.11 confirm the existence of cointegration, we proceed to test the speed of adjustment to long run equilibrium (Equation 3.4). The results in Table 4.11 were indeterminate when FID was a dependent variable as F-statistic was between the lower and upper bound of the asymptotic critical values, as a result would treat this as no cointegration.

4.4.2 Estimated ARDL Models: The long run and Short Run ECM Models

Using the bounds test approach whose results are reported in Tables 4.10 and 4.11, confirmed there exists a stable long-run relationship between the variables used to examine the relationship of economic growth and financial development in South Africa. In this section, coefficients of the explanatory variables were derived for both long-run and short-run estimates.

Table 4.12: Estimated long run coefficients based on AIC ARDL (1,2,0,0,0,0,0) dependent variable: real GDP

Panel A: Long run Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FIE	2.275726	10.02625	0.226977	0.8222
FID	28.58873	25.41011	1.125093	0.2705
FIA	-19.32390	9.296698	-2.078577	0.0473
FME	5.074296	8.101658	0.626328	0.5364
FMD	-7.617243	14.30924	-0.532330	0.5989
FMA	-0.488133	5.090616	-0.095889	0.9243
Panel B: Short Run Estimates (Real GDP is the dependent variable D(RGDP))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.13741	1.959835	-5.682831	0.0000
D(FIE)	4.735964	5.756095	0.822774	0.4178
D(FIE(-1))	14.58762	5.351340	2.725975	0.0111
CointEq(-1)*	-0.847046	0.148782	-5.693199	0.0000
R-squared	0.585580	Mean dependent var		-0.123614
Adjusted R-squared	0.547905	S.D. dependent var		2.553966

S.E. of regression	1.717235	Akaike info criterion	4.021114
Sum squared resid	97.31363	Schwarz criterion	4.195268
Log likelihood	-70.39062	Hannan-Quinn criter.	4.082512
F-statistic	15.54311	Durbin-Watson stat	2.137210
Prob(F-statistic)	0.000002		

Source: Author's computation based on data described in this text

Table 4.12 gives details of estimated coefficients of the long run and short run relationship between economic growth and financial development variables from 1980 to 2018 in South Africa. From Table 4.12-Panel A, we observe that two of the variables of financial institutions development (FIE and FID) show a positive relationship with economic growth, yet FID is not statistically significant. Financial institution efficiency (FIE) coefficient implies that an increase in FIE would positively lead to a 2.27% increase in real GDP. However, it is not significant. While from this table (Table 4.12-Panel A) we also found that a 5% increase in financial institution access (FIA) is statistically and significantly associated with a 19.32% decrease in economic growth. Consistent with financial institution access, financial markets access also reveal a negative relationship with economic growth though not statistically significant, so is financial markets depth. The results of financial access being negative is consistent with the World Bank concerns that "the benefits produced by financial intermediation and markets are not being spread widely enough throughout the population and across economic sectors, with potential negative impacts on growth, income distribution and poverty levels" (World Bank, n.d.; Demirgüç-Kunt, Thorsten and Patrick, 2008). While financial inclusion has been improving in South Africa, it might be faced with a situation defined by Demirgüç-Kunt, Thorsten and Patrick (2008) to be an economy that has a group that consists of "individuals and firms that are unbankable from the perspective of commercial financial institutions and markets". Making use of the financial services provided by banks remains a challenge for this sector of the economy because financial institutions lack adequate information about creditworthiness of prospective users of credit. Also, consistent with Nyasha and Odhiambo (2015) when they argued that bank based financial development "is vulnerable to problems, such as inefficient capital allocation..". This adds to the narration that financial institutions are not always optimal in the gathering and processing of information, as a result do not finance investment projects in the real sector. The long run results also reveal that financial markets efficiency is positively related to economic growth, however, not statistically significant. Table 4.12-Panel A shows that all variables of financial markets and two of financial institutions are not related to any changes in economic growth.

The long-run results in Table 4.12-Panel A indicates that any disequilibrium in the system can be corrected in the long run by the error correction term. The error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

EC = RGDP - (2.2757*FIE + 28.5887*FID -19.3239*FIA + 5.0743*FME -7.6172*FMD - 0.4881*FMA)

The error correction model was estimated within the ARDL framework in EViews 11. The EC shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted.

Table 4.12-Panel B is the results of the short run estimates of the RGDP cointegrated relationship for the period 1980 to 2018. In the short run, only the FIE and its lagged value is found to have positive relationship with the dependent variable (RGDP). FIE is positive with a coefficient of 4.75, but not statistically significant, while the lagged value of FIE is positive and statistically significant. It shows that a 5% increase in FIE in the lag period would increase RGDP by 14.59%. Theory on the speed of adjustment suggests that the coefficient of the error term (ECT_{t-1}) must fall between 0 and -1. According to Nkoro and Uko (2016), the coefficient of the error term can exhibit divergence (positive coefficient) or they can converge (negative coefficient). They continue to argue that when the estimated of $EC_t = 1$, then 100% of the adjustment takes place within the period, or the adjustment is instantaneous and full, if the estimate of $EC_t = 0.5$, then 50% of the adjustment takes place each period. $EC_t = 0$, shows that there is no adjustment, and that takes away the claim of long run relationship. As provided in Table 4.12-Panel B the error correction coefficient of the short run model (CointEq(-1) = ECM(-1)) is -0.8470 with a high *t statistic* of *-5.69* and significant at 1%. This coefficient indicates that distortions in the short term would be brought back to equilibrium at the rate of 84% within 1 year 2 months (1/0.84=1.19).

Looking at a summary of statistics in Table 4.12-Panel B, it can be observed that the adjusted R^2 is approximately 0.55. This explains that 55% of the variation in the real GDP is explained by the regressors. Durbin-Watson statistics of approximately 2.14 reveals the absence of autocorrelation.

