A CAUSAL RELATIONSHIP BETWEEN FINANCIAL INTERMEDIATION AND ECONOMIC GROWTH: A CASE STUDY OF SOUTH AFRICA

by

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Abstract

Financial intermediation is responsible for channelling funds throughout the economy and acts as the main source of production in any economy. More specifically, financial intermediation acts as a link between savings and investment in the economy through the successful transfer of saving into investments. With the current persisting contradiction of literature on the role of financial intermediation on economic growth, this study, therefore, examined the causal relationship between financial intermediation and economic growth in South Africa using two methodologies, namely the Autoregressive Distributed Lag Model and the Granger Causality Test. The study used annual data obtained from the World Bank statistical reports which covered periods from 1975-2018 in which forty-three observations were used in the study. To capture this relationship, GDP per capita was used to proxy economic growth. The proxies for financial intermediation include the domestic credit to the private sector by banks as a percentage of GDP (CPS by B to GDP), domestic credit provided by the financial sector as a percentage of GDP (CPS by FS to GDP) and the ratio of broad money to GDP (M2 to GDP), which represents the role of the banking sector and other financial institutions. Domestic market capitalisation of listed domestic companies as a percentage of GDP (MCLC to GDP) and the value of domestic shares traded divided by their market capitalisation (DST to MC) were used to proxy the stock market. The results of the study confirmed a positive relationship between financial intermediation and economic growth in both the short-run and in the long-run, however, this relationship proved to be unilateral and financially led. The results also showed a less significant relationship between financial intermediation and economic growth when the stock market proxies were used to test the relationship.

Keywords: Financial intermediation; Financial intermediaries; Economic growth; Causal relationship; Banking sector; Stock markets and financial sector.

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Dedication

To my God for making it all possible for me and to my lovely son Kgothatso Joel Makola who has become my everyday inspiration.

Acknowledgements

I owe special gratitude to the Almighty God who is the greatest source of my strength. I would like to express my sincere gratitude to my supervisor Prof Jeke L, and co-supervisor Dr Nyamazunzu, Z for all their hard work in ensuring that I complete my work. I am grateful to my fiancé, Michael Makola, for his great contributions and encouragement and to my colleagues, Mr. E. Lubulwa and Mr. K. Kufakunesu, for showing me support. I am also grateful to my friend, Morris Phundulo for being there for me always and to my family for being the best part of my life.

Declaration

I, Mixo Sweetness Sithole hereby, declare that this dissertation entitled "**A causal relationship between financial intermediation and Economic Growth: A case study of South Africa**" for the degree of Master of Commerce in Economics submitted to the Department of Economics at the University of Venda has not been submitted previously for any degree at this or another university. It is original in design and in execution and all reference material contained therein has been duly acknowledged.

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Student **Date**

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List of Abbreviations

ADF	Augmented Dicky-Fuller
ADRL	Autoregressive Distributed Lag
BASA	Banking Association of South Africa
BDG	Bank deposit as a percentage of GDP
CC/M1	Current Ratio
FIN	Financial Development Indicator
FSB	Financial Services Board
GDP	Gross Domestic Product
GNP	Gross National Product
IFWG	Intergovernmental FinTech Working Group
LLG	Ratio of liquid liabilities as a percentage of GDP
NGDP	Nominal Gross Domestic Product
P-P	Phillip-Perron
SADC	Southern African Development Community
SAFEX	South African Features Exchange
SARB	South African Reserve Bank

SASRIA	South African Special Risks Insurance Association
Stats SA	Statistics South Africa
UNIVEN	University of Venda
y/N	per capita income

Chapter One: Introduction

1.1 Background of the Study

The financial sector is an anchor of the economy, and it plays a critical role in the allocation of capital from savings to investment, managing financial risks, facilitating trade, and offering access to the payment system (South African Reserve Bank [SARB], 2019). Adedamola and Adewele (2015) state that adequate financial resources are responsible for ensuring economic growth through financial intermediaries. Financial intermediation mediates financial resources between those with a surplus and deficit in pursuit of their business interests (Grbic, 2016). The role of financial intermediaries is to provide a link between savings and investments by channelling funds into the economy to influence businesses and the production of goods and services (SARB, 2019). Moreover, it is possible to reduce the costs per unit of invested capital by minimising the difficulty of efficiently transferring savings into investments due to the cost of transaction and information costs (Grbic, 2016).

Allen and Ndikumana (2000) assert that financial intermediary systems assist business and stimulate economic growth because of economies of scale that facilitate cost effective collection and evaluation of information more efficiently than when done by individual investors. Financial institutions are also responsible for identifying innovative and productive investment opportunities that contribute to economic growth. According to Bakar and Sulong (2018), financial intermediation facilitates efficient resource allocation and ensures the availability of various other instruments, such as insurance deals and information that promotes trade activities and increases overall productivity in an economy.

According to Paun, Musetescu, Topan and Danuletiu (2019), the quality of the financial institution, regulation and market sophistication determines the cost of capital and the risks associated with various financial options. Allen and Ndikumana (2000) argue that financial institutions are significant to economic growth through transferring funds from the saving entities to those who need it in an efficient way to facilitate investment in physical capital and spur innovation and development. Financial institutions are also responsible for reducing the liquidity risk and facilitating the management of risk by both the savers and the investors, thus channelling savings into long-term assets that are more efficient and productive than short-term assets (Allen and Ndikumana, 2000). To make this possible, financial institutions assist savers

and investors in diversifying their investment portfolios. Development and sophistication of these institutions creates more investor choices and opportunities. This is important for economic growth as it transfers and allocates idle resources to productive economic activities which are beneficial to the economy by incentivising investors and savers.

Ivic (2015) defines economic growth as a constant increase in production of a country. According to Mohr and Associates (2015), production of goods and services increases from one period to another in a growing economy. Population growth that is not backed by economic growth results in a decrease in standard of living. This occurs mainly due to the failure by the job market to absorb the growing employment needs. Economic growth can be measured in differing ways. However, the real gross domestic product (GDP) is the most common measure. According to Leamer (2009), GDP measures the total value of all goods and services produced in the country within a given timeframe. Unlike nominal, real GDP is adjusted for inflation. To calculate real GDP, all the goods and services produced per annum each year, in terms of the ruling prices of a certain period, referred as the base year are valued (Mohr and associates, 2015). In South Africa, real GDP is measured in two different ways. Firstly, quarterly growth at a seasonally adjusted and annualized and secondly, unadjusted year-on-year quarterly economic growth (Statistics South Africa, [Stats SA], 2012).

The World Bank (2018) revealed an improved economic outlook with the rise notable in early 2018. The revision of the national accounts between 2015 and 2017 shows that the country is recovering from the difficult time, in 2015 and 2016, which marked the end of the super-commodity cycle and severe drought. As reported by the National Treasury (2019), South Africa's GDP growth forecast for 2019 was revised from 1.7 to 1.5 percentage points estimated in 2018. Poor investment growth as well as moderation in global trade and investment explains why, in 2018, production and employment decreased. The World Bank (2018) explains that to sow growth in private investment and weak integration into the global value chains blocks the country from getting new economic growth opportunities from around the world. The manufacturing sector; wholesale and retail trade; mining; agriculture; transport; tourism; and the financial sector as financial intermediaries are the main economic drivers in South Africa.

In South Africa, the role of financial intermediation is mostly seen through the banks as well as in the stock market. In the past, however, Akinboade and Kinfack, (2014), report that the

country's private banking sector was mostly led by commercial banks until the banking services diversification in the 1950s. Prior to this, personal loans, leasing of property and credit card facilities services were excluded by the commercial banks. As a result, discount houses, merchant banks, and general banks emerged to cater for this demand. This forced the commercial banks to follow suit by entering medium-term credit agreements with commerce and industry. They managed to get interests in hire-purchase firms and leasing activities and improved their operational services to insurance and even investments in manufacturing and commercial entities. The South African Reserve Bank fully controls the entire banking system. It acts as the main monetary authority and the custodian of the country's gold and foreign exchange reserves.

The financial sector's contribution to South Africa's GDP has continued to increase in recent years. It contributes approximately 20% to the country's GDP in the banking sector and accounts for 35% of this value. The Banking Association of South Africa, BASA (2018), reported that the amount lent by bank in 2017 increased by 5% from R232.7 billion in 2016 to R244.3 billion in 2017.

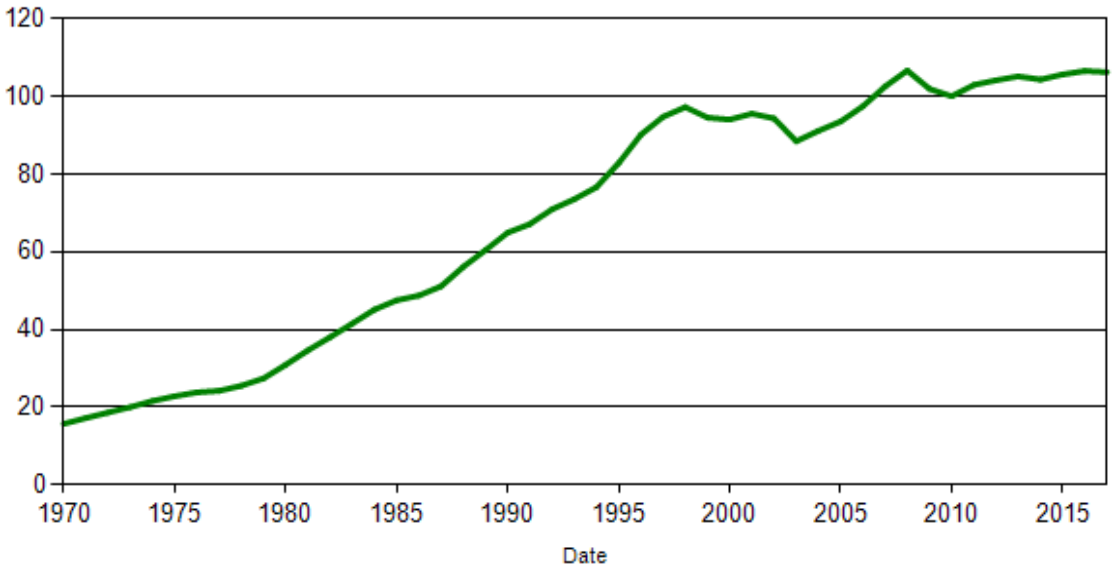
Figure 1.1 shows the comparison of loans offered by banks between 2016 and 2017. From the figure below, we can see that personal and household loans were the highest between 2016 and 2017, this means more households demanded personal loans and mortgage loans. The demand for wholesale insurance was the lowest, implying less demand for wholesale loans. This shows that domestic credit to household increasingly grows more than all the other credit demands in South Africa over the years. The growth in the demand for the personal and household loans contributes greatly to the growth of the financial sector, and simultaneously, on economic growth.

Figure 1.1: *The comparison of loans offered by banks between 2016 and 2017*

(Source: Banking Association of South Africa, 2018)

Financial institutions enable entrepreneurs to meet their capital demands in the process of creating and adding jobs to the labour market (Banking Association of South Africa, 2017). In other words, banks play a transformative role in the society, and they employ over 158 000 people. Figure 1.2 shows the employment rate for different years in the financial institutions in South Africa from 1970 to 2017. From the figure, an increase in employment by the financial sector is seen, especially, from 1995 to 2017, with over 100 million people employed in the financial sector.

Figure 1.2: *Employment in the private sector: Financial institutions*



(Source: https//: www.resbank.co.za)

According to Shittu (2012), financial intermediation is not a new concept. It has been a subject of study for decades at both macro-level and micro-level. However, at macro-level, arguably, the significance of financial intermediation is not comprehensively defined. Bakar & Sulong (2018), show us that, to date, there is still no consensus reached in empirical literature on the relationship between the financial sector and economic growth. In general, four viewpoints exist regarding the relationship between financial sector development and economic growth, as observed by Odhiambo (2011). Firstly, the financial development causes economic growth. This view shows that there is a supply-leading response between the two sectors. Secondly, financial development is a result of economic growth. In other words, financial markets as well as credit markets development is a product of economic growth (Odhiambo, 2011). Thus, financial development is driven by market demand. Thirdly, the work by Akaboade (1998), posits that there is a bi-directional causal relationship between financial development and economic growth. Thus, both concepts influence each other. Lastly, Adedamola and Adewele (2015) argue that there is no causal relationship between financial development and economic growth. This means that the two sectors have no effect on each other. Although the economy may grow as the financial sector grows, they are both distinct and follow their own logic. For this reason, this study examined the causal relationship between financial intermediation and economic growth in South Africa.

1.2 Problem Statement

The study takes note of the several empirical literatures conducted on the similar topic under study in South Africa, including the study by Odhiambo (2004), Louw (2015) and Gondo (2009). Other studies conducted on the similar topic in other countries, include the study by Akaboade (1998), conducted in Botswana and the study conducted by Shittu (2012) conducted in Nigeria. Of the studies reviewed, it is found that the relationship between financial intermediaries and economic growth is rather difficult to determine. According to Odhiambo (2011), the empirical studies conducted on the relationship between financial sector development and economic growth yield different results that are contradictory. Some show evidence of the relationship between financial intermediation and economic growth (Gondo 2009, Louw 2016), whilst some studies (Adedamola and Adewele 2015) show no evidence of the relationship between the variables under study. Shittu (2012) also confirmed a contradiction of the theoretical analysis on the relationship between financial intermediary and economic growth and stated that there is no significant emphasis of the role of financial intermediation on economic growth at macro-level and that, at micro-level, such significance can be seen in several ways.

There has been a constant belief in literature that financial intermediaries significantly impact on economic growth, whilst other studies, by scholars such as Odiambo (2004), argue that economic growth results in financial development. About two decades ago, Akaboade's (1998) evidence supported a bi-directional connection. More recently, Adedamola and Adewele (2015) found no relationship, whereas Ncangwa and Mabusela (2019) found a positive relationship between credit instruments and economic growth needs. This shows inconsistences in literature and an evolutionary relationship than changes over time and is contextual. This explains why Castelli (2018), states that the debate among economists on this relationship is ongoing.

The role of the financial sector, in stimulating economic growth, is increasing in many countries (Muazu and Alagidede, 2018). However, these authors reveal that, in the Sub-Sahara Africa, the financial sector development remains slow and underdeveloped. The major reasons being weak institutional quality, governance as well as political and economic instability. Improvement in access to credit has the potential to improve the low productivity and contribution of agriculture in the rural areas and small enterprises to private sector

development. Given these revelations, it is, therefore, important that the relationship between financial intermediation and economic growth in Sub-Saharan countries is investigated. This is crucial towards building resilient strategies for sustainable complimentary growth.

1.3 Aim and Objectives of the Study

The aim of this study was to examine the causal relationship between financial intermediation and economic growth in South Africa and to determine whether the relationship holds in both the short-run and the long-run.

1.3.1 The specific objectives

1. To determine the relationship between financial intermediation and economic growth.
2. To examine the direction of the causal relationship between financial intermediation and economic growth.

1.4 The Study Hypotheses

The hypotheses given below, therefore, aimed to provide guideline to the study in terms of the expected relationship between financial intermediation and economic growth and is given as follows:

Hypothesis 1

H0: There is no relationship between financial intermediation and economic growth.

H1: There is a relationship between financial intermediation and economic growth.

Hypothesis 2

H_0: There is no causal relationship between financial intermediation and economic growth.
H_1: There is a causal relationship between financial intermediation and economic growth.

1.5 The Study Rationale

The study on the causal relationship between financial intermediation and economic growth in South Africa is significant as it aimed to make contributions to the policy makers, literature

and to the practitioners. The study aimed to determine the relationship between financial intermediation and economic growth. Knowing this relationship is critical for not only gaining insights, but also for making policy recommendations to improve the South African financial system for efficient economic growth. This can be done through promoting domestic savings and investments while tackling the information asymmetric challenges in the financial sector. The study also contributed to knowledge production and transfer by revealing current developments in the financial sector characterised by the introduction of assets like Crypto currency and the Block Chain technology. This knowing helps economic players and the sector to know what adaptation mechanism to use in response.

Furthermore, the study contributed to the ongoing debate on the direction of the causal relationship between financial intermediation and economic growth. Analysing the causal relationship between financial intermediation and economic growth helped to capture both the short-run and the long-run relationship between the variables. The direction of the relationship was also tested. Two broad methodologies namely, Autoregressive Distributed Lag and the Granger causality test methods were utilised for this purpose, as they can show the direction of the relationship between financial intermediation and economic growth. The study also added to the scantiness in literature on the subject in the South African context. This study filled this gap by studying the most recent literature on the subject which utilises the most recent data which caters for the period from 1975 to 2018.

1.6 Study Delimitation

The study focused on examining the causal relationship between financial intermediation and economic growth in South Africa using annual data from 1975 to 2018. Specifically, the data was obtained from the World Bank statistical reports. This study acknowledged the current development of the Crypto currency in the financial sector and that it may affect the role of the financial intermediation in the current as well as the future economic activities. This study, however, only focused on the relationship between financial intermediation and economic growth in South Africa, with less emphasis given on the development of this Crypto currency and other factors affecting the relationship between the variables under consideration.

1.7 Operational Definitions of Terms

The meaning of key concepts as applied in the context of this study were defined in this section.

- **Financial Intermediation-** this is a process performed by banks and other financial institutions of transferring savings from lenders to borrowers in the form of investment (Gorton and Winton, 2002).
- **Financial Intermediaries-** are the financial institutions that act as mediators between borrowers, or investors and the lenders or savers. According to Grbic (2016), their role is to act as intermediaries between those with a surplus of money and those who lack money, and they need to pursue their business interests.
- **Economic growth**- according to Ivic (2015), Economic growth is the increase in the total production of goods and services of a country in a certain period, usually measured by the GDP.
- **A causal relationship-** is the cause and effect. It is a relationship between two events that exist only if the events of the first affects the other event.
- **Financial sector-** is a section of a country's economy that consists of financial services providers and includes banks, insurance companies, pension funds and unit trusts.

1.8 Research Methodology

The study followed the empirical approach and applied quantitative research methods to answer the main question. Secondary data obtained from different sources was used through the application of different statistical methods to test the relationship between two or more variables under study. Two methodologies were applied in this study, which are the Autoregressive Distributed Lag Model (ARDL) and the Granger Causality test. The Autoregressive Distributed Lag Model (ARDL) was used to analyse the long-run relationship. The main advantage of the ARDL technique is its reliability even when testing smaller observations and which is unbiased in the long-run model estimates. Granger Causality test was used to test the directional relationship between financial intermediaries and economic growth. This methodology is preferred for its ability to test the causality between two or more variables in time series.

1.9 Ethical Considerations

The study used secondary data sources from the World Bank statistical reports which can be freely obtained and utilized for research purposes. The study adhered to the university's ethical clearance requirements.

1.10 Structure of the Dissertation

The study was divided into six chapters, given as follows:

- The first chapter introduced the study and sets the scene, and this chapter also provides the background from which the study is based and the applicable context.
- The second chapter covered the South African financial sector and its role in enhancing economic growth.
- The third chapter discussed the relevant literature review where the theoretical and the empirical reviews are fleshed out.
- Chapter Four covered the research design and methodology applied in this study, including the methods of data collection employed.
- Chapter Five presented the findings and the discussions of the different tests conducted in the study.
- Chapter Six, which is the last chapter, comprised a summary of the findings, conclusions and policy recommendations and areas of further study.

1.11 Conclusion

This chapter introduced the study, and it outlines the study background and the problem statement. The objectives of the study were also outlined in the chapter. The chapter also discussed the justification of the study and the study delimitation. The chapter also briefly outlined the methods and techniques followed to answer the study results. The next chapter looks at the history and the role of the South African financial system.