Table 4.13: Estimated long run coefficients based on AIC ARDL (1,1,1,0,2,0,0) dependent variable: FIA

Panel A: Long run Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	0.002447	0.001547	1.581491	0.1269
FIE	0.005272	0.048598	0.108477	0.9145
FID	0.101195	0.110605	0.914929	0.3693
FME	0.010052	0.049368	0.203619	0.8404
FMD	0.011851	0.068840	0.172151	0.8648
FMA	0.006464	0.033505	0.192934	0.8486

Panel B: Short Run Estimates (FIA is the dependent variable D(FIA))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.047072	0.003177	14.81603	0.0000
D(RGDP)	0.000614	0.000375	1.639114	0.1142
D(FIE)	0.114427	0.018529	6.175658	0.0000
D(FME)	0.028307	0.013384	2.115033	0.0450
D(FME(-1))	0.046986	0.014412	3.260274	0.0033
DUMFIA	0.291587	0.016788	17.36828	0.0000
CointEq(-1)*	-0.544164	0.034982	-15.55536	0.0000

R-squared	0.929235	Mean dependent var	0.006700
Adjusted R-squared	0.915083	S.D. dependent var	0.018537
S.E. of regression	0.005402	Akaike info criterion	-7.435467
Sum squared resid	0.000875	Schwarz criterion	-7.130699
Log likelihood	144.5561	Hannan-Quinn criter.	-7.328022
F-statistic	65.65685	Durbin-Watson stat	2.190942
Prob(F-statistic)	0.000000		

*Source: Author's computation based on data described in this text. Note: DUMFIA is the interactive dummy variable given by dummy*FIA. Source: Author's computation based on data described in this text*

Table 4.13-Panel A shows the long run results. FIE is negatively related to development of financial institutions access but not statistically significant. FID is positively related to the development of FIA also not statistically significant. FME and FMD coefficients are negative and not significant. FMA shows a positive relationship but also not significant, and neither is real GDP. These results reveal that real GDP and all variables of financial markets and two of financial institutions are not related to any changes in financial institutions access.

The long-run results in Table 4.13-Panel A, indicates that any disequilibrium in the system can be corrected in the long run by the error correction term. The error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

EC = FIA - (0.0024*RGDP + 0.0053*FIE + 0.1012*FID + 0.0101*FME + 0.0119*FMD + 0.0065*FMA)

The error correction model was estimated within the ARDL framework in EViews 11. Table 4.13-Panel B shows the results of the short run estimates of the FIA cointegrated relationship for the period 1980 to 2018. In the short run only RGDP is not significant. The efficiency variables for both financial institutions and markets are positive and significant. FIE with a coefficient of 0.1144, it implies that a 1% increase in FIE leads to approximately 0.11% development in FIA. FME coefficient of 0.02 significant at 5% significance level, it implies a 5% increase in FME leads to approximately 0.02% increase in FIA. The coefficient of lagged value of FME is statistically significant at 1%, giving indication that if financial markets efficiency were to increase by 1%, financial inclusion as measured by financial institution access would increase by approximately 0.04% in the short run.

The ECM (CointEq (-1)) coefficient is negative and statistically significant at 1% as expected. ECM (-1)) is -0.544 with a high *t statistic, -15.55* and significant at 1%. This coefficient indicates that distortions in the short term would be brought back to equilibrium at a rather moderate rate of 54.44% within 1 year 8 months (1/0.544=1.83).

Looking at the descriptive statistics in Table 4.13-Panel B, it can be observed that the adjusted R^2 is approximately 0.91. This explains that 91% of the variation in the FIA is explained by the regressors. Durbin-Watson statistics of approximately 2.20 reveals the absence of autocorrelation.

Table 4.14:Estimated long run coefficients based on AIC ARDL (1,0,1,0,1,0,1) dependent variable: FME

Panel A: Long run Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	0.000499	0.005502	0.090626	0.9285
FIE	-0.023851	0.205672	-0.115966	0.9086
FID	-1.261016	0.482637	-2.612765	0.0147
FIA	0.192493	0.509666	0.377684	0.7087

FMD	1.172992	0.239842	4.890688	0.0000
FMA	0.340554	0.159003	2.141807	0.0417

Panel B: Short Run Estimates (FME is the dependent variable D(FME))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.395839	0.049055	8.069333	0.0000
D(FIE)	-0.283830	0.136915	-2.073043	0.0482
D(FIA)	1.000167	0.392119	2.550674	0.0170
D(FMA)	-0.078880	0.093934	-0.839739	0.4087
DUMFME	-0.106838	0.044106	-2.422284	0.0227
CointEq(-1)*	-0.826385	0.104348	-7.919533	0.0000

R-squared	0.717584	Mean dependent var	0.007806
Adjusted R-squared	0.673456	S.D. dependent var	0.070318
S.E. of regression	0.040183	Akaike info criterion	-3.446825
Sum squared resid	0.051669	Schwarz criterion	-3.188258
Log likelihood	71.48967	Hannan-Quinn criter.	-3.354829
F-statistic	16.26158	Durbin-Watson stat	1.853035
Prob(F-statistic)	0.000000		

*Source: Author's analysis based on data described in this text Note: DUMFME is the interactive dummy variable given by Dummy*FME. Source: Author's computation based on data described in this text*

Table 4.14-Panel A shows the long run results. The long run results reveal that the coefficient of FMD is statistically significant at 1% significance level, suggesting that an increase of 1% in FMD would positively ginger up FME by approximately 1.17%. A 5% increase in FID would reduce FME by 1.26%. All other variables including Real GDP are not statistically significant, indicating that they have no relation in the changes of FME.

The long-run results in Table 4.14-Panel A as well as in Tables 4.12 and 4.13 indicate that any disequilibrium in the system can be corrected in the long run by the error correction term. Using EViews 11, the error correction model was estimated within the ARDL framework. The EC shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted.