Chapter 2: The South African Financial Sector

2.1 Introduction

This chapter discussed the background of the South African financial system and highlights its major role in the economic growth. The topics included cover, in-depth, the role of financial systems in general in the context of the South African financial system. Furthermore, in the South African context, the discussion points are divided into the banking sector, the capital market and non-bank institutions that include insurance companies, pension funds and the unit trusts. In conclusion, the chapter discusses the rise of crypto currency and its possible impact on South Africa's financial system.

2.2 The Financial systems

This section discussed the general roles and functions of financial systems as seen in South Africa and globally, beginning with the roles and functions of financial systems.

2.2.1 The Role and functions of Financial Systems

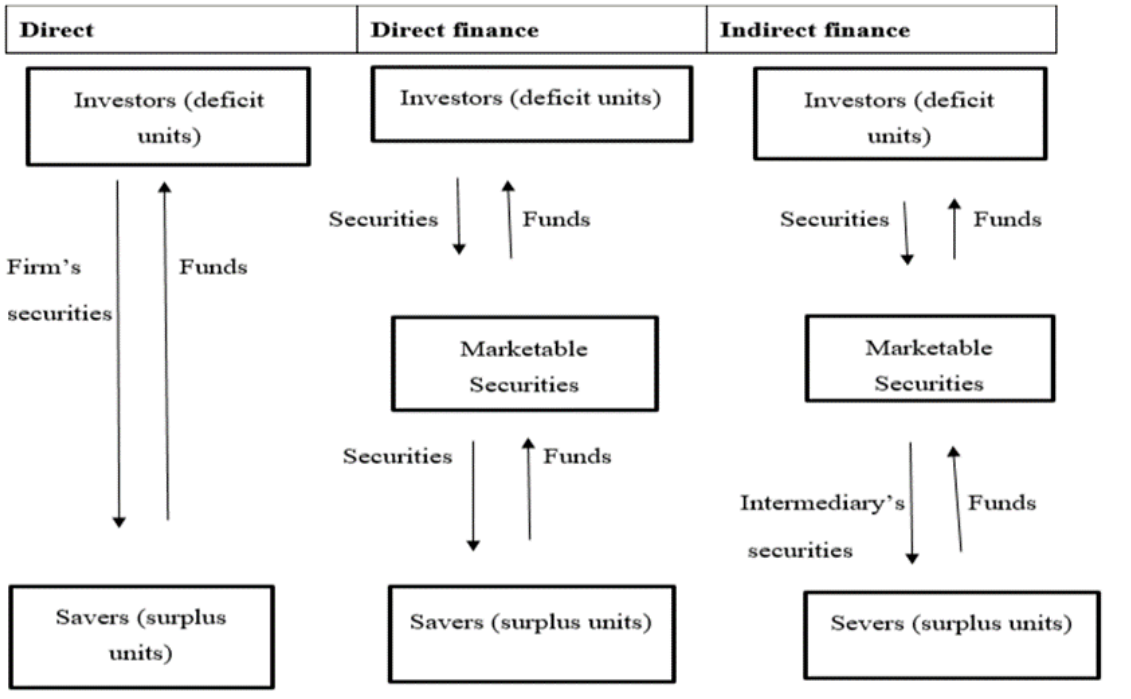
Financial systems are the main source of capital formation and act as intermediators between savings and investments. According to Pal (2018), the process of capital formation involves savings, finance, and investment. Financial systems efficiently transfer savings into investment, thereby stimulating economic growth. These financial systems consist of financial markets, financial intermediaries, and financial assets. Financial intermediaries are responsible for capital formation by administering the transformation of savings into investments, while financial markets play a role of facilitating savings and investments processes. Financial markets are classified into money markets and stock or security markets. Lastly, financial assets consist of all form of securities held in forms of asset investment that are used as a store of value which include direct, indirect as well as derivatives thereof.

Schmidt and Hryckiewicz (2006), analysed financial systems using three approaches. The institutional approach looks at the financial institutions that exist and how they perform their respective functions. The second approach is the intermediation function and focuses on the process of transferring funds from the surplus to the deficit units of the economy. The third

approach is the functional approach. Its focus is on how certain financial functions in the economy are fulfilled.

Akdogu and Umutlu (2014) assert that the main economic function of a financial system is to channel funds from savers to spenders. This system allows investors with a shortage of money to access cheaper financial resources to finance their projects. Butterworth and Malherbe (1999) add that there are three main roles of the financial system. These are the allocation of the economy's resources in capital form; managing the financial risks in the economy; and generating value addition to the economy. The functions of financial systems include the provision of a payment system that facilitates the exchange of goods and services and the allocation of funds. The transferring of resources across sectors allows for the management of asymmetric information, and the management of uncertainty and controlling risk (Linciano, 2019). Financial systems use three main channels to transfer funds. These are the direct, direct finance and indirect finance, as illustrated in figure 2.1 below.

Figure 2.1 *Three financial system channels of funds transfer*



(Source: Linciano, 2019)

In the direct channel, firms or investors give up securities in exchange for the required funds with those with access to money willing to give it up for the firm's securities. On the other hand, the direct finance channel transfers the funds from savers to investors through the marketable channel, by bringing in a third party into play. Thus, there is limited contact between the investors and savers. In the indirect channel, savers and investors make use of intermediaries and act as a middleman between savers and investors. In this scenario, investors access funds through the intermediaries. Similarly, savers transfer and access cash through intermediaries. The two parties do not interact as this role is facilitated by the intermediaries. Nguyen (2017) alludes that, financial intermediaries help reduce the information asymmetry problems through efficient credit screening and delegated monitoring. Financial intermediaries influence economic growth by improving the saving investment ratio and the social productivity of investment. Each economy has its own financial system that follows the country's unique economic system. This study analyses South Africa's financial system and how its intermediary role impacts the country's economic growth by studying the causal relationship between financial intermediation and economic growth.

2.2.2 The Global Perspective

According to the European Central Bank, the impact of systemic risk in the economy depends heavily on the collective behaviour of financial institutions and how they are connected as well as the interaction between financial markets and the macroeconomic environment. Schmitz and Silva (2020) investigated the connection between financial intermediation and economic growth with a focus on human capital development using data based on a period of exceptional growth in the credit market in Brazil, from 2004 to 2016. Also, the study investigated the correlation between credit and economic growth based on the type of a bank property, credit, object of the loan and borrower type. The authors found that there is a positive relationship between finance and growth. This was more pronounced in regions with an intermediate level of human capital development. The results of the study by Schmitz and Silva (2020) ascertained that progress loses momentum after human capital development reaches a yet higher given level.

Moreover, Lee (2005) investigated the relationship between financial intermediation and economic performance in Canada based on the data at two intervals. Firstly, the period between 1870 and1926 and secondly, from 1948 to 2002, using Granger causality tests and time series

econometrics. The author found that, for data between 1870 and 1926, only the monetary base variable is significant for growth (Lee, J. (March 2005). Another study, in Pakistan, by Lee et al (2015) analysed the influence of financial intermediation on micro and macro growth in emerging economy. The results revealed that several proxies of the financial intermediation functions moderate the impact on economic growth across different industries. It emerged in the study that firms with a higher level of financial inclusion, such as access to financial services, positively influence firm growth. The evidence concludes that the linkage between financial intermediation and economic growth is present as a significant interaction in the emerging economy of Pakistan. These findings from different countries highlight differences in how financial intermediation mediates economic growth. Thus, there are variations on the impact of financial intermediation functions.

2.2.3 The Sub-Saharan Africa

In the sub-Saharan Africa, evidence exists that supports the role of financial mediation in economic growth. Recently, Yeboah (2020) researched the long-run and short-run relationship between domestic bank credit to the private sector as measures for financial intermediation and per capita GDP in Ghana. This study followed the Autoregressive Distributed Lag Model (ARDL) bounds testing the approach to co-integration based on the data from 1993-2018. Results indicate that private sector credit, as well as factors such as the lending interest rates and rent for natural resource used in the model, play a critical role in explaining the differences in the long run per capita GDP in Ghana.

Makwe, Anyanwaokoro and Ijeoma, (2020) investigated the financial intermediation and economic growth linkage in the Nigerian Economy in the Insurance sector. The data covered the period from 1981 to 2018. Like the study in Ghana, annual time series from ARDL was used for the analyses (Yeboah, 2020). It emerged that the price of insurance premiums and claims significantly affect the economic growth rate. In the same vein, another study in Nigeria studied causal relationship between bank credit and economic growth based on time series data for the period 1993-2017. Results found no causal relationship between bank credit and the growth of the economy. These indicates that there are variations in the roles of the financial mediators across different countries in the region. These differences also vary across industries and periods in the Sub-Saharan Africa similarly indicating similar trends globally. This

highlights that the role of financial mediation is likely to be different also in South Africa depending on the industry, sector, period, and measures used to estimate financial intermediators and economic growth.

2.3 South Africa's Financial System

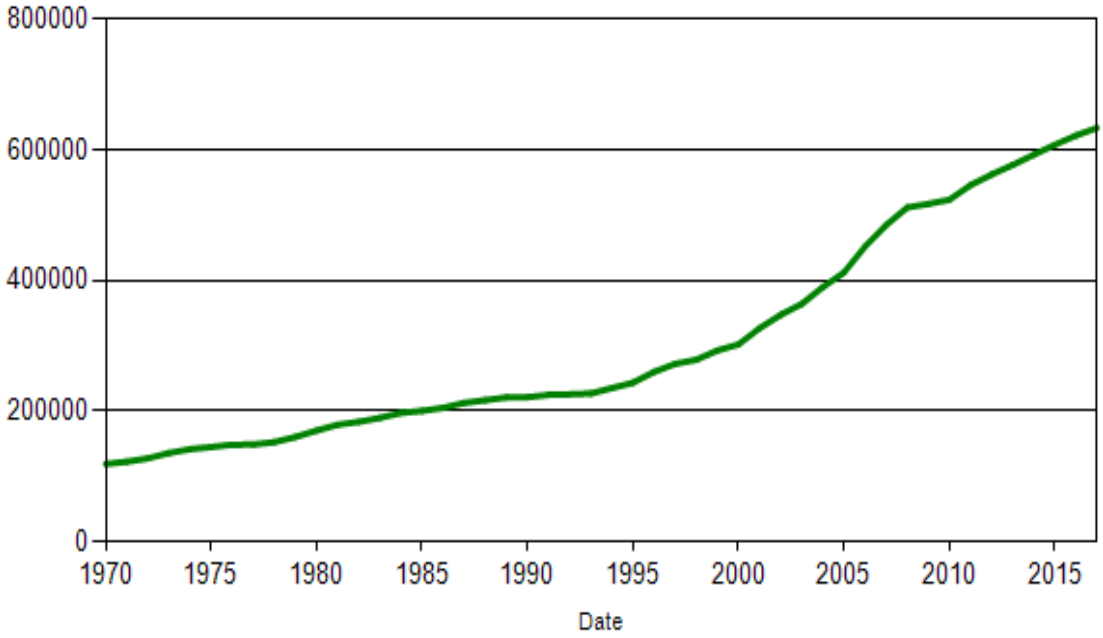
South Africa's financial system is considered the most developed and highly sophisticated by the standards of emerging markets' economies in the Sub-Sharan Africa (Odhiambo, 2011). It has two broad markets, namely the money market and the bond market. The money market is responsible for issuing and trading investments. The instruments of the money market of South Africa include the Treasury bills, government bonds, negotiable certificates of deposit and repurchase agreements. The bond market on the other hand, issues trade in long-term securities. Prior to 1975, the South African financial system experienced a series of financial suppression, with fixed interest rates as determined by the central bank (Ndako, 2008). However, by 1980, the SARB allowed the market forces to determine the interest rates. As such, the Direct Control mechanism on the deposit interest rate previously used by the banks was abolished. Late in 1985, SARB introduced the banking supervision department which aimed at supervising the activities of South Africa's banking institutions internationally. Furthermore, the Financial Services Board was established in 1990 in further pursuit of reforming the financial sector (Ndako, 2008).

The Financial Services Board is an independent institution that is responsible for supervising the non-banking financial institutions, including the mutual banks. In 1991, four of the major leading financial institutions, Allied Bank, United Bank, Volksak and Sage Bank came together to form the biggest banking group in South Africa, called the Amalgamated Bank of South Africa (ABSA). The National payment Act of 1998 was formed to align South Africa's financial settlement with the international practice on settlement system and systematic risk management procedures.

Butterworth and Malherbe (1999) stated that South Africa's financial system consists of the banking sector, capital markets, as well as several other nonbank institutions, which include insurance companies, pension funds, and collective investment schemes. The systems contain a smaller number of large corporations that cover many intermediary activities, including

banking, insurance as well as asset management. The role of the sector on growth of the country's GDP increases from year to year and figure 2.2 below contains the information on the gross value added at basic prices of finance, insurance, real estate, and business services.

Figure 2.2: *Gross value added at basic prices of finance, insurance, real estate and business services.*

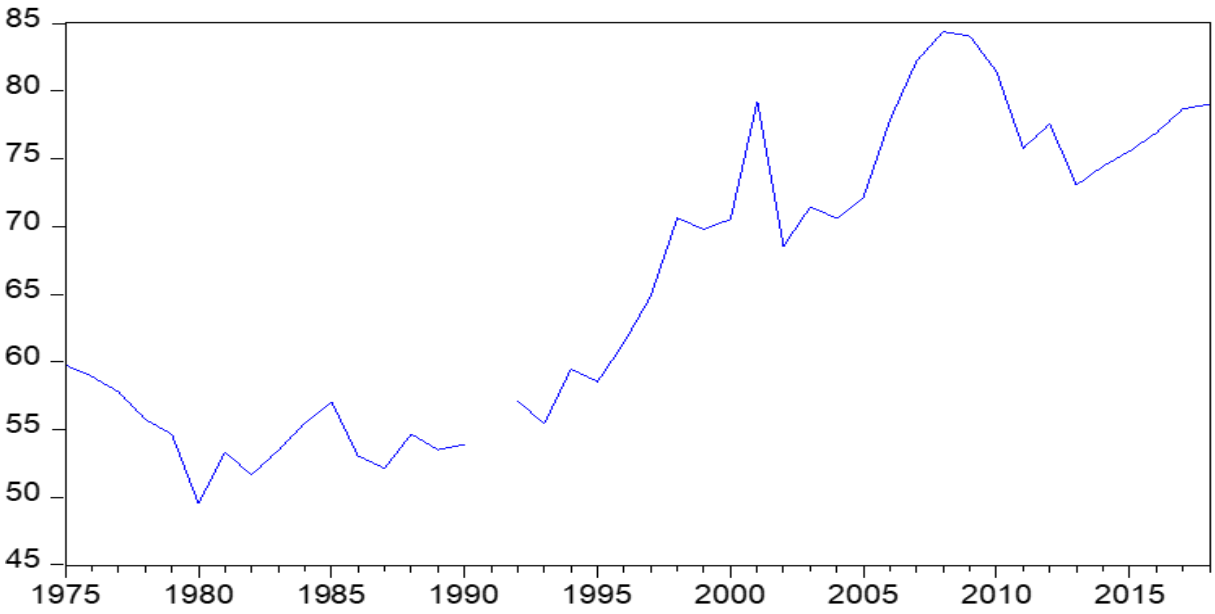


(Source: https://www.resbank.co.za)

The y-axis represents the level of GDP in millions and the x-axis shows the years from 1970 to 2017. The diagram shows a slow growth in the level of gross value added at basic prices of the financial sector, between 1970 and 2000, and begins to grow rapidly after 2000.

The growth of the of the financial sector, has contributed rapidly to the growth on the economy in many ways than one and this contribution continues to increase. Figure 2.3 shows the contribution of the financial sector to GDP between 1970 to 2015 in South Africa and shows an increase in domestic credit provided by the financial sector to GDP, significantly after 2001.

Figure 2.3: *Domestic Credit by the financial sector to GDP*



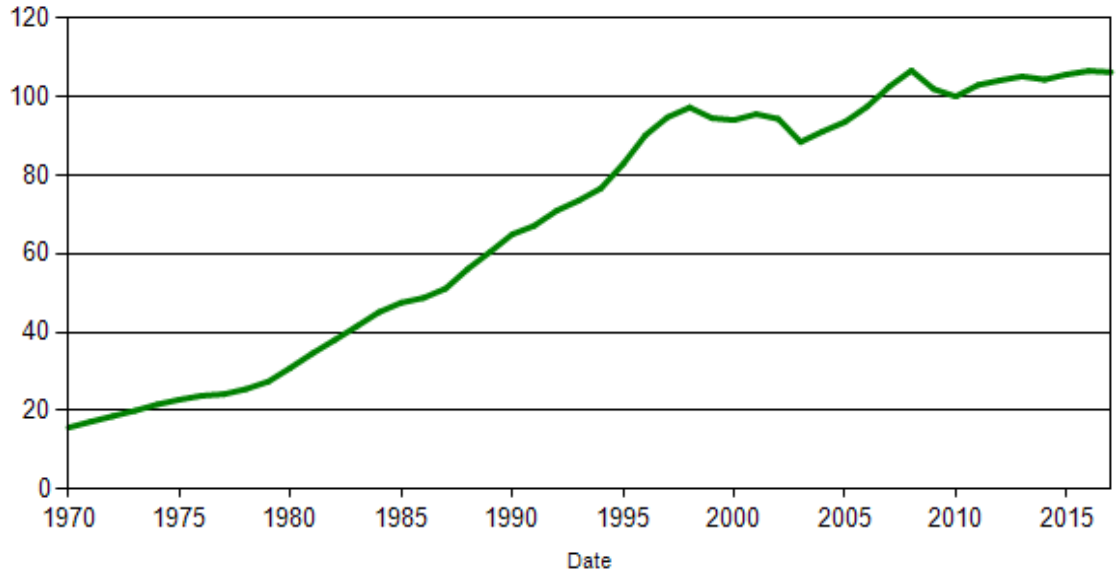
(Source: www.data.worldbank.org)

2.3.1 The Banking Sector

According to the Banking Association of South Africa, (BASA, 2014), South Africa has one of the most well-regulated and well-developed banking sectors which can be favourably compared with those from developed countries. The South African banking sector has attracted several international banks to enter the country and acquire shares in major banks within the country despite its past changes and instabilities. Such banks include Barclays which acquired a major share in ABSA, as well as Industrial and Commercial Bank of China which bought a major stake in Standard Bank (de Lange, 2013). In 2014, BASA reported that the South African banking sector was ranked number 3 of 148 countries in the 2013/14 World Economic Forum Global Competitiveness Survey.

The Banking Association of South Africa (2017) further asserts that banks play a crucial role in ensuring job creation. It does this by enabling the entrepreneurs to achieve their goals through financing projects from small businesses to large infrastructure projects. The Figure 2.4 shows the employment rate for different years in the financial institutions in South Africa from 1970 to 2017.