EC = FME - (0.0005*RGDP -0.0239*FIE -1.2610*FID + 0.1925*FIA + 1.1730*FMD + 0.3406*FMA)

The results of the short run estimates of the FME cointegrated relationship for the period 1980 to 2018 is presented in Table 4.14-Panel B. In the short run only three variables found to have a relationship with FME. Two explanatory variables are statistically significant. The coefficient of FIE is negative and significant at 5% significance level, implying a 5% increase in FIE, would lead to a -0.28% reduction in FME. The coefficient of FIA is positive and significant at 5%, implying that a 5% increase in FIA would lead to a 1.00% in FME. The coefficient of FMA of -0.07 is not significant.

One of the important results of Table 4.14-Panel B, is the corresponding error correction coefficient of the short run model. The ECM coefficient is -0.826, with a high *t-statistic* -7.919 and statistically significant at 1%. This coefficient indicates that distortions in the short term would be brought back to equilibrium at a rate of 82.6% within 1 year 2 months (1/0.826=1.21).

Looking at the descriptive statistics in Table 4.14-Panel B, it can be observed that the adjusted R^2 is approximately 0.673. This explains that approximately 67% of the variation in the FME is explained by the regressors. Durbin-Watson statistics of approximately 1.85 reveals the absence of autocorrelation.

Table 4.15: Estimated long run coefficients based on AIC ARDL (0 Lags) dependent variable: FMD

Panel A: Long run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	-0.000989	0.003537	-0.279549	0.7818
FIE	-0.081324	0.134142	-0.606254	0.5491
FID	1.287569	0.256352	5.022652	0.0000
FIA	0.020199	0.438187	0.046096	0.9635
FME	0.507877	0.110007	4.616747	0.0001
FMA	0.030897	0.088920	0.347470	0.7307

Panel B: Short Run Estimates (FMD is the dependent variable D(FMD))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.437668	0.063899	-6.849331	0.0000
DUMFMD	0.005873	0.015240	0.385339	0.7028
CointEq(-1)*	-0.850686	0.119234	-7.134579	0.0000

R-squared	0.596488	Mean dependent var	0.013837
Adjusted R-squared	0.573430	S.D. dependent var	0.045531
S.E. of regression	0.029738	Akaike info criterion	-4.117148
Sum squared resid	0.030952	Schwarz criterion	-3.987864
Log likelihood	81.22580	Hannan-Quinn criter.	-4.071150

F-statistic	25.86923	Durbin-Watson stat	1.715848
Prob(F-statistic)	0.000000		

*Source: Author's analysis based on data described in this text. Note: DUMFMD is the interactive dummy variable given by dummy*FMD. Source: Author's computation based on data described in this text*

Table 4.15-Panel A explains the coefficients of the long run relationship between FMD and its regressors. The results show that FID and FME are positive and statistically significant. While the rest of the variables are not statistically significant. This means that a 1% increase in financial institutions depth would bring an approximately 1.29% increase in financial market depth. While the coefficient of financial market efficiency is statistically significant at 1% significance level, implying a 1% increase in FME is associated with a 0.51% increase in FMD.

The long-run results in Table 4.15-Panel A indicates that any disequilibrium in the system can be corrected in the long run by the error correction term. The error correction model was estimated within the ARDL framework in EViews 11. The EC shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted. The error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

EC = FMD - (-0.0010*RGDP + 0.0202*FIA + 1.2876*FID -0.0813*FIE +0.0309*FMA + 0.5079*FME + 0.0069*DUMFMD)

The error correction model was estimated within the ARDL framework in EViews 11. The results of Table 4.15-Panel B shows that no variables were found to have relationship with FMD. One important outcome of this short run result is the error correction coefficients. The short-run coefficient presented is statistically significant at the 1% level with a negative coefficient. The ECM (CointEq(-1)) coefficient is negative and statistically significant at 1% as expected. ECM(-1)) is -0.8506 with a high *t-statistic, -7.295* and significant at 1%. This coefficient indicates that distortions in the short term would be brought back to equilibrium a rate of 85.01% within 1 year 2 months (1/0.8506=1.17).

Looking at the descriptive statistics in Table 4.15-Panel B, it can be observed that the adjusted R^2 is approximately 0.58. This explains that 58% of the variation in FMD is explained by the regressors. Durbin-Watson statistics of approximately 1.72 reveals the absence of autocorrelation.

Table 4.16: Estimated long run coefficients based on AIC ARDL (1,0,0,1,0,0,1) dependent variable: FIE

Panel A: Long run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	0.002526	0.008670	0.291406	0.7730
FID	0.419981	0.860595	0.488012	0.6295
FIA	0.453994	0.813546	0.558043	0.5814
FME	-0.676255	0.467457	-1.446669	0.1595
FMD	0.364188	0.580414	0.627462	0.5356
FMA	0.553860	0.363406	1.524080	0.1391

Panel B: Short Run Estimates (FIE is the dependent variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.059221	0.013108	4.518067	0.0001
D(FIA)	1.255636	0.342726	3.663667	0.0011
D(FMA)	-0.035801	0.081696	-0.438219	0.6647
DUMFIE	-0.067305	0.021311	-3.158281	0.0039
CointEq(-1)*	-0.454116	0.077588	-5.852946	0.0000

R-squared	0.571728	Mean dependent var	-0.001863
Adjusted R-squared	0.519817	S.D. dependent var	0.054053
S.E. of regression	0.037456	Akaike info criterion	-3.609202
Sum squared resid	0.046298	Schwarz criterion	-3.393730
Log likelihood	73.57483	Hannan-Quinn criter.	-3.532538
F-statistic	11.01348	Durbin-Watson stat	2.234820
Prob(F-statistic)	0.000009		

*Source: Author's computation based on data described in this text. Note: DUMFIE is the interactive dummy variable given by dummy*FIE. Source: Author's computation based on data described in this text*

Table 4.16-Panel A shows the long run results. FME is negatively related to development of financial institutions access but not statistically significant. FID is positively related to the development of FIA yet not statistically significant. FME coefficients is negative and not significant. FMA and FMD shows a positive relationship but also not significant, so is real GDP. The results reveal that real GDP and all variables of financial markets and two of financial institutions are not related to any changes in financial institutions access.

The long-run results in Table 4.16-Panel A indicates that any disequilibrium in the system can be corrected in the long run by the error correction term. The error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

EC = FIE - (0.0025*RGDP + 0.4200*FID + 0.4540*FIA -0.6763*FME + 0.3642*FMD + 0.5539*FMA)

The error correction model was estimated within the ARDL framework in EViews 11. The results of Table 4.16-Panel B shows that the coefficient of FIA is found to have a positive relationship with FIE. At 1% increase of FIA, FIE would be expected to increase by approximately 1.26%. FMA is negative and not statistically significant. One important outcome of this short run result is the error correction coefficients. The short-run coefficient presented is statistically significant at the 1% level with a negative coefficient. The ECM (CointEq(-1)) coefficient is negative and statistically significant at 1% as expected. ECM (-1)) is -0.4541 with a high *t statistic, -5.853* and significant at 1%. This coefficient indicates that distortions in the short term would be brought back to equilibrium a rate of 45.42% within 2 year 2 months (1/0.4541=2.20).

Looking at the descriptive statistics in Table 4.16-Panel B, it can be observed that the adjusted R^2 is approximately 0.52. This explains that 52% of the variation in FIE is explained by the regressors. Durbin-Watson statistics of approximately 2.23 reveals the absence of autocorrelation.

Table 4.17:Estimated long run coefficients based on AIC ARDL (1,0,1,0,1,1,1) dependent variable: FMA

Panel A: Long run Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	0.007309	0.005004	1.460716	0.1565
FIE	-0.686384	0.227383	-3.018621	0.0058
FID	-1.536232	0.668497	-2.298040	0.0302
FIA	0.322550	0.294724	1.094412	0.2842
FME	0.892623	0.238698	3.739552	0.0010
FMD	0.096388	0.373878	0.257807	0.7987

Panel B: Short Run Estimates (FMA is the dependent variable D(FMA))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	1.121763	0.122875	9.129290	0.0000
D(FIE)	-0.020866	0.123621	-0.168789	0.8673
D(FIA)	-0.788847	0.381048	-2.070205	0.0489
D(FME)	0.143018	0.119447	1.197328	0.2424
D(FMD)	0.506244	0.150805	3.356949	0.0025
DUMFMA	0.736421	0.084136	8.752705	0.0000
CointEq(-1)*	-0.824127	0.089926	-9.164552	0.0000

R-squared	0.791166	Mean dependent var	0.010492
Adjusted R-squared	0.750746	S.D. dependent var	0.076123
S.E. of regression	0.038005	Akaike info criterion	-3.537396
Sum squared resid	0.044775	Schwarz criterion	-3.235735
Log likelihood	74.21052	Hannan-Quinn criter.	-3.430067
F-statistic	19.57387	Durbin-Watson stat	2.279811
Prob(F-statistic)	0.000000		

*Source: Author's computation based on data described in this text. Note: DUMFMA is the interactive dummy variable given by dummy*FMA.*

Table 4.17-Panel A shows the coefficients of the long run relationship between FMA and its regressors. The results show FME is positive and statistically significant. A 1% increase on FME, FMA would increase by 0.89%. Coefficients of financial institutions (FID and FIE) are negative and statistically significant. At 1% increase in FIE and FID would lead to a -0.68% and -1.53% reduction in FMA, respectively. While the rest of the variables are not statistically significant.

The long-run results in Table 4.17-Panel A indicates that any disequilibrium in the system can be corrected in the long run by the error correction term. Using EViews 11, the error correction model was estimated within the ARDL framework. The EC shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted. The error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

EC = FMA - (0.0073*RGDP -0.6864*FIE -1.5362*FID + 0.3225*FIA + 0.8926*FME + 0.0964*FMD)

The results detailed in Table 4.17-Panel B shows that the coefficients of FIA and FMD are found to have a relationship with FMA. At 1% increase of FMD, FMA would be expected to increase by approximately 0.51%. While for a 5% increase in FIA, FMA would be approximately decrease by -0.79%. FME is positive and not statistically significant and FIE is negative and not statistically significant. One important outcome of this short run result is the error correction coefficients. The error correction coefficient represented by (CointEq(-1) is negative and statistically significant at the 1% level. ECM(-1)) is -0.8241 with a high *t statistic, -9.165* and significant at 1%. This coefficient indicates that distortions in the short term would be brought back to equilibrium at a rate of 82.41% within 1 year 2 months (1/0.8241=1.20).

Looking at the summary statistics in Table 4.17-Panel B, it can be observed that the adjusted R^2 is approximately 0.75. This explains that 75% of the variation in FMA is explained by the regressors. Durbin-Watson statistics of approximately 2.28 reveals the absence of autocorrelation.

4.4.3 Diagnostic and Stability Tests: The long run and Short Run ECM Models

4.4.3.1 Diagnostic Tests

Table 4.18 presents results of the tests performed for serial correlation and heteroscedasticity for all variables with cointegration relationship. The null hypothesis for serial correlation is that the standard errors have no serial correlation and for heteroscedasticity the null hypothesis is that of homoscedasticity.

Table 4.18: Diagnostic Test

	RGDP	FME	FMD	FIA	FIE	FMA
Test Statistics	F-statistic and Probability					
Serial Correlation	0.879608 (0.3569)	0.164918 (0.6881)	0.482081 (0.4932)	0.416199 (0.5252)	0.751920 (0.3938)	1.454652 (0.2395)
Heteroscedasticity	0.850199 (0.5784)	0.494012 (0.8898)	0.496488 (0.8486)	0.834882 (0.6164)	0.558305 (0.8325)	0.977559 (0.4946)

Note: Test on significance level of 5%. p-value in parenthesis. Source: Author's computation based on data described in this text.