Figure 2.4: *Employment in the private sector: Financial institutions*



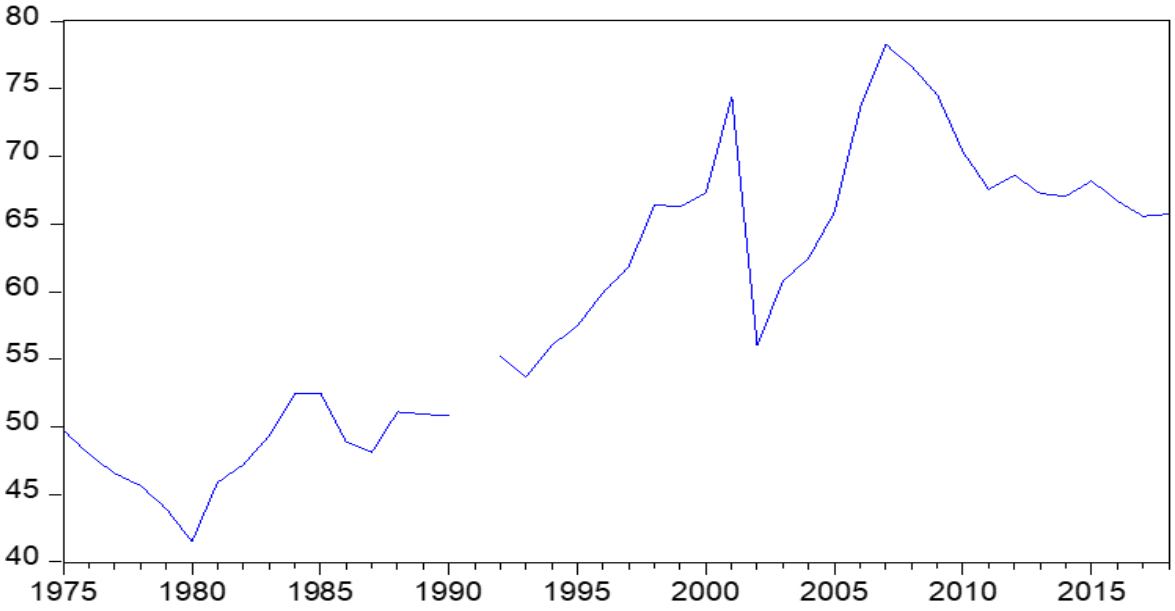
(Source: https//: www.resbank.co.za)

2.3.3 The contribution of the Banking Sector to Economic Growth

The banking sector of South Africa is a major contributor to the country's financial sector and the overall economic growth. The contribution of the banking sector to economic growth is measured using the domestic credit extended to the private as a percentage of GDP. This has seen growth over the years, despite the sector's instability. The Figure 2.5 shows the overall growth in the domestic credit by banks to the private sector as a percentage of GDP.

The figure shows the contributions of the domestic credit to the private sector by banks to economic growth from 1970 to 2017. The period that recorded most growth is from 2001 to 2009 which recorded the highest growth. The banking sector of South Africa consists of 37 banks which are licensed by the South African Reserve Bank. Commercial banks are the largest part of the financial sector and their assets represent about 120 percent of GDP. Furthermore, according to Ndako (2008) South Africa's four biggest banks, including the Amalgamated Banks of South Africa (ABSA), First Rand Bank, Ned Bank, and Standard Bank have about 85% of the total assets and have branches internationally in countries like Botswana, Mozambique, Namibia, and Zimbabwe.

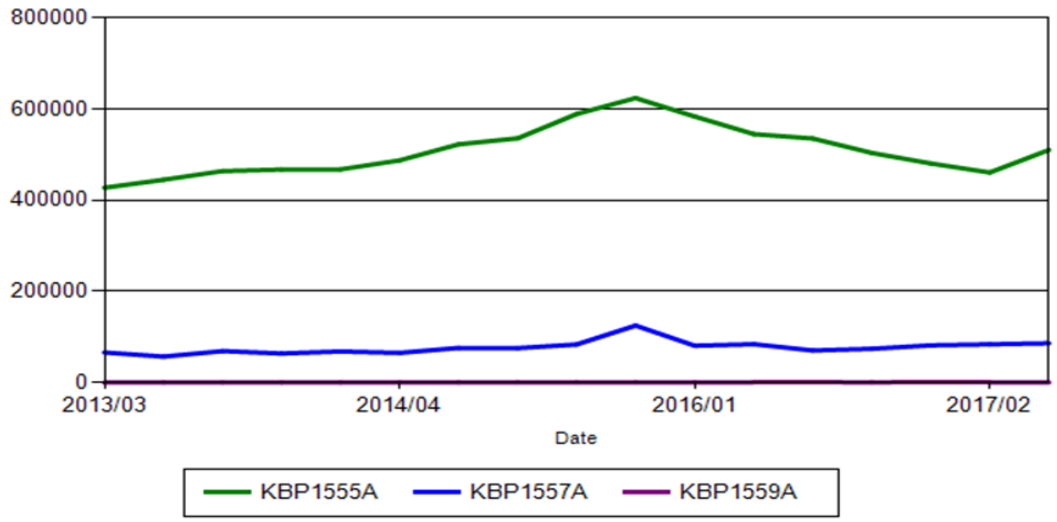
Figure 2.5: *Domestic credit to the private sector by banks as a percentage of GDP*



(Source: www.data.worldbank.org)

Figure 2.6 shows the total assets of banks categorised in domestic banks, foreign branches, and subsidiaries with the largest assets from the domestic banks. The second largest assets are from the foreign banks and the subsidiaries having less assets, measured quarterly in millions of Rands from 2013/03 to 2017/03.

Figure 2.6: *Locational banking statistics: All sectors: Total assets: Total banks by domestic banks, foreign branches and subsidiaries*



(Source: https//: www.resbank.co.za)

The major banks are ranked according to their total assets measured in U.S dollars and the Standard Bank Group was in first place in 2019 with assets over $b156 followed by FirstRand Ltd with $b118.167 total assets. The table below summarises the major banks and their total asset measured in USD in 2019.

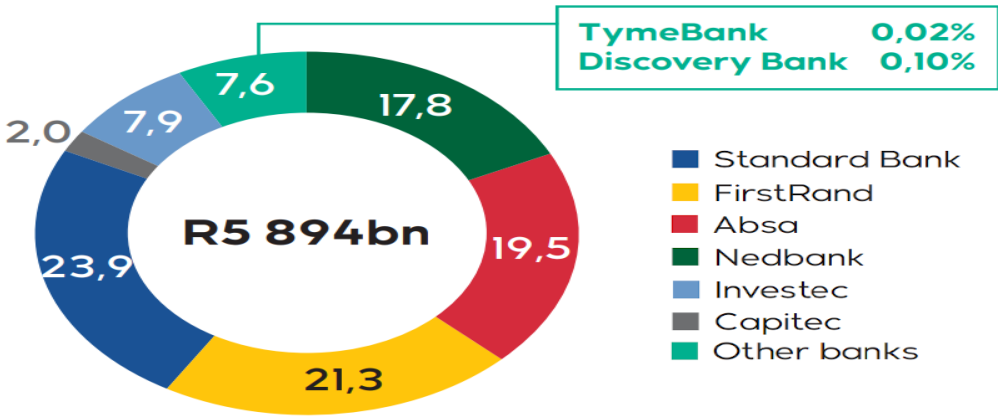
Table 2.1: Top five banks and their assets in South Africa

Rank	**Bank**	**Total Assets, U.S.D $b**	**Balance sheet**
1	Standard Bank Group	156,482	06/30/2019
2	FirstRand Ltd	118,167	06/30/2019
3	Absa Group Ltd	97,468	06/30/2019
4	Nedbank Group Ltd	77,991	06/30/2019
5	Investec Ltd	76,797	06/30/2019

(Source: www.advratings.com)

The chart below shows the biggest banks according to their market share in South Africa. Standard Bank group was leading by 23,9% followed by FirstRand at 21,3%. The banking sector held a total of R5894 billion worth of the market share. This indicated growth in the banking sector over the years and confirms the importance of banking in the overall country's economic growth.

***Figure 2.7**: The major banks and their market share*



(Source: www.businesstech.co.za)

2.3.4 The Capital/Stock Market

Odhiambo (2011) iterates that the capital market of South Africa is well developed and liquid. The capital market is mostly controlled by the Johannesburg Stock Exchange (JSE). It was founded in 1887 and has been a member of the Federation of International Stock Exchanges since 1963. The JSE is the largest stock exchange in Africa and has developed modernised active markets such as financial derivatives and agricultural products markets. The South African Features Exchange (SAFEX), introduced in 1990, consists of two divisions. The first caters for equity and interest rate futures as well as options markets, whilst the second division are the agricultural markets responsible for soft commodities futures as well as options on maize, sunflower, and wheat (Ndako, 2008).

Furthermore, Ndako (2008) stated that the JSE also has bond markets that are active and headed by the Bonds Exchange of South Africa (BESA), registered formally in 1996 as an exchange, and currently handling bond automated trading settlements. According to Odhiambo (2008), the Bond Exchange of South Africa (BESA) was licensed under the Financial Markets Control Act, 1989 (Act No. 55 of 1989), and its functions include the listing, trading as well as the settlement of interest on loan stock or debt securities. In 1996/97, after the BESA, it was registered, with more than 430,000 stocks with a nominal value of USD $704 billion that were

exchanged, and by 2001, the bond exchange received an annual liquidity 38 times more than the market capitalisation, making it one of the most liquid emerging bond markets in the world.

The JSE has been performing very well and its market capitalization is one of the biggest in the emerging markets. In addition to this, the JSE is now a member of the world Federation of exchanges. This also resulted in South Africa being included in the major investible global stock market indexes. More specifically, Odhiambo (2011) reveals that more than four million futures contracts, valued at USD $62 billion, were traded in 1996. That resulted in the SAFEX changing from being the 22nd to the 18th biggest capacity exchange in the world in 1999. Furthermore, South African securities are currently traded in Johannesburg, London, New York, Frankfurt, and Zurich simultaneously (Odhiambo, 2011). In addition, Butterworth and Malherbe (1999) reiterated that the JSE's market capitalisation summed up to R1, 360 billion at the end of June 1999, whilst the liquidity measured by the fraction of annual trade over market capitalisation, in 1998 was at 27% in 1998 from 5% in 1992. In that period, the new capital annually raised increased to R89.5 billion.

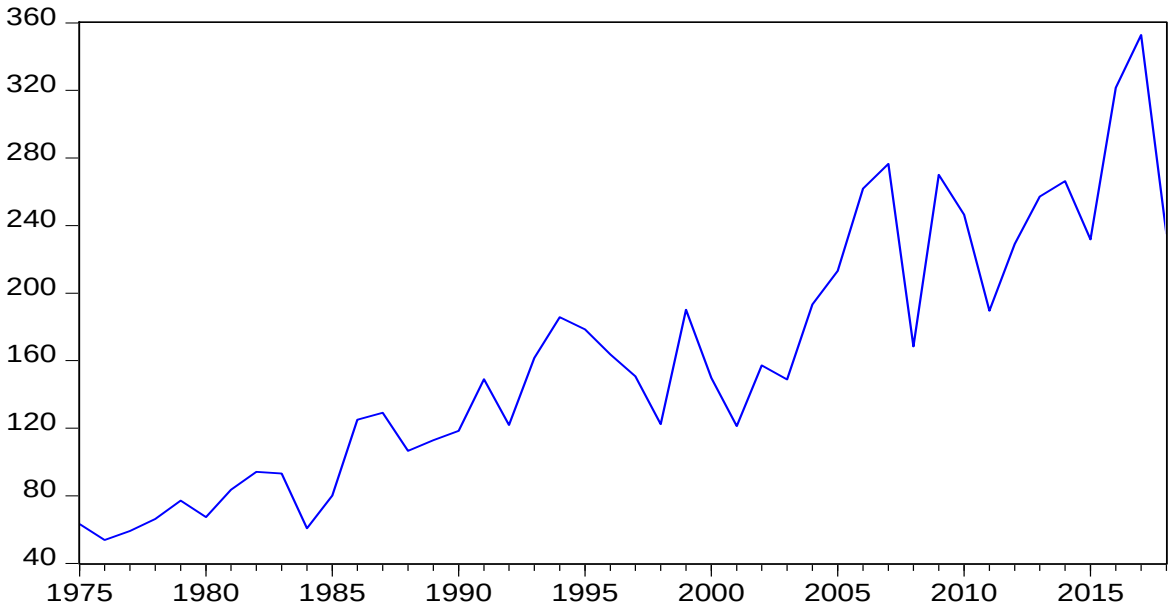
Odhiambo (2011) further found that the securities market of South Africa was in strict regulation for more than a century by the JSE, which was using the strict or 'single-capacity' policy. Under this policy, member firms were only allowed to be either brokers or principals in securities' trading. However, they could not do both functions simultaneously. Also, only South African firms were allowed membership with limited liability. This changed amid the introduction of new structures at the JSE in November 1995. As result, there was a 'Big Bang' in 1996. By 2003, the number of companies listed in the JSE increased to 472 and market capitalisation was estimated at USD $182.6 billion. On average, the value traded monthly was pegged at US $6,399 million.

2.3.5 Contribution of the Stock Market on Economic Growth

According to Tinavapi (2017), stock markets are one of the essential parts of a financial system, and they enable firms to raise capital by listing their shares for purchase. Stock markets also create an environment wherein shares can be traded. The impact of the stock market on South African economy has been increasing over the years. Stock markets contribute to economic growth by allowing firms to trade their ownership, which enables investors to diversify away the unsystematic risks, thereby maximising their risk returns. The market capitalisation is used

to measure the growth of the stock market. The figure below shows the market capitalisation of domestic listed companies as a percentage of GDP.

Figure 2.8: *Market Capitalisation of domestic listed companies as a percentage of GDP*



(Source: www.data.worldbank.org)

From the figure above, there is an increase in the market capitalisation, especially after 2000. According to Odhiambo (2011), the amount of the market capitalisation of the JSE increased to USD $579.1 billion in September 2006 and, currently, the JSE is the 16th biggest stock exchange in the world. The table below is a summary of the market capitalisation in the JSE from 2010 to 2017.

Table 2.2: Market Capitalisation of the JSE

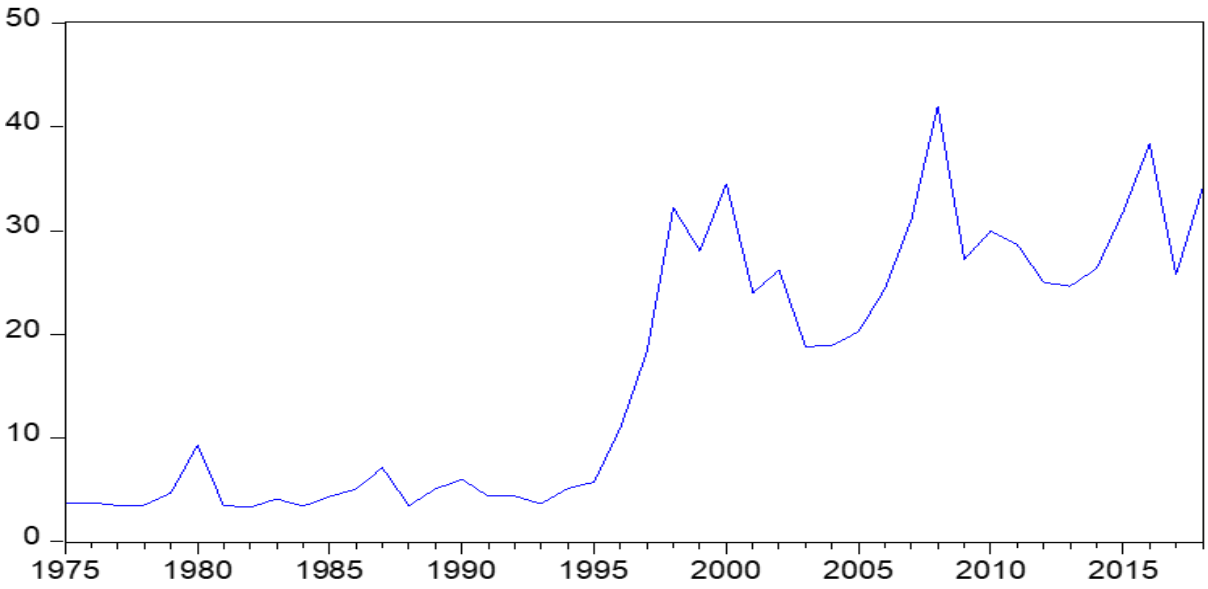
Year	JSE Market Capitalisation at month end (Shares) in Millions R	JSE Market Capitalisation at month end (Bonds) in Millions R
2010	6698700	1269593
2011	6908507	1485795
2012	8383564	1862894
2013	10626244	1968195
2014	11505020	2204289
2015	11727560	2258674
2016	13580619	2512148
2017	15461400	2726590

(Source: https://www.banking.org.za).

The value of domestic shares traded divided market capitalisation is another measure used to measure the contribution of the stock markets to economic growth. Figure 2.9 shows the fluctuations in the value of domestic shares traded divided by market capitalisation.

The Figure 2.9 shows the domestic shares traded over the years from 1975 to 2017. The data shows an increase in the number of shares traded, especially after 1995. There has been, however, some fluctuations on the traded stock over the years.

Figure 2.9: *Value of domestic shares traded divided by market capitalisation*



(Source: www.data.worldbank.org)

2.3.6 The Nonbank Institutions

The nonbank institutions consist of insurance companies, pension funds and the unit trust entities. According to Butterworth and Malherbe (1999), the insurance industry of South Africa is well advanced, and its assets are extremely high, relative to GDP. The industry's role of risk pooling is efficient. These companies have dominated the long-term savings in South Africa for a long time, although its domination is now decreasing. In addition, the industry also serves as a large employer of the labour force and its employment increased to 80 000 by 1990. The insurance industry's total market capitalisation amounts to 10% or up to R 131 billion. The insurance sector can be divided into two sections of Acts, which are the Short-Term Insurance Act No. 53 of 1998 and the Long-Term Insurance Act No 52 of 1998.

Hawkins (2004) found that there are four companies dominating the long-term insurance industry, including Old Mutual, Sanlam, Momentum and Liberty Group. These made up to 35, 22, 11 and 10% of assets in the long-term insurance industry respectively, by 2001. The fifth largest company is Investment Solution, which has 4.3% of the market share. There were 57 long-term insurance firms in total registered with the Financial Services Board (FSB) in June 1998. The table below contains the total market share of the top six long-terms insurance companies in 2016 and 2017.

Table 2.3: Top six long-term insurers in South Africa in 2016 and 2017

Company	**Market share in 2016 (%)**	**Market share in 2017 (%)**
Metropolitan	81.4	86.2
Old Mutual	78.0	80.3
Liberty	74.1	78.1
Sanlam	74.9	77.5
Momentum	79.3	77.5
Discovery	75.0	74.0

*Source: Business Tech (*https://businesstech.co.za*)*

The short-term industry however, according to Hawkins (2004), was dominated by two large firms, Mutual and Federal and Santam which both made up to 32% of the market share by 2001. There are, however, other large firms including Hollard and Guardian as well as SASRIA in the short-term industry. More specifically, the table below shows the market share of top five short-term insurers in 2015.

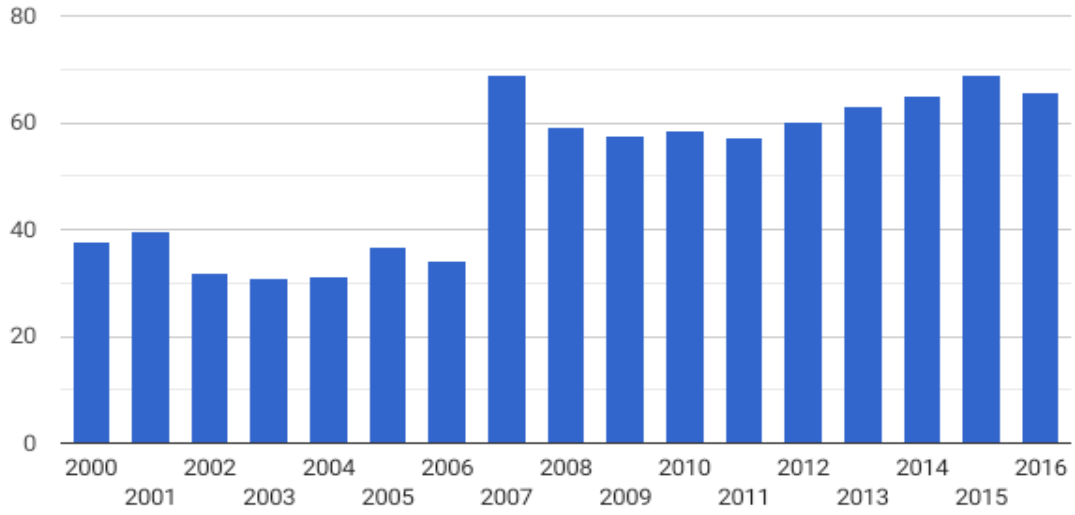
Table 2.4: Top five short-term insurers in 2015

Company	**Market share in 2015 (%)**
Santam	25
Mutual and federal	11
Hollard	9
Outsurance	8
Telesure	7

*Source: Business Tech (*https://businesstech.co.za*)*

The short-term insurance companies registered are 81 in total, four of which offer both the services of long-terms and short-term insurance. Furthermore, the short-term insurance industry is divided into the direct market as well as reinsurance wherein the direct insurance is the largest. The products of the direct market are sold to the public whilst the reinsurance companies sell their products to each other. The figure below shows the total assets of insurance companies in South Africa from 2000 to 2016.

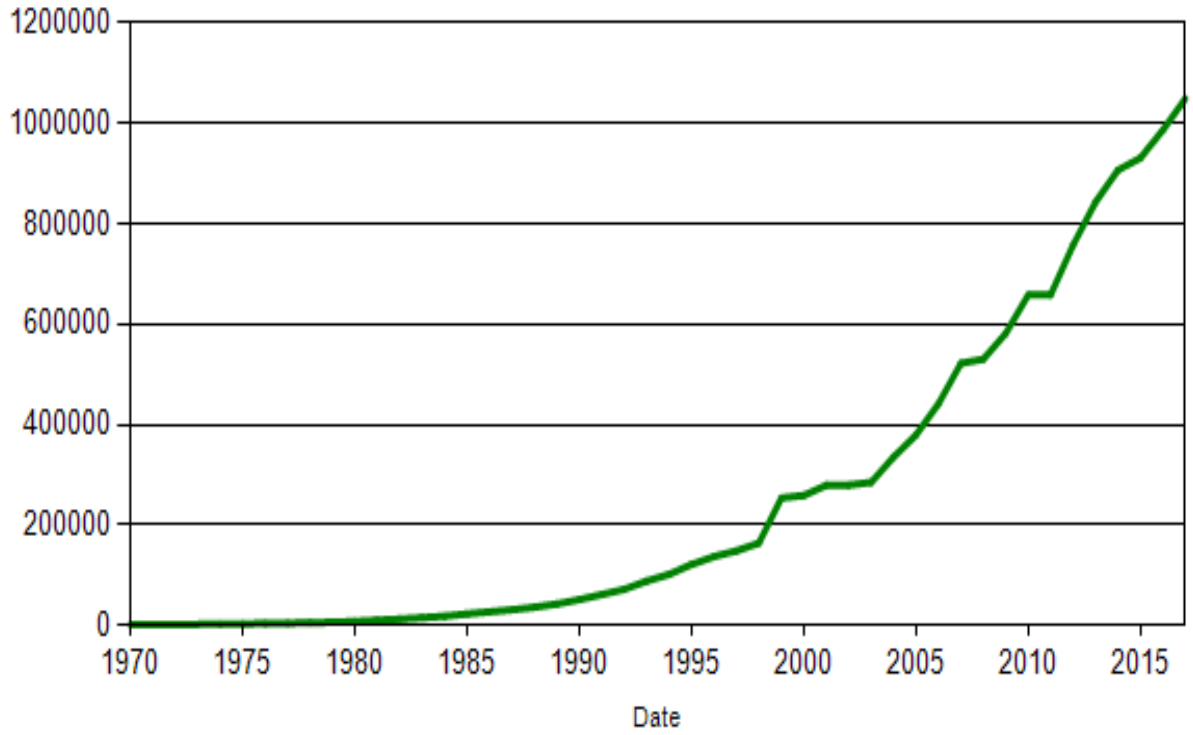
Figure 2.10: *Total assets of insurance companies in South Africa*



(Source: www.theglobaleconomy.com)

According to Butterworth and Malherbe (1999), pension funds are the form of long-term savings dominating in South Africa with assets of up to R543 billion by the end of 1997. These assets increased by 9% per year from 1992 and membership also increased by 2% per year in the 1990s, reaching over 10 million at the end of 1998. The three categories of the pension funds include self-administered pension funds controlled by independent administrators, life insurance pension fund products which are insurance policies offered by a registered long-term insurer as well as official pension funds controlled by different local authorities, government departments as well as the parastatals. There were 172 pension fund administrators at the end of 1997, including asset management companies, long-term insurance companies as well as private professional administration companies with self-administered funds getting the highest growth rate of up to 23% per year. In addition to this, almost half of the assets of the pension funds are under self-administered pension funds which increased their market share by 7% from 1992. The figure below contains a summary of the total assets of self-administered pension provident funds from 1970 to 2017 measured in millions of rands.

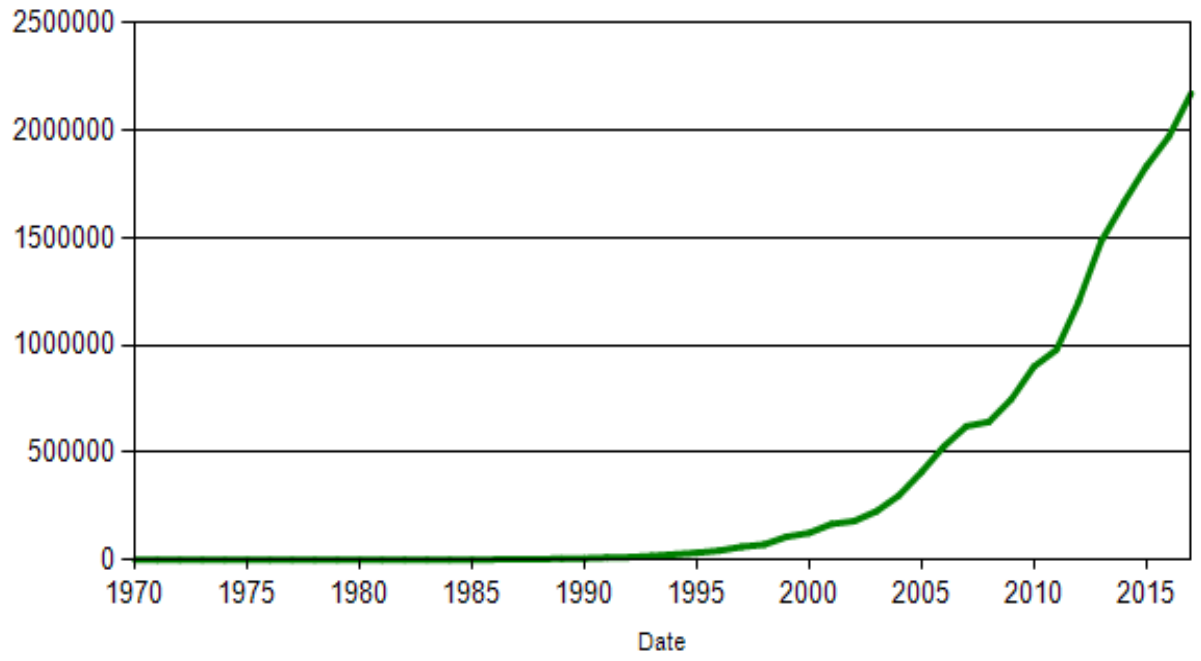
Figure 2.10: *Total assets of private self-administered pension and provident funds*



(Source: https//: www.resbank.co.za)

Lastly, the unit trust industry had about 204 funds managed by 28 companies at the end of 1998, and the total assets this industry summed up to R90 billion by the end of 1998. According to Butterworth and Malherbe (1999), the five biggest assets management firms own about 61% of the assets in the unit trust industry. Moreover, the assets of the unit trust took about 3.4% of total JSE market capitalisation, which increased from 1.8% in 1994. The figure below shows the market value of net assets of all unit trusts funds from 1970 to 2017, measured in millions of rands.

Figure 2.11: *Unit trusts: All funds-market value of net assets*



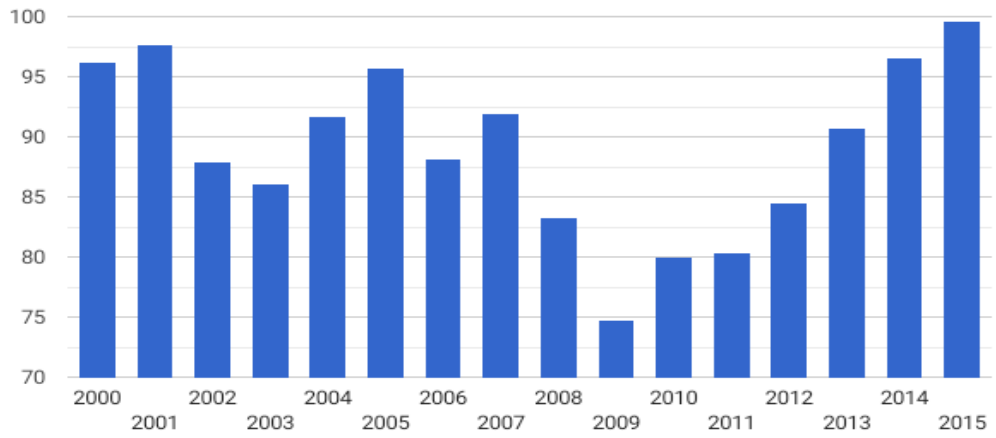
(Source: https//: www.resbank.co.za)

2.3.7 Contribution of the Non-Bank Financial Institutions to Economic growth

Insurance companies, pension funds schemes and unit trusts also contribute massively to the economy of the country. Individually, these players have contributed largely to the financial development growth, thereby enhancing economic growth in the country. In addition, according to Moleko (2019), pension assets have shown growth in the financial markets and the overall economy of South Africa over the years.

According to Sibindi and Godi (2014), the insurance sector contributes to economic growth through its mechanism of risk transfer and the intermediation role it plays in the economy. The figure below shows the total assets as a percentage of GDP of the pension funds from 2000 to 2015.

Figure 2.12: *Pension funds' assets to GDP*



(Source: www.theglobaleconomy.com)

2.4 Growth Facilitated by Financial System

Scholars have observed a link between the expansion of the financial sector and the real sector. This has led to the growth and prosperity of the economy. Studies by Schumpeter's theoretical framework (1911), the work of Hicks (1969) and the evidence by Miller (1986) provides a cornerstone in understanding finance as a structural block for successful economic growth at the micro and macro levels. There are several studies carried out to date, that measure different aspects' relationship between the financial intermediaries and economic growth. Vazakidis and Adamopoulos (2009) discussed the role of effective capital mobilisation for industrial growth. About a decade ago, Rengin and Kara (2011) studied the long and short effects of financial intermediation on economic growth. The literature thus provides a significant theoretical overview of the role of financial intermediaries in the financial system, facilitating both individual investors and credit units.

2.5 Qualitative Asset Transformation facilitated by Financial Intermediaries.

The financial intermediaries facilitate the Qualitative Asset Transformation. It can be observed in five main dimensions:

I. Liquidity Intermediation – converting assets into liquidated funds to meet liquidity requirements of savers and borrowers.

II. Maturity Intermediation – providing desired maturity instruments i.e., short, and long maturities to surplus and deficit units.
III. Denomination Intermediation – offering products according to the denomination requested for by both savers and the borrowers.
IV. Diversification Intermediation – developing a diversified portfolio of investments and reducing exposure to financial risks.
V. Information Intermediation – removing informational asymmetries providing informational advantage avoiding problems of adverse selection and moral hazard.

The research takes into consideration the role of financial intermediaries over and above the pooling and savings function for efficient resource allocation and identifies the presence of financial intermediaries as vehicles for driving growth. For the firm level, the specified functions are identified in literature. These are also the major reasons for the dominance of intermediated financing over direct financing. These attributed functions performed by intermediaries are identified below, considering different theories of financial intermediation.

a) Transaction Cost Reduction (Benston and Smith 1976)
b) Liquidity Assurance (Diamond and Dybvig 1983)
c) Information Sharing Coalitions (Leland and Pyle 1977)
d) Delegated Monitoring (Diamond 1984, 1996)

Lee et al (2015) also emphasize the company's access to financial services for growth. This study considers the above functions and attempts to measure the quantitative effect of intermediate funding on a fixed level on growth. For the industry level, the study considers the above intermediary functions, as well as making a relative comparison of various industries to observe the industrial growth. At the third level, the macroeconomic variables used in literature are considered to study the impact of macroeconomic intermediate variables on macro-level growth. The study is therefore structured as a three-part study, ie firm level, industry level and economic level in Pakistan.

According to conventional mediation theory, transaction costs, asymmetric information and agency problems between savers and entrepreneurs give rise to financial intermediaries. Financial intermediaries can reduce the cost of financial operations in terms of time and money,

thanks to economies of scale, scope, and expertise (Benston and Smith, 1976). But the main concern of mediation is the treatment of asymmetric information. Asymmetric information before and after causes problems with the unfavourable selection and poses a moral danger.

The intervention of financial intermediaries makes it possible to indicate information at a lower cost than that of an individual who tends to provide only the information (Leland and Pyle, 1977). Intermediaries can produce information by taking advantage of economies of scale (Ramakrishman and Thakor, 1984) and guarantee its credibility (Campell and Kracaw, 1980). Furthermore, a financial intermediary provides better monitoring (Diamond, 1984; Williamson, 1986). In addition, banks can solve the shortcomings in the market in the event of shocks in consumer consumption by producing liquidity (Diamond and Dybvig, 1993).

2.5 The Rise of Crypto Currency

The movement of money has evolved over time and the increasing digitalization of society led to the development of electronic money. Crypto currencies, also known as crypto coins, are increasingly getting more popular (Krafft, Penna and Pentland, 2018). The prices and market share of these crypto currencies increases with assets worth billions of US dollars being traded in this market every day. According to Thakur and Banik (2018) crypto currency has become a global term, but is still not understood by most people, banks, business and governments. According to the IFWG (2018), several central banks have been reluctant to refer to this crypto phenomenon as a currency to avoid giving it as some form of unwarranted legitimacy as a legal tender. Hence, this phenomenon is referred to as crypto assets on the IFWG paper. Cocco, Consas and Marchesi (2014) describe Crypto currency as a digital currency implemented with the principles of cryptography. It is used to validate transactions and generate new currency. Crypto currency also uses cryptography to make it difficult to counterfeit, states Thakur and Banik (2018). Unlike the traditional financial intermediaries, crypto currencies are not issued by any central authority as such, it is independent of government interference.

Mothokoa (2017) further described Crypto currencies as the decentralised convertible currencies that use a technology system called block chain to process the peer-to-peer electronic payments. Block chain, on the other hand, is described as a master ledger that records and stores all the previously done transactions and activities, thereby validating the ownership

of all crypto currency at any given time. More specifically, Crypto currency is a medium of exchange that uses cryptographic techniques to protect transactions and manage the additional units of the currency created. The South African Reserve Bank SARB (2014) referred to the crypto currency phenomenon as virtual currency and defined it as a digital representation of value that can be traded digitally and act as a medium of exchange, a store of and a unit of account, with no legal tender status.

According to the IFWG (2018), the crypto phenomenon is rather difficult to classify, as some have classified it as a unit of exchange whilst others have rejected it as such. There are some jurisdictions that have classified it as a unit of account. The South African jurisdiction has, however, been looking at the functioning and the economic activities of the crypto currencies and have classified their activities to be like those of currencies, securities, and commodities.

Thakur and Banik (2018), iterated that, digital currency existed before crypto currency, but it is different from crypto currency because digital currency is centralised, and crypto currency is not. The first crypto-currency was Bitcoin which was established in 2009 by Sotoshi Nakamoto and is described a as peer-to-peer type of e-money allowing digital payments and exchanges between the participants with no intervention from a central bank or any other form of financial institution using the Block chain technology.

According to Thakur and Banik (2018), the value of Bitcoin, for example, was way too less in the past as people disregarded its importance. However, crypto currencies have become the most trending topic around the world, although people still have little information on their nature. The figure below shows the emergence and the growth of Bitcoin over the years from 2014.

Figure 2.13: *Bitcoin chart between 2014-2019*

(Source: http://coinmarketcap.com)

From the chart above, the trade of Bitcoin was significantly lower between the years 2014 to 2016 and begins to rise after 2017. The other crypto currencies that followed Bitcoin include Ethereum, launched in January 2014 by Vitalik Buterin and is defined as an open programme giving anyone access to build and use a decentralised application on block chain technology. Ripple was developed in 2013 by Jed McCaleb and his friends and it is a single decentralised network of banks and other payment providers that uses the distributed financial technology of Ripple which offers clearing, settlement, and messaging of financial transactions. According to Mothokoa (2017), Ripple also gives a platform where the participants can transfer and make payments globally using the block chain. Litecoin was developed in 2011 by Charles Lee and is the fourth largest crypto currency in terms of its market share, which is approximately $3,3 billion selling at $63 per coin. The rapid growth and development of technology, innovation as well as the great use of internet has increased the development of crypto currency. The table below summarises the most common crypto currencies and their market share in 2019.

Table 2.5: List of crypto currencies with market capitalisation over 1 billion USD

#	Name	Market Cap	Price	Volume (24h)	Circulating supply
1	Bitcoin	$184,544,558,521	$10,311.21	$17,873,581,752	17,897,462 BTC
2	Ethereum	$20,516,368,996	$190.89	$6,874,655,939	107,475,882 ETH
3	XRP	$11,653,569,398	$0.271585	$1,128,653,524	42,909,539,227 XRP
4	Bitcoin cash	$5,591,057,154	$311.17	$1,340,301,589	17,967,738 BCH
5	Litecoin	$4,689,355,041	$74.30	$2,781,009,887	63,114,962 LTC
6	Binance coin	$4,087,419,033	$26.28	$175,001,868	155,536,713 BNB
7	Tether	$4,057,931,416	$1.00	$19,899,745,246	4,049,107,372 USDT
8	EOS	$3,368,394,232	$3.63	$1,597,861,289	929,024,131 EOS
9	Bitcoin SV	$2,398,713,217	$134.34	$295,102,323	17,854,986 BSV
10	Monero	$1,402,906,280	$81.68	$111,521,420	17,174,622 XMR
11	Stellar	$1,326,874,823	$0.067573	$122,814,593	19,636,142,641 XLM
12	Cardano	$1,285,561,035	$0.049584	$105,303,516	25,927,070,538 ADA
13	UNUS SED LEO	$1,199,562,655	$1.20	$6,782,406	999,498,893 LEO
14	TRON	$1,181,766,594	$0.017722	$508,503,418	66,682,072,191 TRX

(Source: Giudici, Milne and Vinogradov, 2020)

Bitcoin is the leading crypto currency with the highest return, followed by Ethereum. These are the main crypto currencies whose market capitalisation exceeded 1 billion USD in 2019. According to IFWG (2018), crypto currencies are purchased for several reasons, including medium of exchange, as speculative investment, for facilitating transactions and for allowing access to other services. They can also be bought for selling or trading. These crypto currencies can be bought in three different ways, which include a crypto trading platform, crypto currency vending machines or through a bilateral transaction with other crypto currency holders. The buyer may require a wallet digitally to buy the crypto assets which is attainable through software platforms or given by the digital service provider or the crypto asset trading platform.