From the results in Table 4.18, the regressions satisfy the diagnostics tests conclusion that there is no evidence of serial correlation and no evidence for the presence of heteroscedasticity, since the p-values are considerably in excess of 5% significance level.

4.4.3.2 Stability Test for the Long run and Short run ECM Models

To examine the stability of the long run stability of the ARDL models, the cumulative sum of recursive CUSUM and CUSUM-squared residuals was used. The CUSUM and CUSUMSQ statistics are plotted against the critical bound of 5% significance level, and the plot presented in figure 2 and 3 suggest the absences of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study. Pesaran, Shin, and Smith (1999) do warn though that these tests are known to have low powers and as a result likely to have missed some important breaks.

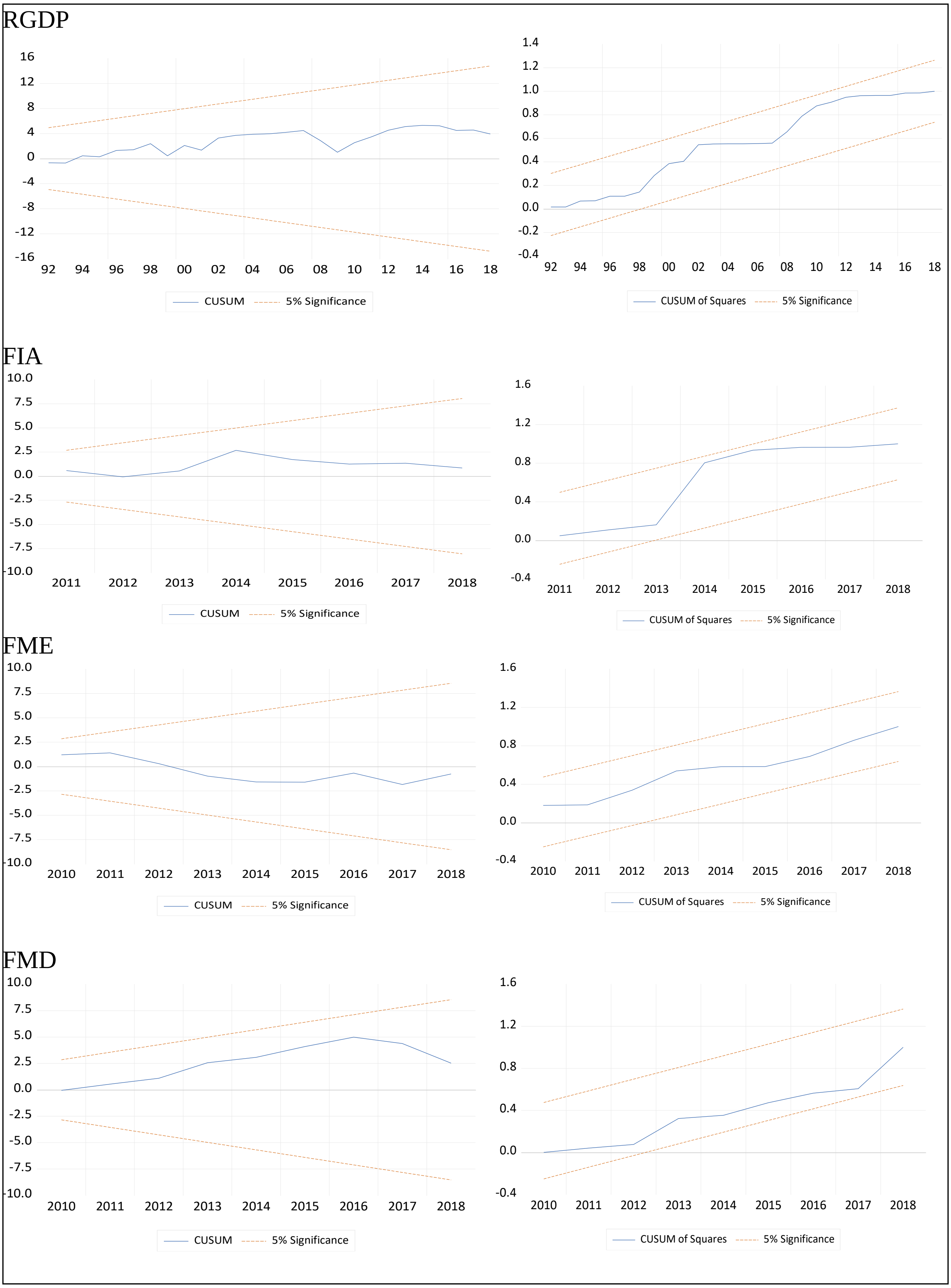

Figure 4.2: Cumulative Sum of Recursive Residuals and Cumulative Sum of Squares of Recursive Residuals Plot