The crypto assets may also be acquired through the primary sourcing of crypto assets using mining pools that use expensive and specialised computing equipment. Reijers and Coeckelbergh (2016), explained that the miners are the agents responsible for controlling the computational nodes that validate the transactions within the network. Whenever a transaction takes place anywhere in the world, the miners validate it and then add it to the public block

chain which then blocks the transferred digital object from being doubly spent or transacted to different addresses at the same time. According to IFWG (2018), the crypto currency mining is done by big companies or mining experts that own expensive and specialised equipment.

Krafft, Penna and Pentland (2018) state that the rapid rise in the use of crypto currency as an alternative currency does, however, come with threats, evident from the collapse of Mt. Gox in 2014 and the hack of Etherium in 2016. One of the features of crypto currency is that there is no level of control on its functioning, more specifically, according to Mothokoa (2017), there is no control on how the networks are created. Modifications and building of these networks only require a machine connected to the internet.

IFWG (2018) further stated that one of the potential risks associated with the use of crypto currencies is that, as the demand for the crypto currency increases, the demand for normal currency will decrease which may in turn result in a creation of a fragmented monetary system. The most pressing risks of concern associated with the rise of crypto currencies, is however, those pertaining to the lack of consumer protection, money laundering and terrorist financing, circumvention of exchange controls and the increase of undetected illegal financial flows, inaccurate balance of payment data, illegal purchases, tax evasion, and the lack of market integrity.

According to Krafft, Penna and Pentland (2018), the traders in these markets trade with expectations of an increase in the value of one of the crypto currencies. This often leads to volatility in such a market. Moreover, according to Mothokoa (2017), the rise of crypto currency may also result in financial instability relative to the real economy and through the threat posed by crypto currencies on the functioning of payment systems. Since Crypto currencies are creating their services separate from the supervision and regulation, this may evoke new risks. Their development also has a significant impact on the volume of financial transactions, which could lead to financial instability and volatility. Furthermore, according to Barros (2019), other disadvantages of crypto currencies include higher energy costs and environmental threats and there is a reduced number of goods and services stores that accept crypto currencies as a means of payment.

Thakur and Banik (2018) also argued that there is less acceptance of crypto currencies worldwide as they have proven to be difficult to understand, and once a payment is made using crypto currency, it becomes impossible to reverse. However, the rise of these new technologies also brings about certain benefits, including fast transactions, reduced costs, and permanent availability of the system. The other benefits associated with crypto currencies are that customers can do portfolio diversification and there is anonymity for those wishing to remain anonymous in their purchases. The holders of the assets can participate in alternative market offerings and the payments made using crypto currencies are faster, safer, and cheaper.

According to IFWG (2018), these benefits are likely to be enjoyed only on a short-term basis. Thakur and Banik (2018) also noted that it is easy to transfer funds between two parties using crypto currencies, the processing of crypto currencies uses a push mechanism that allows the holders to send exactly what they wish to send to the recipient without further information being required. The transactions are secured and there is no involvement of a third party,

Crypto currency has recently made its way to South Africa, although its impact on the country's financial system is less evident. More evidently, according to Mothokoa (2017), the concept of crypto currency is relatively new in South Africa but shows a great potential of growth, evidenced by the Bitcoin ATM that was planted in Midrand, South Africa. The report by Phantom Design (2018) estimated about 550,000 to 650,000 active crypto currency users in South Africa and about 60,000 South Africans that invested money in crypto currency in 2017. There are, however, recent studies that have investigated its impact on the country's financial system and some have shown the need for the industry's regulation. According to the study by IFWG (2018), the recent rise of a need to regulate or develop a policy of regulation of the crypto currency is due to the following reasons:

- Crypto currencies are a type of innovation that have the potential of impacting the financial sector of the country,
- They do not fit in the current regulatory framework of the country as it is an area that still requires clarity for the regulators,
- The crypto assets still pose a risk and create conditions for regulatory arbitrage,

- And lastly, there is a growing interest, in investment as well as participation in the crypto assets. Even financial institutions have shown increasing interest in these activities.

2.6 The Savings and Investment Mechanism

Economics identifies the presence of two major economic groups in the economy. The first has an income level more than their consumption portion resulting in generation of savings. They are referred to as the surplus unit or savers. The second group is identified with consumption levels more than their income and are always looking forward to raising financing to fulfil their funding needs. These are referred to as the deficit unit or borrowers. Savers are usually the individual households who save a portion of their income while the deficit unit represents the corporate sector that always needs cheap financing options. According to the Fisher's Savings and Investment Theory (1930), savings of the households are translated into investments to earn them an acceptable return on their investments. The higher return increases the willingness of surplus units to furnish funds for investment providing the deficit units financing they need. However, this return earned by the investors is the cost of funds paid by the deficit unit. The higher the cost paid on the funds obtained, the lesser is the willingness to borrow funds.

Funds always flow from the surplus unit to the deficit unit. This flow of funds from one economic group i.e., surplus unit to the other economic group i.e., deficit unit, may take two possible routes: (1) The Direct Funds Flow Mechanism or (2) The Indirect Funds Flow Mechanism. The adversities in the direct flow of funds mechanism make way for the utilization of the indirect funds flow mechanism. From the perspective of investors, the riskier direct investment, with higher asymmetry of information, keeps them at bay from using the direct route. Thus, they prefer making indirect investments utilizing the services of the financial intermediaries. From the viewpoint of the borrowers, it is very rare to have an individual saver having the potential to cater for the financing needs of the borrower. Therefore, the company must interact with multiple individual financers to fulfil their financing needs. This requires the management of each financer individually and catering for his expectations resulting in high costs for the borrower. Thus, the borrowing unit seeks an intermediary to provide the requisite funds. It is not a matter of chance that these financial intermediaries not only provide them with requisite funds but also offer a wide variety of functions to facilitate firm growth.

2.7 Growth and Financial Intermediation

Firms strive to grow at a rapid pace to raise their market worth and benefit their shareholders. Ho (2018) states that the emergence of enlightened shareholders' approaches to corporate governance focuses on companies to magnify the benefits beyond the shareholders' interests. This results in spill over effects beyond firm level growth to benefitting the economy at large. Operational efficiencies are thus the focus of firms to optimize performance. This results in higher productivity levels, the generation of higher profits and sustained financial benefits for shareholders. Better performing firms can capture greater market share and grow. The growth in firm size is attributed to availability of resources. This includes financial as well as non-financial assistance. Managers try to generate funds utilizing sources which optimize firm profitability.

Berger et al. (2010) stated that banks perform a vital part in the allocation of resources by transformation of relatively little liquid deposits into big illiquid loans providing benefits to surplus and the deficit economic groups. During this process, bank provides a wide range of services to facilitate the savers and borrowers. After the 70s era, the deregulation of the financial system and the technological advancement and globalization has transformed the banking sector. Berger et al. (2010) further state that the mergers and acquisitions have resulted in enormous banks and have offered diversified financial service achieving economies of scale. De Young et al. (2004) identified that the smaller banks deliver highly differentiated products and high-end consumer banking services.

Historically, intermediaries have an essential role in accelerating economic growth. This seems to be realistic in almost all developed countries, but rising economies are at a very early stage. Here too, the expansion of financial intermediaries seems to drive the expansion of financial markets on their own (McKinnon, 1973). In brief, banks have stayed alive ever since very old times, making this an attraction to household for deposits and loans to operators who are in requirement of funds. Didier, Levine and Schmukler (2014) studied the firms which issue securities in equity and debt markets and its impact on growth.

The knowledge of the functions played by the financial intermediaries in the financial dissection has different models in the areas known to the theory of intermediation. These

theories of financial intermediation models have a built-in resource allocation based on perfect markets. The theory suggests that the functions of transaction cost reduction performed by the intermediaries and unequal information resulting in asymmetry are significant in the perceptive of the brokerage of intermediaries.

The exploration of financial theory for growth at the firm level identifies the existence of two schools of thought regarding the generation of funds using banking services: the irrelevance and the relevance approach. According to the irrelevance approach, the sources of funds does not matter, and it is an irrelevant aspect towards the valuation of the firm, its cost of funds and market valuation. The Net Operating Income Approach (NOI Approach) and the Modigliani Miller Approach (MM Approach) are the proponents of the irrelevance school of thought. In contrast to the irrelevance school of thought, there exists the relevance approach which states that the way a company chooses to generate funds is a relevant decision as this decision influences the valuation of the firm, its cost of funds and the market value. The Pecking Order Hypothesis (POH) conceived by Myers and Majluf (1984) predicts that information asymmetry between managers and investors creates a preference ranking over financing sources. Beginning with internal funds, followed by debt, and then equity, firms work their way up the pecking order to finance investment to minimize adverse selection costs and improve operational profitability.

To finance themselves, the companies, select direct financing mechanism or indirect financing mechanism or a hybrid of these. This is among the decisions of prime importance to determine the sources of funds. Company management identifies the level of funds sufficient to finance its short-term and long-term needs and then plans for how to generate those funds. These funds generated, serve for making expansion, starting new production lines, escalating the production capacity ultimately enabling the firms to generate more sales and enabling firms to grow rapidly. Chauvet and Jacolin (2015) conducted a study to focus on the impact of financial inclusion and development on the performance of firms in countries with low financial development. They found that, while financial development does not influence firm performance on average, the financial inclusion i.e. access to financial services at the firm level has a positive influence on a firm's growth. The present study also draws its influence from it.

Managers explore possible options to generate funds in search of identifying an optimum level of financial structure, ultimately resulting in benefitting the firm's growth. To generate the necessary funds, firms have the option to utilize the direct financing mechanism or the indirect financing mechanism. As discussed in the introduction, the benefits of intermediated financing provide it a as preference over the direct financing module. The presence of financial intermediaries in our financial system facilitates the process and makes available the funds required by the corporate sector.

The deficit unit in the economy has multiple options to utilize when it feels the need to generate funds. This segment classifies the options available to the deficit unit for fulfilment of its financing needs. Figure 2.1 classifies the options available to the deficit unit in two broad categories: Internal Financing Option and the External Financing Option. In the External Financing Option, the deficit unit has a further two options to select from: direct financing or the in-direct financing i.e., intermediated financing option. The intermediated financing option classifies the financial intermediaries in three broad categories: Depository financial institutions, non-depository financial institutions and the federal government financial institutions.

The depository financial institutions are financial intermediaries where there are frequent deposits and frequent withdrawals. The depository financial institutions are categorized further in two broad categories: Banking Depository Institutions and the Thrift Institutions. The Thrift Institutions are specialized financial institutions having a specified scope such as the House Building Finance Corporation (HBFC) or Zarai Taraqiati (Agricultural Development Bank Limited (ZTBL). The banking depository institutions are also classified into two further categories: Conventional Banking Institutions and the Islamic Banking Institutions.

The non-depository financial intermediaries are classified into three categories: Insurance Companies, Pension & Retirement Funds, and the Mutual Funds. The insurance companies receive premiums, create a pool, and invest with the deficit unit. These may be further classified into life insurance companies who invest a major portion of the accumulated premiums in long term investments and the non-life insurance companies who invest a major portion of their premiums in short term investments.

The pension and retirement funds offer pension and retirement services and plan for one's retirement and post retirement by collecting frequent instalments or lump sum payments before retirement and offering frequent payments past one's retirement for a happy post retirement life. The funds accumulated by these companies are utilized for making investments with the deficit units and earning returns. The next classification identifies the mutual funds which gather funds from the individual investors planning to make investments. The mutual funds combine investments from multiple individual savers and combine them to invest as a mutual fund. The investment units are identified, and investments made under the specialized institutional setup of the mutual fund company yield returns for the surplus unit.

The federal government financial institutions are governmental institutions working to provide government the financing needed by offering the surplus units risk free returns. These investments have a hypothetically zero risk and are the safest of the investments. They offer a lower rate as compared to the market but are secured by the government backing. These institutions usually contribute to finance the governmental projects and offer an investments opportunity to savers.

2.8 Conclusion

This chapter analysed the financial system of South Africa and its role on economic growth of the country throughout the years. The role of the introduction in crypto currencies and their impact on the role of the financial system was also discussed. As discussed, South Africa serves as the biggest economy in Africa that is very productive with good macroeconomic reforms that help in job creation and promoting economic growth. It is ranked 25th in the world by the world economic forum's first development report. Its financial system has also improved due to sound policies of intervention. However, the current development of new technologies and the COVID-19 pandemic poses a threat on the stability of the country's financial system. This may require more stringent proper regulation and control to ensure continued growth and stability in the financial sector of the country for sustained economic growth. The next chapter consists of the literature review. Specifically, it outlines the theoretical framework as well as the empirical review.

Chapter 3: Literature Review

3.1 Introduction

The previous chapter analysed the South African financial sector and its role on economic growth. This chapter outlined the literature review which comprised of the theoretical and the empirical literature review on the relationship between financial intermediation and economic growth. Kidwell, Blackwell, Whidbee and Sias (2012) explained that the financial system's main role is to gather funds from individuals and firms with more funds than what they need and transfer them to those that need them. Firms need money for investment and business expansion, whilst individuals usually need money for purchasing purposes. Therefore, money can be referred to as the main source that drives the economy and without it, many financial transactions will be impossible. More specifically, money is the main factor that runs the economy, making the role of financial intermediaries crucial in stimulating economic growth in a country.

3.2 Theoretical Review

This section covered the theoretical background of financial intermediation as well as the economic growth theories. The review outlined the theoretical framework of the relationship between financial intermediaries and economic growth looking at different theories of literature that underpins the study.

3.2.1 Financial Intermediation Theories

The basic theoretical framework of financial intermediation is the Arrow-Debreu world theory. It is based on the complete market's paradigm. According to Scholtens and van Wensveen (2003), this theory argues that in the complete markets, the prices of investment projects are stipulated efficiently. Lenders and borrowers can locate each other due to perfect information on each other's preferences at little or no cost, to trade their savings on accessible financial instruments. Such instruments are made and traded at no cost and are able to meet both the savers and investors' needs simultaneously. The supply of capital instruments is diversified adequately to provide full diversification of risk due to the perfect information. Also, market stakeholders have possessed similar expectations and are rational. As alluded to by Allen and

Santomero (1998), when markets are complete, the allocation of resources becomes Pareto efficient, and the intermediaries therefore have no role to play in improving market welfare. However, Scholtens and van Wensveen (2003), point out that this situation does not exist in the real world. Therefore, the role of intermediaries remains crucial in bringing together the lenders and the borrowers who make financial instruments that meet their needs with cost reimbursement. The essence of this theory, therefore, is that in the world with perfect information, the role of financial intermediaries can be eliminated. However, this may never occur in the real world characterized by incomplete information. It is in the real world of no perfect information where the role of financial intermediaries is crucial and effective. Financial intermediaries rise to mitigate the problem of imperfect markets, by providing information and eliminating the cost of acquiring information. In their role as intermediaries, they collect and analyse information on behalf of the savers and investors. As a result, they provide players with different financial services to meet their individual unique needs. In a nutshell, financial intermediaries fill the imperfect information gap in the real world and make it easy for investors and savers to save and invest with complete information.

The theory is backed by the information asymmetry theory which follows that there is imperfect information in the market. According to Scholtens and van Wensveen (2003), the asymmetries can be of an ex-ante form, where they can cause an unfavourable selection. They can be interim, causing moral hazard, and they can be of an ex-post form, which mostly results in auditing or state verifications and enforcement that are expensive. These information asymmetries result in market imperfections and increases transaction costs. The role of financial intermediaries is, therefore, to mitigate these costs, making it easy for savers and investors to trade. This study investigated to confirm the role of financial intermediaries by outlining the role they play in mitigating information asymmetry by making it easy for both savers and investors to transact with efficient information. Financial intermediaries can eliminate the uncertainty that comes with imperfect information through their role as the middleman between savers and investors. They provide services that are not only favourable to their clients but also satisfactory, eliminating risk and uncertainty and providing security.

3.2.2 Economic Growth Theories

According to Todaro & Smith (2012), the basic economic growth theory that underpins this study is the Harrod-Domar model developed by, Harrod (1939) and Domar (1946). The theory

holds that there is a positive relationship between capital stock and national output. This model gives the general format of mobilizing savings to initiate investment sufficiently in pursuit of increasing economic growth, as:

$$\Delta Y/Y = s/k$$

The equation given above shows that the growth rate of GNP, given by (Δy/y) is jointly given by the ratio of national savings (s) and the national capital-output ratio (k). In general, the Harrod-Domer model assumes that, in the absence of government intervention, the national income growth rate is positively related to the savings ratio. Todaro and Smith (2012) further stipulate that the equation shows that countries must save and invest a certain amount of their gross national product (GNP) to grow. Thus, the more they save and invest, the quicker the economy grows. Financial intermediaries play an important role in this case. They are responsible for ensuring that saving and investment is done in a less costly and more effective way.

The Solow growth model also supports the notion of savings and investment as a way of enhancing economic growth and holds that savings and capital accumulation are the most important factors of growth. The Solow growth model assumes that economies can connect and reach the same level of income if they can achieve the similar savings rates, depreciation, growth in the labour force, and growth in productivity (Todaro and Smith, 2012). Moreover, the model accepts that there are constant returns to scale, and the effective substitution in the production inputs. The technological progress is exogenously determined in the long run with the Solow growth model and there is the diminishing marginal productivity of capital. Financial intermediaries enhance economic growth through safer and more effective savings facilities that are less costly. These are also responsible for assisting firms with capital accumulation and effective investment.

The Keynesian view of economic growth is that governments should increase aggregate demand to achieve economic growth. Sangukuhl (2015) states that the general idea of the Keynes General theory is that governments must create policies that promote spending in the economy to ensure economic growth. In this situation, financial intermediaries increase

aggregate demand and spending through efficient credit provision and investment promotion that results in increased spending in the economy.

Lastly, according to Masoud (2014), the neoclassical growth models which include the work of Ramsy (1928) and Arrow (1962) mainly argued that investment in knowledge cumulation is the main contribution to economic growth. More specifically the 'learning by-doing' theory by Arrow (1962) holds that technological improvement and productivity are both a function of cumulated knowledge which also results in an increase in investment. Financial intermediaries play a massive role in knowledge investment and their financial assistance in development and cumulation of knowledge have resulted in a great contribution to economic growth.

3.3 Empirical Review

The empirical analysis mainly comprises of different studies conducted on the similar topic under study. The different results yielded by different researchers serve as a direction to the study and provides guidance in drawing the conclusion on the relationship between financial intermediation and economic growth of South Africa. The section is categorised into the foundational as well as the country-specific studies and is discussed below.

3.3.1 Foundational studies

The empirical studies conducted by several researchers on the direction of the causal relationship between financial intermediation and economic growth shows different results that are contradictory. Most of the empirical studies, including those by King and Levine (1993), sustain the view that financial intermediation is important for economic growth, whilst other studies, like those of Odhiambo (2004), argue that economic growth is essential for financial development. There are, however, certain studies like Akinboade (1998) which shows that financial development and economic growth have a bi-directional relationship, meaning that the relationship comes from both directions and those that show no causal relationship between financial intermediation and economic growth, like the study by Adedamola and Adewele (2015). Bakar and Sulong (2018) divided the results of the empirical analysis on the relationship between financial intermediation and economic growth into four categories. The first and second results are categorized into the positive and negative relationship between financial intermediation and economic growth. The third category explains the effect of

financial sector to the higher and lower income countries and the last category explains the transmission channels of the financial sector on economic growth.

According to Adu, Marbuah and Mensah (2013), the first framework of analysing the role of financial intermediation in enhancing economic growth is the renowned work of Schumpeter (1911) which stipulated that a financial system that is functioning effectively can increase technological innovations through efficient resource allocation from the sectors that are less productive to more productive sectors in the economy. Schumpeter's main argument is that the services of financial intermediaries which include mobilizing savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions enhances the technological innovation and economic development. This phenomenon is strongly supported by King and Levine (1993) in their study which holds that different financial development measures link strongly to economic growth. Each of the measures has shortfalls, but they all conclude that finance is essential for growth. In other words, financial development is linked positively with investment rate and efficiency.

Atindehou, Gueyie and Amenounve (2005), developed another fundamental study that analysed the relationship between financial development and economic growth developed by Patric (1966) which brought forth two hypotheses of analysing this relationship. These are the supply-leading phenomenon and the demand-following phenomenon. According to Odhiambo (2004), the supply-leading phenomenon holds that financial development is a crucial factor that leads to economic growth. This phenomenon further stipulates that financial development enhances real growth by transferring the funding resources from small saving entities to bigger investment entities. Odhiambo (2004) further pointed out that the demand-following phenomenon, on the other hand, holds that the passive growth in finance results from the lesser demand for financial services. Therefore, as the economy grows, the demand for several financial services grows.

The theory on the relationship between financial intermediaries and economic growth, developed by Khan (2001), is based on the cost associated with the provision of external finance which rises through the information asymmetries between the borrowers and lenders. According to this theory, when borrowing is limited, the producers that have access to financial intermediary loans get higher returns on investment than others. This, therefore, creates

incentives for the other producers to make the necessary technological improvements that will grant them access to the investment loans. As the number of producers with access to external finance increases over time, the borrower's net worth relative to debt increases. This thereby decrease the costs of financial intermediation and increases the overall return on investment. Furthermore, according to Khan (2001), the theory supports the recent evidence that financial development can reduce the cost of external finance provision, thereby increasing economic growth.

Swamy and Tulasimala (2011) introduced the microfinance models of lending which offers less transaction than the regular models. According to this study, microfinance models of lending are more cost-efficient and can foster financial development, thereby enhancing economic growth. The study by Yusifzada and Mammadova (2015) added aspects such as depth, access, efficiency and stability in analysing the relationship between financial intermediation and economic growth. The results showed that the impact of these four aspects on economic growth differs and depends on the level of financial development.

3.3.2 Country-specific studies

According to Gondo (2009), recently the country-specific studies are getting more attention since the researchers can model the specific changes that occur in a specific country and are able to assess the causes of growth and the financial development level in that specific country. One such study, conducted in South Africa by Akinboade and Kinfack, (2013), aimed at analysing the relationship between financial development, economic growth and millennium development goals. The study made use of different variables to proxy financial development, economic growth and the millennium development goals which include per capita income, per capita spending on education, total domestic credit to GDP ratio and spending on education. These variables showed an existence of a long-run relationship between them. The other variables included in the study are per capita spending on food, household spending on clothes, and access to health care. The results of the study mostly showed no existence of the short-run relationship between the variables and confirmed the existence of this relationship in the long-run.

The study by Louw (2016) aimed at analysing a causal relationship between the financial development, economic growth and investment in South Africa using various financial sector indicators to proxy financial development. The recently developed ARDL-Bounds testing procedure, as well as the VECM-Granger approach and Innovative Accounting Approach, were applied in the study. The study showed evidence of a short-run bidirectional relationship between financial development and economic growth. The results, however, showed a change when the stock market indicators were used rather than the banking sector indicators.

Odhiambo (2004) also aimed at analysing the relationship between financial development and economic growth. The researcher made use of the quantitative measurement to measure the economic growth and financial development variables in which the per-capita income (y/N) was used as a proxy for economic growth. Financial development was measured by three variables which are the ratio of broad money (M2) to gross domestic product (GDP) given as (M2/GDP); the currency ratio (CC/M1) and the ratio of bank claims on the private sector to nominal GDP (DCP/GDP). Using the Johansen-Juselius cointegration and the vector error correction model to examine the directional relationship between financial development and economic growth, the study rejected the supply-leading hypothesis, that is, financial development leads to economic growth, and accepted that economic growth causes financial development in South Africa.

The study by Sunde (2012) examined the nexus between financial sector development and economic growth in South Africa using cointegration and error correction modelling and the Granger causality tests. The results of the study show that economic growth is explained by the financial sector variables and control variables such as inflation, exchange rate, and real interest rates. The Granger causality test results show that there is generally a bidirectional relationship between economic growth and financial sector development which implies that if the economy grows, the financial services sector also grows and vice versa.

Gondo (2009) examined the impact of financial development on economic growth in South Africa using a time series empirical growth model. The study introduced an index of political and economic polarisation and inflation tax as identifying instruments which were used to reimburse for the simultaneity bias in the financial development variables. The results of the study showed that credit extension to the private sector and the stock market liquidity have an

impact on economic growth in the long run. In the short run, however, at least liquid liabilities show a negative impact on economic growth. The study also found that institutions and the regulatory environment have an impact on both economic growth and financial development.

The study by Godza (2013) analysed the financial structure and economic growth nexus, comparing banks, financial markets, and economic growth in South Africa between 1990 and 2011. The study used the Vector Error Correction model and the Johansen co-integration model to test the relationship. The results showed a positive relationship between stock turnover ratio, bond market capitalisation and government expenditure and economic growth and a negative relationship between bank credit to private sector and value shares traded.

The study conducted in Botswana by Akinboade (1998) argues that the relationship between financial development and economic growth is bi-directional. In other words, economic growth in Botswana causes and is caused by financial development. The researcher made use of the Granger causality technique to test the relationship, followed by the error correction method and unit root and cointegration, to test the presence of unit root and the variables used in the analysis which includes the real non-mineral GDP per capita as proxy for economic growth; the ratio of bank claims on the private sector to nominal non-mineral GDP and the ratio of bank deposit liabilities to nominal non-mineral GDP.

Sekakela (2018) examined the interrelationships between financial development, economic growth, capital accumulation and productivity in Botswana using the Autoregressive Distributed Lag (ADRL) bounds test technique from 1980-2014. The study found that financial development has a negative impact on economic growth in both the short-run and the long-run when private credit is used as a measure. Furthermore, when liquid liability was used as a measure of financial development, the study found that financial development has a positive and significant impact on economic growth. The study, therefore, concluded that when private credit is used to measure financial development, the interrelationship between financial development and economic growth supports the supply leading hypothesis, and when liquid liabilities is used to measure financial development, the interrelationship between financial development and economic growth supports the demand-following phenomena.

The study by Adu, Marbuah and Mensah (2013) on financial development and economic growth in Ghana aimed at investigating the effects of financial development long-run growth in Ghana. The study found that this effect depends on the proxy of financial development used. Furthermore, the study revealed that the credit to the private sector to GDP ratio, as well as total domestic credit, are essential for growth, whilst the broad money stock to GDP ratio is less essential. In conclusion, therefore, the study concluded that the impact of financial development on growth depends on the variables employed as proxies for financial development thereof.

The study conducted on the causal relationship between financial intermediaries and economic growth in Nigeria by Adedamola and Adewele (2015) shows no evidence of the existence of the causal relationship between financial intermediaries and economic growth. The researchers made use of the Toda Yamamoto Granger non-causality method to test the relationship and the variables used. This includes the nominal gross domestic product as a proxy for economic growth, saving, investment, cost of financial intermediation, size of the banking sector and accessibility to financial intermediaries as proxies for financial intermediaries.

Ageze (2004) studied the impact of financial intermediation on economic growth in Nigeria between 1970 and 2003 using the correlation analysis. The researcher started by analysing the origin of trade from the barter system to its evolution through money and the dominant economic system of capitalism, analysing the role of financial intermediation in such a system. Using aggregate deposit money bank credit and GDP, the results of the study found a positive relationship between the variables under study. The study by Shittu (2012) on the causal relationship between financial intermediation and economic growth in Nigeria using the Engle-Granger technique found that financial intermediation has a great impact on economic growth in Nigeria. The researcher used the growth rate of the real gross domestic product as proxy for economic growth and the ratio of broad money supply (M2) to nominal gross domestic product (NGDP) as well as the ratio of domestic credit to the private sector (CPS) to the nominal gross domestic product (NGDP) were used as proxies for financial intermediation. Economic growth was used as the dependent variable in this study.

Marshal, Onyinye, Ifechi and Charles (2016) examined the long run and short run dynamics between financial intermediation development and economic growth in Nigeria using data from

1970 to 2015. The study made use of the VAR testing approach, Johansen co-integration testing technique as well as the Engle Granger causality test. The results of the study showed evidence of an existing long run relationship between financial intermediation development and economic growth. However, the results also showed both positive and negative signs in the relationship between the financial intermediation development and economic growth when VAR was used and lagged once or twice, meaning that the relationship is less significant, especially when credit to private sector to GDP was used as an indicator of financial intermediation development.

Puatwoe and Piabuo (2017) studied the impact of financial development on economic growth in Cameroon using the ADRL methodology. The indicators applied included broad money, deposit to GDP and domestic credit to private sector. The results showed an existence of a short-run positive relationship between the financial development and economic growth when broad money was used as an indicator. The results found a negative relationship between financial development and economic growth when bank deposits and private investment were used. However, in the long run, all the financial development indicators showed a positive impact on economic growth.

Gisanabagabo and Ngalawa (2016) conducted a study in Rwanda which aimed at investigating the possible cointegration as well as the causal relationship between financial intermediation and economic growth, using the quarterly data from 1996Q1 to 2010Q1. The study used a Structural Vector Autoregressive model to analyse the short-run dynamics between the variables under study. In its findings, the study confirmed the evidence of a cointegration relationship financial intermediaries and economic growth in Rwanda. The study also found that shocks in the domestic private sector credit result in large fluctuations in real output growth and shocks in potential liquidity show less effect. The study, therefore, supported the supply-lending phenomenon in the relationship between financial intermediation and economic growth and concluded that the country needs to reinforce incentives to encourage businesses to utilise the present financial services in order to achieve the desired economic growth.

The study by Muhoza (2019) examined the relationship between financial intermediation and economic growth in the East African Community. The study created a financial development index using the principal component analysis to examine the impact of financial intermediation

on economic growth. The panel data from 1985 to 2017 was used and the results confirmed a positive relationship between financial intermediation and economic growth in the East African Community (EAC) countries in the long run.

The study conducted in Kenya by Uddin, Sjö and Shahbaz (2013) aimed at re-examining the relationship between financial development and economic growth over the period of 1971-2011 using the Cobb-Douglas production augmented to incorporate financial development. The study also used a simulation based ARDL bounds testing and Gregory and Hansen's structural break cointegration methodologies. The study found the evidence of cointegration between the series in the presence of a structural break in 1992. The study also found that the development of the financial sector in the long run shows a positive impact on economic growth in Kenya and that the policy makers of Kenya need to put more emphasis on financial development to enhance economic growth.

The study by Guru and Yadav (2018) examined the relationship between financial development and economic growth for the five-emerging economies including Brazil, Russia, China, India and South Africa between 1993 and 2014. The study made use of the banking sector and stock market development as indicators and the generalized method of moment system estimation method was used as methodology. The results of the study found that the banking sector development, as well as the market development indicators, were complementary and enhance economic growth.

Bittencourt (2012) investigated the role of financial development in creating economic growth in Latin American countries between 1980 and 2007 using the panel time-series data analysis. The results of the study confirmed the Schumpeterian prediction which holds that finance enables entrepreneurial investment in production and thereby enhances economic growth. The study further pointed out the importance of a more competitive and active financial sector in directing the financial resources to entrepreneurs as well as the importance of macroeconomic stability and structural reforms as essential pre-conditions for ensuring financial development, thereby increasing growth in a country.

The study by Yakubu, Abokor and Balay (2020) examined the impact of financial intermediation and economic growth in Turkey using the Autoregressive Distributed Lag

(ARDL) methodology to test the long-run relationship between financial intermediation and economic growth, and the Error Correction model (ECM) to test the short-run relationship. The study used annual data from 1970 to 2017 and the results showed that financial intermediation has a significant impact on economic growth, in both the short-run and the long-run. However, this impact was positive in the short run only.

The study by Rateiwa and Aziakpono (2015) aimed at analysing the structure of financial systems and economic growth in Africa's three biggest economies including South Africa, Egypt and Nigeria using the Johansen cointegration and the vector error correction model to test the evidence of the long-run equilibrium relationship between financial structure and economic growth as well as the causality between them within a specific country's setting. The study used the empirical evidence of the selected African countries, covering periods from 1971-2013, and the results showed the existence of a long-run relationship between financial structure and economic growth only in Egypt and South Africa. This relationship, however, was less significant regarding Nigeria. In conclusion, the study showed that financial structure is significant for economic growth only in countries with financial systems that have achieved a certain level of development.

Ahmed (2010) conducted a study on the relationship between financial liberalization, financial development, and growth in 15 Sub-Saharan countries including South Africa, Ghana, Lesotho, Malawi, among others, using the latest dynamic panel data framework and time series analysis with the annual observations covering periods between 1976-2005. The proxies used for financial development included the ratio of private sector credit and share of domestic credit to income. The study therefore found the evidence of existence of the long-run equilibrium relationship between financial development and economic growth, supporting the view that financial development is crucial for economic development. The results, however, showed less evidence of the existence of the relationship between financial liberalization and economic growth.

The study by Ncanywa and Mabusela (2019) analysed the impact of financial development on economic growth in Sub-Saharan Africa using the panel Autoregressive Distributed Lag Model as the methodology. The countries of interest used in the study include Botswana, Ghana, Kenya, Nigeria and South Africa and the variables employed include the annual growth rate of

GDP as proxy for economic growth and bank credit to the private sector as a proportion of GDP (BCG) The ratio of liquid liabilities as a percentage of GDP (LLG) as well as the ratio of bank deposit as a percentage of GDP (BDG) were used to proxy financial development. The study found that there exists a long-run as well as a short-run relationship between financial development and economic growth.

The study conducted by Allen and Ndikumana (2000) on financial intermediation and economic growth in Southern Africa showed that financial intermediation is essential for enhancing the economic growth of these Southern African countries. The researchers used the Panel data approach, in which annual and pooled data were used to analyse this relationship. The variables used in the study include real per capita GDP as proxy for economic growth, denoted by (y) and (FIN) was used as an indicator for financial development. Other variables employed in the study include inflation, government consumption, openness, and debt service.

Lastly, Castelli (2018) analysed the relationship between financial sector development and economic growth utilizing the cross-county data from 87 countries, covering periods from 2005 to 2015 and using the OLS methodology. The study's main aim was to revisit the relationship between financial development and economic growth, following the study by Levine (1997) and found that there is a positive relationship between financial development and economic growth. The countries under study included all SADC countries, including South Africa, Mauritius, the Democratic Republic of Congo, and the Seychelles, among others.

The studies above examined the relationship between financial intermediation and economic growth in different countries, most of which focused on examining financial development and economic growth. The studies used the financial market and the stock market indicators to analyse this relationship. The results of the literature proved the existence of a positive relationship between financial intermediaries and economic growth when financial market indicators are used as proxies for financial intermediation. This relationship has proven to be less significant when stock market indicators were used. There are, however, certain studies, such as the study by Sekakela (2018), which found a negative relationship between the two variables under study. This study noted a scantiness in literature, as there are few studies conducted in South Africa on the relationship between financial intermediation and economic growth. Even in the latest literature, such as studies by Ncanywa and Mabusela (2019) and

Yakubu, Abokor and Balay (2020), less emphasis is given in South Africa and this study aimed to fill the gap by examining the causal relationship between the two variables under study and providing a clear guideline on the direction on this relationship in South Africa.

3.4 Conclusion

This chapter outlined the literature pertaining to the study where, both the theoretical as well as the empirical literature review, were clearly outlined. On the theoretical analysis, the financial intermediation theories and the economic growth theories were clearly defined. The empirical review was divided into foundational, and country specific studies and the significance of the literature was clearly defined. The literature shows a contradiction in literature, and this makes further analysis on the relationship between financial intermediation and economic growth essential. The next chapter will discuss the study methodology and design.

Chapter 4: Research Methodology and Study Design

4.1 Introduction

This chapter outlines the methodology applied in the study as well as the research design of the study. The models are clearly specified in this chapter and the data sources as well as the scope of the study are also discussed in the chapter. This chapter will also outline the study expectations as well as the explanation of the variables used in the study. The last part of this chapter will be the techniques of estimation, which will be discussed in depth.

4.2 Research Paradigm

The research paradigm used in this study is the positivism paradigm. According to Pham k2(2018), a positivism research paradigm uses causal inferences resulting from experimental designs to study the relationship between an independent variable and one or more independent variables. Such a relationship is determined through the way the researchers maximize the influence of the independent variable on the dependent variable. The Positivism paradigm also helps researchers to clearly understand the studied phenomenon through empirical tests and methods such as sampling, measurement, questionnaire and focus group discussion. Given the purpose of this study, to examine the causal relationship between two variables, using empirical analysis and quantitative methodologies, is appropriate. Furthermore, it allows for testing the direction of the relationship between financial intermediation and economic growth.

4.3 Research Design and Methodology

This study followed the experimental research design to explore the causal relationship between financial intermediation and economic growth, and more specifically, the time series research design. According to Louw (2016), a time series analysis enables the study to test whether the relationships under examination changes over time. This study, therefore, followed time series research design to determine if the relationship changes over time. The time series research design is more reliable and can be used to analyse and understand fluctuations that occur from one period to another. This approach was considered more relevant for the purposes of this study.

The study followed the empirical approach and the methodology used is quantitative. Quantitative methodologies make use of secondary data obtained from different sources and use different statistical methods to test the relationship between two or more variables under study. More formally, according to Creswell (2014), quantitative research is an approach used to test objective theories through the examination of the relationship among variables which makes it the most relevant for this study.

4.4 Explanation of Variables

In the effort to examine the causal relationship between financial intermediation and economic growth, the study takes note of the fact that measuring the role of financial institutions is not an easy task as it differs from country to country. The most basic role of financial intermediaries captured in literature include the study by Adeniyi, Oyinlola and Omisakin (2015) which includes efficient channelling of savings, monitoring firms, identifying, and allocating investment to high return to more productive investors and the management of risk. In South Africa, as indicated previously by Akinboade and Kinfack (2014), the role of financial intermediaries is seen through the banks and the stock market. More specifically, according to Fedderke and Simkins (2012), the role of financial intermediaries on economic growth is seen through the credit extension as well as in the liquidity of the stock market.

To examine the causal relationship between financial intermediaries and economic growth in South Africa, therefore, the study measured the size as well as the value of the financial intermediaries in South Africa using five variables that will proxy the banks and other financial institutions as well as the stock market. The study also analyses the role of the central bank's money supply through the broad money ratio to GDP variable included in the study. These variables are given as:

- Domestic credit to the private sector by banks to GDP (CPS B to GDP), this variable measures the relationship between banks and economic growth using the ratio of credit offered by banks to the private sector, divided by the value of gross domestic product.
- Domestic credit provided by financial sector to GDP (CPS FS to GDP) measures the relationship between other financial intermediaries and economic growth.

- Ratio of broad money to GDP (M2 to GDP), this variable measures the ratio of money supply in South Africa by the South African Reserve Bank, divided by GDP.
- Market capitalization of domestic listed companies to GDP (MCLC to GDP) measures the size and the market share of total shares traded domestically divided by GDP.
- The value of domestic shares traded by market capitalization (DST to GDP), this variable measures the value of total shares listed domestically, divided by their market share in the country.
- The GDP per capita at constant prices was be used to proxy economic growth. GDP per capita at constant prices is a gross domestic product measure that caters for the population of the country. We use constant prices to eliminate the effect of inflation.