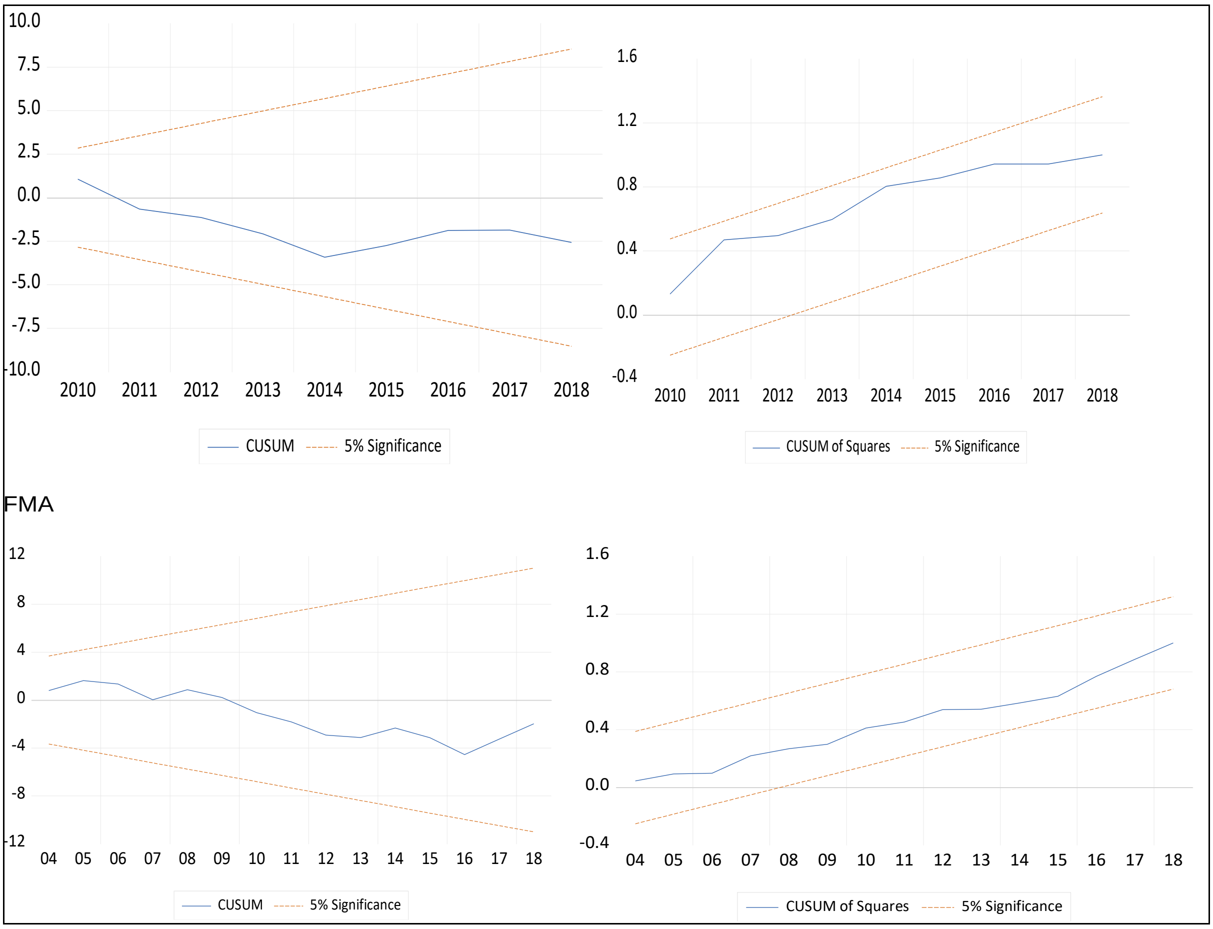

Figure 4.3: Cumulative Sum of Recursive Residuals and Cumulative Sum of Squares of Recursive Residuals Plot

Source: Author's calculations

4.4.4 Analysis of Causality Test

In the preceding section of this study, equation (3.3) and (3.4) was run and the results are reported in Panel A and Panel B of the respective tables in section 4.3.2. The cointegration results confirmed the existence of long-run relationship between variables specified in the equations. From these results the causality patterns are examined and inferred through the significance of the coefficient of the lagged error-correction term. The Granger pairwise approach was also used to confirm the short run causality inferred from the long run and short run estimations.

Where RGDP is the dependent variable and cointegration relationship established, the financial institution access (FIA) is the only regressor found to have a long run causal effect at 5% significance level. This long run causal relationship is confirmed by a significant error correction coefficient. In the short run financial institution efficiency (FIE) in its lagged form has a causal effect on RGDP.

In the case where financial institutions access (FIA) is a dependent variable, there is no long run causal relationship, this is confirmed by the significant error correction coefficient. No causal relationship picked up in the short run either from RGDP to FIA, giving an indication that these variables develop independently. The only identifiable short run causal relationship is from FIE, FME and lagged FME to FIA. Confirmed by the significant error correction coefficient.

When financial institution efficiency (FIE) is a dependent variable, FIE and RGDP develop independently as there is no long run and short run causality found. This is confirmed by the statistically significant error correction coefficient. In the short run, FIA shows a short run causal effect on FIE. Where Financial market efficiency (FME) is the dependent variable, FME in the long run does not show any long run causality with RGDP, however, a causal relationship with FMD is determined in the long run. This causal relationship is confirmed by significant error correction coefficient. In the short run, a causal relationship is found with FIE and FIA.

When FMD is a dependent variable, no short run or long run causal relationship with RGDP was found. When financial markets access (FMA) is the dependent variable, no RGDP causal long run or short run relationship is identified, this outcome is confirmed by the significant error correction coefficient. This result suggests that these variables develop as independent variables.

To support the inferred causal relationship from the output result in Tables 4.12 to Table 4.17, this study computed the pairwise granger causality.

Table 4.19:Pairwise Granger Causality Tests

Null Hypothesis:	F-Statistic	Prob.
FIE does not Granger Cause RGDP	3.61434	0.0384**
RGDP does not Granger Cause FIE	2.54688	0.0941*
FID does not Granger Cause RGDP	2.98782	0.0646*
RGDP does not Granger Cause FID	2.15935	0.1319
FIA does not Granger Cause RGDP	0.12057	0.8868
RGDP does not Granger Cause FIA	2.00001	0.1519
FME does not Granger Cause RGDP	0.88541	0.4224
RGDP does not Granger Cause FME	0.97698	0.3874
FMD does not Granger Cause RGDP	0.91008	0.4127
RGDP does not Granger Cause FMD	3.10404	0.0586*
FMA does not Granger Cause RGDP	3.46159	0.0436**
RGDP does not Granger Cause FMA	0.08321	0.9204

*Note: ***, ** and * denotes significance at 1%, 5% and 10%, respectively. Source: Author's analysis based on data described in this text. Source: Author's computation based on data described in this text.*

Table 4.19 shows the results of the pairwise granger causality test, observable from these results is that neither FIA, FMD and FME granger causes RGDP as their p-value is greater than the 10% significance level. However, from these results a confirmation is established that in the short run FIE and FMA granger causes RGDP at 5% significance level. FID in the short run exhibit a unidirectional causality with RGDP, though weak at 10% significance level.