The table below gives a brief description of the variables under study and clearly shows what they represented:

Table 4.1: Variables

Variable	**Short form**	**Dependent/independent**	**Proxy**
GDP per capita of constant prices	GDP per capita	Dependent variable	Economic growth
Domestic credit to the private sector by banks to GDP	CPS B to GDP	Independent variable	Investment
Domestic credit provided by financial sector to GDP	CPS, FS to GDP	Independent variable	The size of the financial sector
Ratio of broad money to GDP	M2 to GDP	Independent variable	Value of currency in circulation
Domestic market capitalization of listed	MCLC	Independent variable	Stock market efficiency

domestic companies as to GDP			
Value of Domestic shares traded by market capitalization	DST to MC	Independent variable	Stock market activity

4.5 Model Specification

The study adopted two models to analyse the relationship between financial intermediation and economic growth, namely the Autoregressive Distributed Lag model and the Granger causality. These two models were preferred for their ability to clearly capture the long-run and the short-run relationship between financial intermediation and economic growth. To specify the model for the study, a simple model was derived to show the relationship between the two variables under study. The model assumes that economic growth is dependent on financial intermediation, or put differently, economic growth is a function of financial intermediation. Using the variables discussed above, gives:

$$GDP = f(B, F, M, C, V, e) \quad (4.1)$$

Where;

GDP= GDP per capita of constant prices

f= represent the function of

B= Domestic credit to the private sector by banks to GDP

F= Domestic credit to the private sector financial institutions to GDP

M= Ratio of broad money to GDP

C= Domestic market capitalization of listed domestic companies as to GDP

V= Value of Domestic shares traded by market capitalization

e= the error term

From the above model, the specific models for the two methodologies used in the study, the were derived and discussed below as follows:

4.5.1 Model 1

The first approach used in this study, in pursuit of examining the relationship between financial intermediaries and economic growth in South Africa, was the Autoregressive Distributed Lag Model (ARDL). This method was used to analyse the relationship between financial intermediaries and economic growth. According to Adu, Marbua and Mensah (2013), the Autoregressive Distributed Lag Model can be used to test the long-run relationship between the variables under study using the F-statistic at different sets of critical values, such as 5% and 10%. Akinboade and Kinfack (2013) further confirmed that the ARDL technique is reliable, even when testing smaller observations, and it provides estimates that are unbiased in the long-run model. This methodology is most preferred for the purpose of this study due to its ability to capture and accurately analyse a relationship between two or more variables. The model assisted in drawing up the most accurate conclusion in the relationship between financial intermediation and economic growth in South Africa. The ARDL model also produced valid t-statistics even to endogenous regressors. The models applied for this methodology, following the study by Akinboade and Kinfack (2013), were given as follows:

$$\Delta InGDPPCt = \beta 0 + \sum_{i=1}^{n} \beta 1i \Delta InGDPPCt - i + \sum_{j=0}^{k} \beta 2j \Delta InCPSBt - j + \sum_{u=0}^{m} \beta 3u \Delta InCPSFSt - u + \sum_{k=0}^{l} \beta 4k \Delta InM2GDPt - k + \sum_{l=0}^{a} \beta 5l \Delta InMCLCGDPt - l + \sum_{l=0}^{p} \beta 6p \Delta InDSTMCt - p + \beta 7InGDPPCt - 1 + \beta 7InCPSBt - 1 + \beta 8InCPSFSt - 1 + \beta 9InM2GDPt - 1 + \beta 10InMCLCGDPt - 1 + \beta 12InDSTMCt - 1 \mathcal{E}t \quad (4.2)$$

$$\Delta InCPSBt = \delta 0 + \sum_{i=1}^{n} \delta 1i \Delta InCPSBt - i + \sum_{j=0}^{k} \delta 2j \Delta InGDPPCt - j + \sum_{u=0}^{m} \delta 3u \Delta InCPSFSt - u + \sum_{k=0}^{l} \delta 4k \Delta InM2GDPt - k +$$

$$\sum_{l=0}^{a} \delta 5l \Delta InMCLCGDPt - l + \sum_{l=0}^{p} \delta 6p \Delta InDSTMCt - p + \delta 7InGDPPCt - 1 + \delta 8InCPSBt - 1 + \delta 9InCPSFSt - 1 + \delta 10InM2GDPt - 1 + \delta 11InMCLCGDP + \delta 12InDSTMCt - 1 + \mathcal{E}t \quad (4.3)$$

$$\Delta InCPSFSt = \gamma 0 + \sum_{i=1}^{n} \gamma 1i \Delta InCPSFSt - i + \sum_{j=0}^{k} \gamma 2j \Delta InCPSBt - j + \sum_{u=0}^{m} \gamma 3u \Delta InGDPPCt - u + \sum_{k=0}^{l} \gamma 4k \Delta InM2GDPt - k + \sum_{l=0}^{a} \gamma 5l \Delta InMCLCGDPt - l + \sum_{l=0}^{p} \gamma 6p \Delta InDSTMCt - p + \gamma 7InGDPPCt - 1 + \gamma 8InCPSBt - 1 + \gamma 9InCPSFSt - 1 + \gamma 10InM2GDPt - 1 + \gamma 11InMCLCGDPt - 1 + \gamma 12InDSTMCt - 1 + \mathcal{E}t \quad (4.4)$$

$$\Delta InM2GDPt = \alpha 0 + \sum_{i=1}^{n} \alpha 1i \Delta InM2GPDt - i + \sum_{j=0}^{k} \alpha 2j \Delta InCPSFSt - j + \sum_{u=0}^{m} \alpha 3u \Delta CPSBt - u + \sum_{k=0}^{i} \alpha 4k \Delta InGDPPCt - k + \sum_{l=0}^{a} \alpha 5l \Delta InMCLCGDPt - l + \sum_{l=0}^{p} \alpha 6p \Delta InDSTMCt - p + \alpha 7InGDPPCt - 1 + \alpha 8InCPSBt - 1 + \alpha 9InCPSFSt - 1 + \alpha 10InM2GDPt - 1 + \alpha 11InMCLCGDP + \alpha 12InDSTMC - 1 + \mathcal{E}t \quad (4.5)$$

$$\Delta InMCLCGDPt = \theta 0 + \sum_{i=1}^{n} \theta 1i \Delta InMCLCGDPt - i + \sum_{j=0}^{k} \theta 2j \Delta InM2GDPt - j + \sum_{u=0}^{m} \theta 3u \Delta CPSFSt - u + \sum_{k=0}^{i} \theta 4k \Delta InCPSBt - k + \sum_{l=0}^{a} \theta 5l \Delta InGDPPCt - l + \sum_{l=0}^{p} \theta 6p \Delta InDSTMCt - p + \theta 7InGDPPCt - 1 + \theta 8InCPSBt - 1 + \theta 9InCPSFSt - 1 + \theta 10InM2GDPt - 1 + \theta 11InMCLCGDPt - 1 + \theta 12InDSTMCt - 1 + \mathcal{E}t \quad (4.6)$$

$$\Delta InDSTMCt = \psi 0 + \sum_{i=1}^{n} \psi 1i \Delta InDSTMCt - i + \sum_{j=0}^{k} \psi 2j \Delta InMCLCGDPt - j + \sum_{u=0}^{m} \psi 3u \Delta M2GDPt - u + \sum_{k=0}^{i} \psi 4k \Delta InCPSFSt - k + \sum_{l=0}^{a} \psi 5l \Delta InCPSBt - l + \sum_{l=0}^{p} \psi 6p \Delta InGDPPCt - p + \psi 7InGDPPCt - 1 + \psi 8InCPSBt - 1 + \psi 9InCPSFSt - 1 + \psi 10InM2GDPt - 1 + \psi 11InMCLCGDPt - 1 + \psi 12InDSTMC + \mathcal{E}t \quad (4.7)$$

Where;

GDPPC= is the GDP per capita

CPSB = is the domestic credit to the private sector by banks to GDP

CPSFS= is the domestic credit to the private sector by financial sector to GDP

M2GDP= is the ratio of broad money to GDP

MCLCGDP= is the market capitalisation of domestic listed companies to GDP

DSTMC= is the value of domestic shares traded by market capitalisation

ε_t= is the error term

The sign Δ was used as the difference operator and "n", "k", "m", "i" and "a" on the models represented the optimum lag length of real per capita GDP, credit to the private sector, the bank's total assets, value of domestic equities and the stock market liquidity respectively. Each one of the variables in the models were measured as independent variables for determining the long-run as well as the short-run relationships among them. The coefficients β7, β8, β9, β10, β11, β12, δ7, δ8, δ9, δ10, δ11, δ12, γ7, γ8, γ9, γ10, γ11, γ12, α7, α8, α9, α10, α11, α12, θ7, θ8, θ9, θ10, θ11, θ12, ψ7,ψ8, ψ9, ψ10, ψ11, and ψ12 were used to determine the long-run relationship as well as the co-integration on the variables under study, following the study by Akinboade and Kinfack (2013).

4.5.2 Model 2

The second methodology used in the study is the Granger causality method. The Granger causality test will be used to test the directional relationship between financial intermediaries and economic growth. Each variable provided previously was tested against the other as endogenous variables with the Granger causality test. The procedure of testing is given in the following derived models, following the study by Adedamola and Adewele (2015):

$$LGDPPC = \infty \sum_{i=1}^{p} \beta 1iLGDPPCt - i + \sum_{i=1}^{p} \beta 2iLCPSBt - i + \sum_{i=1}^{p} \beta 3iLCPSFSAt - i + \sum_{i=1}^{p} \beta 4iLM2GDPt - i + \sum_{i=1}^{p} \beta 5iLMCLCGDPt - i \sum_{i=1}^{p} \beta 6iLDSTMCt - i + \varepsilon t \quad (4.8)$$

$$LCPSB = \infty \sum_{i=1}^{p} \alpha 1iLCPSBt - i + \sum_{i=1}^{p} \alpha 2iLGDPPCt - i + \sum_{i=1}^{p} \alpha 3iLCPSFSt - i + \sum_{i=1}^{p} \alpha 4iLM2GDPt - i + \sum_{i=1}^{p} \alpha 5iLMCLCGDPt - i + \sum_{i=1}^{p} \alpha 6iLDSTMCt - i + \varepsilon t \quad (4.9)$$

$$LCPSFS = \infty \sum_{i=1}^{p} \theta 1iLCPSFSt - i + \sum_{i=1}^{p} \theta 2iLCPSBt - i + \sum_{i=1}^{p} \theta 3iLGDPPCt - i + \sum_{i=1}^{p} \theta 4iLM2GDPt - i + \sum_{i=1}^{p} \theta 5iLMCLCGDPt - i + \sum_{i=1}^{p} \theta 6iLDSTMCt - i + \varepsilon t \quad (4.10)$$

$$LM2GDP = \infty \sum_{i=1}^{p} \gamma 1iLM2GDPt - i + \sum_{i=1}^{p} \gamma 2iLCPSFSt - i + \sum_{i=1}^{p} \gamma 3iLCPSBt - i + \sum_{i=1}^{p} \gamma 4iLGDPPCt - i + \sum_{i=1}^{p} \gamma 5iMCLCGDPt - i + \sum_{i=1}^{p} \gamma 6iLDSTMCt - i + \varepsilon t \quad (4.11)$$

$$LMCLCGDP = \infty \sum_{i=1}^{p} \lambda 1iLMCLCGDPt - i + \sum_{i=1}^{p} \lambda 2iLM2GDPt - i + \sum_{i=1}^{p} \lambda 3iLCPSFSt - i + \sum_{i=1}^{p} \lambda 4iLCPSBt - i + \sum_{i=1}^{p} \lambda 5iLGDPPCt - i + \sum_{i=1}^{p} \lambda 6iLDSTMCt - i + \varepsilon t \ \varepsilon t \quad (4.12)$$

$$LDSTMC = \infty \sum_{i=1}^{p} \psi 1iLDSTMCt - i + \sum_{i=1}^{p} \psi 2iLMCLCGDPt - i + \sum_{i=1}^{p} \psi 3iLM2GDPt - i + \sum_{i=1}^{p} \psi 4iLCPSFSt - i + \sum_{i=1}^{p} \psi 5iLCPSBt - i + \sum_{i=1}^{p} \psi 6iLGDPPCt - i + \varepsilon t \ \varepsilon t \quad (4.13)$$

Each one of the equations above was used to verify the Granger causality amongst all the variables under study and each variable is tested against the other variables. Each variable was given as endogenous, and the models are all Vector Autoregressive (VAR) models. According to, Monogan, (2018), Vector Autoregressive models are most significant in testing causality relationships, and they are easy to estimate, hence why they were preferred in this study.

4.6 Priori Expectations

The "a priori expectation" of each estimated parameter on the models drawn in section 4.5 above were all expected to be positive. This was mainly because this study aimed to examine the causal relationship between financial intermediation and economic growth, which is assumed to be positive. In other words, the relationship between financial intermediation and economic growth is positive, and an increase in growth of the financial sector is expected to result in an increase in economic growth. The expected signs of the variables, therefore, was positive.

4.7 Sources of Data, Data Collection procedures and Data Analysis

The data used in the study is secondary, sourced from the world Bank and covered periods between 1975 to 2018. Secondary time series data is the most appropriate for this study because of the quantitative methodologies applied in the study. The selected period is preferably the most reliable and the most recent for the purposes of the study. The World Bank annual data reports on different countries are most reliable and contains recent statistical information not captured in most domestic sources of data. The collected data will be accessed in Microsoft Excel which will then be processed and analysed using the most relevant software for time series analysis.

4.8 Estimation Techniques

The estimation procedure followed in this study for both the methodologies includes the test for stationarity, wherein the unit root test was conducted, and the test for co-integration using the ARDL bounds testing approach, aimed at examining the possibility of co-integration in the variables of the models. The Granger causality will be conducted to test for the short-run and the long-run relationship between the variables under study and the causality between the variables under study. Lastly the diagnostic tests will be conducted to validate the significance of the models under study. Each of the estimation techniques are discussed below:

4.8.1 Unit Root Test

Nkoro and Uko (2016b) explain non-stationary as a time series stochastic process with unit root or structural breaks. According to these researchers, a non-stationary stochastic process

can either be Trend Stationary Process (TSP) or Difference Stationary Process (DPS). The TSP time series is characterised by the trend that is predictable and non-variable whilst the DPS time series has an unpredictable trend. A series that is DPS shows the presence of unit root and, therefore, must be differenced to become stationary. Unit roots are the major sources of non-stationarity and the presence of unit root in a time series; therefore, this shows that the time series is non-stationary.

According to Arltová and Fedorová (2016), if the time series is non-stationary, then its first differences must be analysed, and if the time series of first differences is also non-stationary, the time series of second difference must be analysed. However, using this approach leads to an over-differencing risk and to overcome this problem, therefore, requires the use of appropriate tests to determine the order of differentiation. There are several tests applied to test for stationarity or unit root which include Durbin-Watson (DW) test, Dickey-Fuller test (1979) (DF), Augmented Dickey-Fuller (1981) (ADF) test, Philip-Perron (1988) (PP) test, among others, for the purpose of this study, however, the Augmented Dickey-Fuller test, ADF will be considered.

According to Arltová and Fedorová (2016), the ADF is best known and is a popular test used to test for unit root based on the first-order autoregressive process model. According to Nkoro and Uko (2016b), this test adjusts the Dickey-Fuller AD test to cater for the possibility of autocorrelation in the error terms. To do this, the ADF test adds the lagged difference term of the dependent variable. Under the ADF test, when the value of the ADF is greater than the critical value, this shows that the time series is therefore stationary. However, according to Nkoro and Uko (2016b), the null hypothesis of non-stationarity cannot be rejected with the ADF, since it's not as strong in power. This thereby, validates the need to apply other related tests which, in this case, is the Philip-Peron (PP) test. Guaita (2015) asserts that the Philip-Perron test created to eliminate the asymptotic biasness found on the Augmented Dickey-Fuller test.

4.8.4 Autoregressive Distributed Lag Model (ARDL) Approach to Co-integration Testing

The ADRL model is well known for its ability to equate the co-integration of non-stationary variables with an error-correction process, and it also has a re-parameterization in the form of

Error-Correction. According to Nkoro and Uko (2016b), the Autoregressive Distributed Lag (ARDL) approach to co-integration differs with the Johansen and Juselius (1990) co-integration procedure because it helps identify the co-integrating vectors. In other words, the ADRL puts each of the underlying variables on a single long run relationship equation. Furthermore, according to Nkoro and Uko (2016b), the ADRL model can be re-parameterized into the Error Correction Model ECM if one co-integrating vector is identified. The results of the re-parameterized equation give out the short-run dynamics as well as the long run relationship of the variables in a single model. The process of re-parameterization is made possible because the ARDL is a dynamic single model equation and has the same form with the ECM. More specifically, the Distributed lag Model means that including the unrestricted lag of the variables in a regression function.

The procedure thus helps in identifying whether the variables in the model are co-integrated or not, given the endogenous variable. According to Kripfganz and Schneider (2016), the presence of a long-run relationship is tested using the Error-Correction representation and the bounds testing procedure is given to draw conclusive inference, regardless of whether the variables are integrated of order zero or one, I(0) or I(1), respectively. In addition, according to Nkoro and Uko (2016b), the Autoregressive Distributed Lag (ARDL) approach to co-integration can only be applied when one co-integrating vector exists. However, this cannot be possible with multiple co-integrating vectors, which means that the Johansen and Juselius (1990) approach becomes the alternative.

4.8.2 Granger Causality Test

According to Nkoro and Uko (2016a), a causality test helps investigate the ability of one variable to interpret the other. Granger causality test is a statistical measure that outlines how much the lagged values of certain variables are vital in predicting other variables once these lagged values are incorporated in the model. This causality between the variables is captured by a VAR model which makes it possible to test the direction of causality. Furthermore, according to Nkoro and Uko (2016a), the Granger causality test can show how a particular variable can predict the events of the other variable even without the effects of the feedback. According to these researchers, the Granger causality test is very familiar and suitable for

testing the short-run relationship given that there is no co-integration that exists among the variables under study.

4.9 Diagnostic Tests

The diagnostic tests applied in this study to further validate the significance of the study include the test for heteroscedasticity, wherein the General White test will be used. According to Ting (2017), White's general test for heteroscedasticity is one of the best approaches, since it makes few assumptions about the form of the heteroscedasticity. The main purpose of this test is to ensure that the models under study have constant variances or are homoscedastic.

The test for autocorrelation using the Langrange-Multiplier LM test was used to ensure that the residuals of the models in the study are not correlated to each other or put, differently, if the error terms do not contain information that could have been modelled. The third diagnostic test to be applied is the test for linearity which aims at validating the linearity of the models under study. The Ramsey reset test will be applied in this regard. The test for normality using the Jarque-Bera test will also be implemented to ensure that the models are normally stated which will make it possible to use the standard t and f distribution tests. The basic assumption of the diagnostic tests is that the probability of the results should be above 5%. If the results are below 5% then we fail to reject the null hypothesis

4.10 Conclusion

This chapter described the methodology used in the study. Topics discussed herein include research paradigm and the study design. There were two main methodologies applied in this study namely the Granger causality test which is used to analyse short-term dynamics on the relationship between financial intermediaries and economic growth in South Africa. Furthermore, the Autoregressive Distributed Lag Test (ADRL) was used to validate both the short-run and the long-run relationship between the financial intermediation and economic growth. This study also keeps in mind that each one of the two methodologies used in the study suffers from certain disadvantages. Therefore, a combination of these methodologies limits the disadvantages.

Chapter 5: Data Analysis and Interpretation

5.1 Introduction

The previous chapter gave the broad analysis of the methodology used in this study and clearly specified the models to be tested interpreted in that chapter. This chapter entailed the data analysis and interpretation of the models previously estimated in Chapter 4. The main aim of the chapter was to validate the relationship between financial intermediation and economic growth as previously estimated in the previous chapters. The tests conducted in this chapter included the test for unit root using the ADF test, the PP unit root test as a confirmatory test, the ADRL Bound test, the Granger causality test, and the Diagnostic tests.