FIE and RGDP give us a bi-directional causality though it is weak at 10% significance level. FMA and RGDP show a strong unidirectional causality at 5% significance level. In the FMD|RGDP and RGDP|FMD hypothesis, it is notable though that FMD does not granger causes RGDP, there is a unidirectional causality where RGDP in the short run weakly granger causes FMD at 10% significance level. This implies that improvements in real sector in the short run consequently led to improvement in financial markets depth.

The result of FIE|RGDP and FID|RGDP show a short run causal effect on RGDP and is consistent with the result of Nyasha and Odhiambo (2015), where they found that in the short run an increase in bank-based development leads to an increase in economic growth in South Africa. This study on the contrary to Nyasha and Odhiambo further confirms that in the short run there is causal relationship between financial markets access (FMA) and real gross domestic product (RGDP). Whereas Nyasha and Odhiambo show that market-based development and economic growth in South Africa develop independently.

This study's findings on economic growth granger causing financial markets depth is consistent with Odhiambo (2010), whose findings confirmed that economic growth granger causes stock market capitalization. It must be noted though that this study finding is on the broader financial market depth. Financial market depth compiles data on the ratios of stock market capitalization, stocks traded, the value of the international debt securities of the government, and the value of the total debt securities of financial and nonfinancial corporations to GDP. While Odhiambo observed these separately (stock market capitalization, stock market traded volume and stock market turnover).

4.5 Chapter Summary

This chapter empirically verified the relationship and causality between economic growth and financial development in South Africa for the period 1980 to 2018. As the starting point, the summary statistics, correlations analysis, and unit root test were carried out. Though unit root testing was not a requirement for the adopted approach, it was performed to ensure that none of the variables used in this study were found to be I(d) and (d) being integration more than I(1).

After finding that none of the variables were integrated more than I[1], this study proceeded with the ARDL approach through a step by step process. (i) the optimal lag was determined by taking the smallest information criterion as it performs better. (ii) Bounds test was conducted for cointegration, to determine the existence of the long run relationship of the variables used. The cointegration hypothesis was tested by means of *f-statistics* against the Narayan (2005) critical values. A conclusive decision of presence of long run integration was made for variables whose *f-statistics* was above the upper bound critical value I[1]. When the *f-statistics* was below the lower bounds I[0] then conclusively could not reject a no cointegration hypothesis, similarly for variables where *f-statistics* was within the upper bounds I[1] and lower bounds I[0]. (iii) ARDL reparameterization for error correction model to get the long and short run information. One important result of interest of this reparameterized model, was the coefficient value along with *t-statistics* being statistically significant. The ARDL model for equation (3.3) and its reparameterized equation for equation (3.4) was put through the diagnostic and stability testing, which all confirmed models to be stable and whose results can be interpreted.

The results from running equation (3.3) and equation (3.4) were interpreted to infer long run and short run causality of the variables. Along with this, the study also run the pairwise granger test to confirm the inferred results. In the next section, the study concludes and provide recommendations and suggestions for future studies.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

In the preceding chapters, the background, problem statement, research motivation, research objectives, research questions along with significance of research was discussed. Also rendered the literature on relationship between financial development and economic growth. This chapter concludes the study, offers policy implication based on the results obtained from preceding chapters and indicate areas for further research.

5.2 Conclusion of the Study

From the empirical result outlined in chapter 4, this study makes the following conclusion on the relationship between financial development and economic growth in South Africa. The results on the impact of financial institutions based financial development on economic growth has mixed effects in the short and long run. In the long run, financial institution efficiency (FIE) and financial institution depth (FID) have no association with economic growth. Financial institutions access (FIA) showed a negative nexus with economic growth in the long run but no relationship in the short run. This result is consistent with the World Bank assertion that, "the benefits produced by financial intermediation and markets are not being spread widely enough throughout the population and across economic sectors, with potential negative impacts on growth, income distribution and poverty levels." Also, consistent with Nyasha and Odhiambo (2015) who argued that bank based financial development is vulnerable to imperfections of inefficient allocation of capital to deserving projects. The inefficient allocation of scare resources can be attributed to weak competition in the banking sector (Rapapali and Simbanegavi, 2020). These results corroborate assertions by Hawkins (2002) as cited by Basson and Ojah (2011) that inefficiencies of the banking industry will stifle novelty and ultimately hold back economic growth and employment. This study does not find support in the long run nor short run for the impact of financial institutions in identifying and allocating capital to profitable initiatives as measured by financial institution access (FIA). In the short run regression analysis, financial institution efficiency (FIE) is the only variable that has positive relationship with economic growth.

Secondly, the impact of financial markets based financial development on economic growth also showed mixed effects. Apart from financial market efficiency (FME) that is negative in the long run and with no association with economic growth, other measures of financial markets development; financial markets access (FMA) and financial markets depth (FMD) are positive, but show no association shown in the long run nor short run with economic growth. From these long run and short run results this study infers that financial institutions based financial development is integral in propelling economic growth than the financial markets based financial development. These results are consistent with Nyasha and Odhiambo (2015); Ndlovu (2013) who found that stock market development, as measured by various financial development indicators, has no significant impact on economic growth. Puryan (2017) for MENA(Middle-East and North African) countries found a one-way causal relationship from banking sector development towards economic growth. This study is contrary to the results by Mohieldin, Hussein, and Rostom (2019) that found financial market to have a strong association with economic growth.

The results of causal relationship between financial institutions based financial development and economic growth show evidence in support of supply leading hypothesis in the long run and short run (see, among others, Odhiambo, 2010; Nyasha, Gwenhure, Odhiambo, 2016; Puryan, 2017). This causal relationship is from financial institution efficiency (FIE) to economic growth and a weakly unidirectional causal relationship from economic growth to financial institution efficiency (FIE) in the short run. A weak causal relationship from financial institution depth (FID) to economic growth in the short run.

A causal relationship between financial markets based financial development and economic growth is mixed. Financial market access (FMA) supports the supply leading hypothesis. However, when we look at financial market depth (FMD), the demand leading hypothesis prevails. Financial markets efficiency (FME) has no causal relationship with economic growth. The empirical results of this study show evidence that causal relationship between financial development (financial institutions and financial markets) and economic growth is sensitive to variables used. Supported by Peia and Roszbach (2015) who posit that causality patterns between finance and growth differ depending on whether financial development stems from banking sector or stock markets. Overall, this study confirms that causal relationship flows from financial institutions and financial markets development to economic growth. This result is supported by (Nyasha and Odhiambo, 2019). Though financial institution development predominates.

5.3 Policy Recommendations

Research on finance-growth has attracted increasing attention in developing countries and sometimes in country specific context (Guru and Yadav, 2019; Mohieldin, Hussein, and Rostom, 2019; Nyasha and Odhiambo, 2019; Peia and Roszbach, 2015; Puryan, 2017).

From the findings of this study on the relationship between financial development and economic growth, this study recommends that policy makers should formulate policies that shape the development of financial institutions in a direction to increase their contribution to economic growth. Also, to formulate financial and economic policies that will reduce financial markets imperfections and encourage financing of novel, and innovative investments that can lead to creation of new industries. Because financial institutions and financial markets relate differently to the real economy, this study also recommends formulation of policies that support financial markets based financial development to support economic agents that are at mature stages of development.

5.4 Recommendations for Further Research

These include the following:

i) In theory, financial development includes both financial system and financial stability. However, the existing studies examining the relationship between financial development and economic growth, normally do not include the stability elements. For this reason, further studies can explore examination of the relationship between financial development and economic growth that includes both financial system and financial stability.

ii) Financial institutions and markets suffer from market imperfections such as information asymmetry, as a result influence key decision that are constraining to the potential small enterprises that may lack collateral and credit history. It is important to investigate the role of external financing partners that can support enterprise creation, in turn lead to rapid economic growth.

iii) Most importantly, this study was only on South Africa, it will be interesting to investigate what the relationship will be across other African and or emerging market countries, as well as developed countries.

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Appendix

Based on the selected lags, the bounds F-test was applied to equation (3.3) in order to establish whether there exists a long-run relationship between the variables under study model selection criteria- The model with the smallest AIC, SBC estimates performs relatively better.

Appendix A: Lag Length for RGDP

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-71.35897	NA	4.574120	4.353276	4.661183	4.460744
1	-71.02918	0.513011	4.759646	4.390510	4.742403	4.513330
2	-66.74464	6.426798*	3.978816*	4.208036*	4.603916*	4.346208*
3	-66.36188	0.552888	4.134799	4.242326	4.682193	4.395852

*Note: * 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*

Appendix B: Lag Length for FME

Lag	LogL	LR	FPE	AIC	SC	HQ
0	58.46108	NA	0.003373	-2.858949	-2.551042	-2.751481
1	60.98105	3.919956*	0.003108	-2.943392	-2.591499*	-2.820572*
2	62.06953	1.632714	0.003103*	-2.948307*	-2.552427	-2.810134
3	62.43842	0.532849	0.003227	-2.913246	-2.473379	-2.759721

*Note: * 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*

Appendix C: Lag Length for FMD

Lag	LogL	LR	FPE	AIC	SC	HQ
0	244.8260	NA	6.16e-15	-12.85546	-12.55069	-12.74801
1	398.0512	240.1909*	2.31e-17*	-18.48925	-16.05111*	-17.62969*
2	449.0497	60.64690	2.79e-17	-18.59728*	-14.02576	-16.98561

*Note: * 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*

Appendix D: Lag Length for FMA

Lag	LogL	LR	FPE	AIC	SC	HQ
0	41.75359	NA	0.008535	-1.930755	-1.622849	-1.823288
1	46.49149	7.370058*	0.006952*	-2.138416*	-1.786523*	-2.015596*
2	46.63381	0.213485	0.007315	-2.090767	-1.694888	-1.952595
3	46.71961	0.123925	0.007728	-2.039978	-1.600112	-1.886453

*Note: * 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*

Appendix E: Lag Length for FIE

Lag	LogL	LR	FPE	AIC	SC	HQ
0	60.08289	NA	0.003083	-2.949049	-2.641143	-2.841582
1	63.45691	5.248475*	0.002709*	-3.080939*	-2.729046*	-2.958119*
2	63.47783	0.031377	0.002870	-3.026546	-2.630666	-2.888373
3	65.41246	2.794474	0.002736	-3.078470	-2.638604	-2.924945

*Note: * 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.*

Appendix F: Lag Length for FID

Lag	LogL	LR	FPE	AIC	SC	HQ
0	94.44001	NA	0.000457	-4.857778	-4.549872	-4.750311
1	99.23239	7.454816	0.000371	-5.068466	-4.716573	-4.945646
2	101.2663	3.050868	0.000352	-5.125906	-4.730026	-4.987733
3	104.8171	5.128970*	0.000306*	-5.267618*	-4.827752*	-5.114093*

Note: 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*

Appendix G: Lag Length for FIA

Lag	LogL	LR	FPE	AIC	SC	HQ
0	68.03844	NA	0.001982	-3.391024	-3.083118	-3.283557
1	102.7443	53.98697*	0.000305	-5.263575	-4.911682*	-5.140755*
2	103.8770	1.698928	0.000304*	-5.270942*	-4.875063	-5.132770
3	104.3507	0.684328	0.000314	-5.241707	-4.801841	-5.088182

*Note: * 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*