5.2 The Unit root test for Stationarity

In this section, the study applied the Augmented Dickey Fuller (ADF) test and the Phillip-Perron (PP) test as a confirmatory test to check for stationarity between the variables under study, and the following results are derived.

Table 5.1: ADF & PP Unit Root Test results at levels

VARIABLE	ADF		PP		ORDER
	Statistic	*p-value*	*Statistic*	*p-value*	*I(0)*
GDP per capita	*1.6082*	*0.7728*	*1.343425*	*0.8632*	*I(0)*
CPS by banks to GDP	*2.5255*	*0.3149*	*2.639994*	*0.2657*	*I(0)*
CPS by FS to GDP	*2.5832*	*0.2895*	*2.622681*	*0.2729*	*I(0)*

M2 to GDP	*2.1023*	*0.5295*	*2.063960*	*0.5505*	*I(0)*
MCLC to GDP	*5.5460*	*0.0002**	*5.498417*	*0.0003**	*I(0)*
DST to MC	*3.1398*	*0.1104*	*3.082934*	*0.1232*	*I(0)*

** indicates 1% (**p < 0.01**), ** indicates5% (**p < 0.05**) and ***indicates 10% (**p < 0.10**) respectively*

The above table shows the results from the unit root test where Augmented Dicky-Fuller and Phillip-Perron tests are used to test for stationarity at zero level. The first column shows the different variables that were tested whilst the second and third columns show the t-statistical values as well as the probabilities of each variable under the ADF test. The fourth and the fifth columns contained the t-statistical and the probability values of the PP test on each variable under study.

The last column showed the order of difference where, the symbol I(0) showed the order of difference, level zero. From the results of the tests, it is seen that the p-values of the variables show a sign of a unit root on both the ADF and the PP tests, except for the variable MCLC to GDP which seem to be stationary at less than 0.05 probability. This means that we fail to reject the null hypothesis that the variables have a unit root and accept that they are not stationary at levels except for one variable, MCLC to GDP. This, therefore, means that we must proceed with testing the variables at first difference, the results of which are displayed in the table below.

Table 5.2: ADF & PP Unit Root Test results at first difference

VARIABLE	ADF		PP		ORDER
	Statistic	*p-value*	*Statistic*	*p-value*	
GDP per capita	4.031074	0.0150*	*4.016480*	*0.0156**	*I(1)*
CPS by banks to GDP	*7.009104*	*0.0000**	*7.010778*	*0.0000**	*I(1)*
CPS by FS to GDP	*7.489933*	*0.0000 **	*7.409016*	*0.0000**	*I(1)*
M2 to GDP	*4.431745*	*0.0053 **	*4.460474*	*0.0050**	*I(1)*
MCLC to GDP	*8.475737*	*0.0000 **	*11.28563*	*0.0000**	*I(1)*
DST to MC	*-8.050221*	*0.0000**	*-7.977175*	*0.0000**	*I(1)*

** indicates 1% (**p < 0.01**), ** indicates5% (**p < 0.05**) and ***indicates 10% (**p < 0.10**) respectively*

At first difference, showed by I(1), the results of ADF and the PP unit root tests showed no existence of the unit root among the different variables with their probabilities being significantly stationary at less than 0.05. This, therefore, means that we can reject the null hypothesis in this instance, and accept the alternative of no unit root. We can thereby, conclude that the variables are all stationary at 1%, 5% &10% respectively. With the results showing stationarity, it is safe to move on to the next step of the analysis, beginning with the ADRL results.

5.3 ARDL Bound test for Co-integration

This section showed the results of the estimated ARDL model used to test both the short-run and the long-run relationship between financial intermediaries and economic growth using the selected variables as proxies. Each one of the variables was tested as a dependent variable to validate the relationship among them. The results included the bound test results, the long-run F-statistic results and the results of the short-run coefficients, as follows:

Table 5.3: ADRL Bound Test Results

	Asymptitic n=1000	
Significance level	***I(0)***	***I(1)***
10%	*2.26*	*3.35*
5%	*2.62*	*3.79*
2.5%	*2.96*	*4.18*
1%	*3.41*	*4.68*

** indicates 10% (**p < 0.10**), ** indicates 5% (**p < 0.05**), *** indicates2.5% (**p<0.025)** and **** indicates 1% (**p < 0.01)** respectively*

The ARDL bound tests presented on the above table were used to measure the long-run relationship between the variables under study. In order to assume a long-run relationship, the value of the f-statistic test results of each variable should be above each bound test at 10%, 5%, 2.5% and 1% respectively. Any value below the above asymptotic bound tests will mean that we fail to reject the null hypothesis of no long-run relationship between the variables. I(0) and I(1) represents the lower and the upper bounds of the test against which the long-run relationship between the variables will be measured, where I(0) represents the lower bounds and I(1) the upper bounds. The results of the f-statistic tests used to measure the long-run relationship among the variables were presented below as follow:

Table 5.4: ARDL f- Statistic Test Results

	LONG-RUN
Variable	**F-Statistic**
GDP per capita	*8.287274*
CPS by B to GDP	*1.911598*
CPS by FS to GDP	*2.165297*
M2 to GDP	*1.616907*
MCLC to GDP	*0.944345*
DST to MC	*2.495238*

** indicates 10% (**p < 0.10**), ** indicates 5% (**p < 0.05**), *** indicates2.5% (**0.025**) and **** indicates 1% (**p < 0.01**) respectively*

The results of the ARDL f-statistic bound tests are presented on the above table for each variable. From the results, when GDP per capita is used as the dependent variable, the results of the f-statistic show a sign of a long run relationship among the variables with the f-statistical value that is greater than both the lower and upper bounds of the Asymptotic values. This means that we can reject the null hypothesis of no level relationship between the variables. When CPS by Banks to GDP is used as an explanatory variable, the results show no evidence of the long-run relationship among the variables, given the f-statistic value, 1.911598, less than the Asymptotic values in both the lower and the upper bounds. This means that the null hypothesis

of no levels relationship cannot be rejected. When CPS by FS to GDP is the explanatory variable, there is no evidence of the long-run relationship between the variables seen by the F-statistic of 2.165297, less than the lower and upper bounds. This also means that we fail to reject the null hypothesis and accept that there is no long-run relationship between the variables when CPS by FS to GDP is used as the dependent variable.

There seem to be no evidence of the long-run relationship between the variables when M2 to GDP is used as an explanatory variable with the F-statistic of 1.616907 less than the Asymptotic values at both I(0) and I(1). This means that the null hypothesis of no levels relationship between the variables cannot be rejected, and we can accept that there is no long-run relationship between the variables under study when M2 to GDP is used as an explanatory variable. MCLC to GDP also shows no sign of a long-run relationship, seen by the F-statistic value of 0.944345, less than lower and the upper bounds of the Asymptotic values. This means that we fail to reject the null hypothesis of no levels relationship, leading to a conclusion that there is no long run relationship between the variables when MCLC to GDP is used as a dependent variable.

Lastly, DST to MC also shows no sign of a long run relationship between the variables with its value 2.495238 being less than the asymptotic values on both I(0) and I(1). This means that the null hypothesis of no levels relationship between the variables in this regard cannot be rejected, and the conclusion is that there is no levels relationship between the variables when DST to MC is used as the dependent variable. In summary, we can say that the long-run relationship between the variables of interest is evident only when GDP per capita is used as the dependent variable. This means that financial intermediation plays an important role in ensuring economic growth in the long run with less impact shown by the role of economic growth in ensuring growth in the financial sector of South Africa.

The next table presented the short-run co-efficients of the ARDL test, where the presence of a short-run relationship between the variables under study was measured:

Table 5.5: ADRL Short run Coefficient Results

	Short-Run	
Variable	**Co-efficients**	**p-value**
GDP per capita	*0.459837*	*0.0000****
CPS by B to GDP	*0.708122*	*0.0000****
CPS by FS to GDP	*0.235875*	*0.5615*
M2 to GDP	*0.924650*	*0.0031****
MCLC to GDP	*1.056385*	*0.1738*
DST to MC	*0.387297*	*0.0483***

** indicates 10% (**p < 0.10**), ** indicates 5% (**p < 0.05**), *** indicates2.5% (**0.025**) and **** indicates 1% (**p < 0.01**) respectively*

The first column shows each variable tested independently and the second and third columns contain the co-efficient as well the p-values of each variable from the short-run coefficients test results. The results of the short-run coefficients test confirm a short-run relationship between the variables, with the p-values of less than 0.05, except for CPS by FS to GDP and MCLC to GDP whose p-values were greater than 0.05. The results of the ARDL model showed an existence of both the long-run and the short-run relationship between financial intermediation and economic growth in South Africa. The next section presented the results of the Granger causality test.

5.4 Granger Causality test results

In this section, the results of the Granger causality test, as shown in Appendix D, are shown and interpreted in Table 5.10 provided below where GDP per capita was used as the variable

of interest. The results contain the F-statistic value as well as the probability of each relationship tested, and they are interpreted as follows:

Table 5.6: Granger Causality test results

Equations	**Null Hypothesis**	**F-statistic**	**Prob***
Equation 1	CPS_B_TO_GDP does not Granger Cause GDP_PER_CAPITA	4.00625	0.0525*
	GDP_PER_CAPITA does not Granger Cause CPS_B_TO_GDP	0.03971	0.8431
Equation 2	CPS_FS_TO_GDP does not Granger Cause GDP_PER_CAPITA	6.78654	0.0130**
	GDP_PER_CAPITA does not Granger Cause CPS_FS_TO_GDP	0.10973	0.7423
Equation 3	M2_TO_GDP does not Granger Cause GDP_PER_CAPITA	6.96722	0.0118**
	GDP_PER_CAPITA does not Granger Cause M2_TO_GDP	0.38445	0.5387
	MCLC_TO_GDP does not Granger Cause GDP_PER_CAPITA	5.06427	0.0300*

Equations	Null Hypothesis	F-statistic	Prob*
Equation 4	GDP_PER_CAPITA does not Granger Cause MCLC_TO_GDP	1.21457	0.2770
Equation 5	DST_TO_MC does not Granger Cause GDP_PER_CAPITA	4.66927	0.0368*
	GDP_PER_CAPITA does not Granger Cause DST_TO_MC	0.09250	0.7626
Equation 6	CPS_FS_TO_GDP does not Granger Cause CPS_B_TO_GDP	0.75537	0.3902
	CPS_B_TO_GDP does not Granger Cause CPS_FS_GDP	3.88164	0.0561*
Equation 7	M2_TO_GDP does not Granger Cause CPS_B_TO_GDP	0.07256	0.7891
	CPS_B_TO_GDP does not Granger Cause M2_TO_GDP	4.76864	0.0352*
Equation 8	MCLC_TO_GDP does not Granger Cause CPS_B_TO_GDP	4.91552	0.0327*
	CPS_B_TO_GDP does not Granger Cause MCLC_TO_GDP	5.32461	0.0266*

Equations	Null Hypothesis	F-statistic	Prob*
Equation 9	DST_TO_MC does not Granger Cause CPS_B_TO_GDP	2.48299	0.1234
	CPS_B_TO_GDP does not Granger Cause DST_TO_MC	16.5373	0.0002**
Equation 10	M2_TO_GDP does not Granger Cause CPS_FS_TO_GDP	0.11884	0.7322
	CPS_FS_TO_GDP does not Granger Cause M2_TO_GDP	4.12552	0.0493*
Equation 11	MCLC_TO_GDP does not Granger Cause CPS_FS_TO_GDP	6.19852	0.0173**
	CPS_FS_TO_GDP does not Granger Cause MCLC_TO_GDP	4.66127	0.0372*
Equation 12	DST_TO_MC does not Granger Cause CPS_FS_TO_GDP	10.0931	0.0030**
	CPS_FS_TO_GDP does not Granger Cause DST_TO_MC	10.1511	0.0029**

Equations	Null Hypothesis	F-statistic	Prob*
Equation 13	MCLC_TO_GDP does not Granger cause M2_TO_GDP	6.13824	0.0176**
	M2_TO_GDP does not Granger cause MCLC_TO_GDP	3.10146	0.0859***
Equation 14	DST_TO_MC does not Granger cause M2_TO_GDP	3.38984	0.0730***
	M2_TO_GDP does not Granger cause DST_TO_MC	1.61061	0.2117
Equation 15	DST_TO_MC does not Granger cause MCLC_TO_GDP	6.77881	0.0129**
	MCLC_TO_GDP does not Granger cause DST_TO_MC	11.5236	0.0016**

** indicates p<0.05, **indicates p<0.01 and *** indicates p<0.10 respectively*

Equation one has the Granger causality results of domestic credit extended to the private sector by banks as a percentage of GDP (CPS_TO_GDP) and GDP per capita (GDP_PER_CAPITA) and shows that CPS by banks to GDP does Granger cause GDP per capita whilst GDP per capita does not Granger cause CPS by banks to GDP seen by the probability values of both variables. This means that there is a relationship between the two variables that comes from the domestic credit extended to the private sector by banks as a percentage of GDP to GDP per capita and not from GDP per capita.

In equation two, the relationship between the domestic credit by financial sector as a percentage of GDP (CPS_FS_TO_GDP) and GDP per capita also comes from CPS by financial sector to GDP and not from GDP per capita to CPS by financial sector to GDP. This also implies that there is a relationship between the two variables that comes only from CPS by financial sector to GDP. Equation three also confirms an existence of a causal relationship between GDP per capita and the ratio of broad money to GDP (M2_TO_GDP) also coming from M2 to GDP. This means that M2 to GDP causes GDP per capita and GDP per capita does not cause M2 to GDP. In equation four, the causal relationship between GDP per capita and market capitalisation of domestic listed companies as a percentage of GDP (MCLC_TO_GDP) comes from MCLC to GDP and not from GDP per capita. Equation five also confirms a causal relationship between GDP per capita and domestic shares traded divided by their market capitalisation (DST_TO_MC) coming from DST to MC, seen by its probability which is less than 0.05.

When the relationship between the other variables is analysed, it is seen in equation six, that the relationship between the domestic credit extended to the private sector by banks as a percentage of GDP (CPS_B_TO_GDP) and the domestic credit by financial sector (CPS_FS_TO_GDP) as a percentage of GDP is also one-sided and comes only from CPS by financial sector to GDP. However, this relationship is less significant, given that the probability is almost greater than 0.05. In equation seven, we see that the ratio of broad money to GDP (M2_TO_GDP) does not Granger cause the domestic credit extended to the private sector by banks as a percentage of GDP (CPS_B_TO_GDP), and that the relationship comes from CPS by banks to GDP to M2 to

GDP. In equation eight, the relationship between market capitalisation of domestic listed companies as percentage of GDP (MCLC_TO_GDP) and the domestic credit extended to the private sector by banks as a percentage of GDP (CPS_B_TO_GDP) bidirectional, coming from both MCLC to GDP and CPS by banks to GDP, as seen by the probabilities of less than 0.05. In equation nine, the relationship between the domestic credit extended to the private sector by banks as a percentage of GDP (CPS_B_TO_GDP) and the domestic shares traded divided by their market capitalisation (DST_TO_MC) comes from CPS by banks to GDP to DST to MC. The relationship between the domestic credit by financial sector as a percentage of GDP

(CPS_FS_TO_GDP) and the ratio of broad money to GDP (M2_TO_GDP) in equation ten comes from CPS by financial sector to GDP to M2 to GDP.

In equation eleven, the domestic credit by financial sector as a percentage of GDP (CPS_FS_TO_GDP) and market capitalisation of domestic listed companies as percentage of GDP (MCLC_TO_GDP) Granger cause each other, meaning that the relationship is bi-directional between the two variables. The relationship between the domestic shares traded divided by their market capitalisation (DST_TO_MC) and the domestic credit extended to the private sector by financial sector as a percentage of GDP (CPS_FS_TO_GDP) in equation twelve is bi-directional, coming from both directions. In equation thirteen, the relationship between MCLC to GDP and M2 to GDP comes from MCLC to GDP. In equation fourteen, we see that DST to MC and M2 to GDP have no relationship at all, seeing that both their probabilities are greater than 0.05, it implies that we fail to reject the null hypothesis of no short run relationship between the two variables. And lastly equation 15 confirms a bi-directional relationship between DST to MC and MCLC to GDP, seen by both their probabilities less than 0.05. This means that these variables Granger cause each other.

In summation, the results of the Granger causality test showed an existence of a unidirectional relationship between financial intermediation and economic growth in the short run. This relationship came from the financial intermediation to economic growth, which further confirms that financial intermediation plays a significant role in ensuring economic growth in the country and economic growth has no impact on the growth of the financial sector. The next section showed the diagnostic test results on the derived models.

5.5 Diagnostic test results

After the ADRL bounds tests were conducted for each model, the diagnostic tests were conducted to verify the following: if the models are correctly specified, using the Ramsey reset test, if there is no Autocorrelation among the variables, using the Breusch-Godfrey LM test, if the residuals are homoscedastic, using the Breusch-Pagan-Godfrey test, and lastly, we examine if the models are normally specified, using the Jarque-Bera test for normality. The diagnostic tests for each model are given in the tables below.

Table 5.7: GDP per Capita Diagnostic Test Results

Test	**Test statistic value**	**Probability***
Breusch-Godfrey: serial correlation LM test	*1.147429*	*0.2991*
Breusch-Pagan-Godfrey Heteroskedasticity	*1.443698*	*0.2252*
Ramsey reset test: Specification	*0.244034*	*0.8101*
Jarque-Bera test: Normality	*0.973556*	*0.614603*

Indicates p<0.05, ** indicates p<0.01 and * indicates p<0.10 respectively*

The diagnostic test results when GDP per capita is used as the dependent variables, show no sign of autocorrelation between the variables where the Breusch-Godfrey test for serial correlation was used. This is supported by the probability of 0.2991, greater than 0.05. The results of the Breusch-Pagan-Godfrey also show no heteroskedasticity among the variables, seen by the Probability of 0.2252, greater than 0.05. The models seem to be correctly specified with the Ramsey reset test's probability of 0.8101, greater than 0.05, and the residuals are stable, evident from the probability of the Jarque-Bera test, 0.614603, greater than 0.05.

Table 5.8: CPS by Banks to GDP Diagnostic Test Results

Test	**Test statistic value**	**Probability***
Breusch-Godfrey: serial correlation LM test	*0.037892*	*0.8469*
Breusch-Pagan-Godfrey Heteroskedasticity	*4.455532*	*0.0014***

Ramsey reset test: Specification	*0.346485*	*0.7312*
Jarque-Bera test: Normality	*1.174643*	*0.555814*

Indicates p<0.05, ** indicates p<0.01 and * indicates p<0.10 respectively*

When CPS by B to GDP is used as the dependent variable, the diagnostic results presented on Table 5.6 below show no evidence of autocorrelation, with the probability result of 0.8469, greater than 0.05. the results also show that the residuals are both correctly specified and normal, seen by the probabilities of both the Ramsey reset test and the Jargue-Bera test greater than 0.05. The results confirm that there is evidence of heteroskedasticity among the variables with the probability, 0.0014 being less than 0.05. This means that the null hypothesis of no homoscedasticity among the variables cannot be rejected.

Table 5.9: CPS by FS to GDP Diagnostic Test Results

Test	**Test statistic value**	**Probability***
Breusch-Godfrey: serial correlation LM test	*5.462716*	*0.0796****
Breusch-Pagan-Godfrey Heteroskedasticity	*2.761075*	*0.1299*
Ramsey reset test: Specification	*0.351261*	*0.7431*
Jarque-Bera test: Normality	*0.226312*	*0.893011*

Indicates p<0.05, ** indicates p<0.01 and * indicates p<0.10 respectively*

The above results of the diagnostic tests when CPS by FS to GDP is used as the dependent variable shows that there is no autocorrelation among the variables with the probability value of 0.0796 greater than 0.05. The test for heteroskedasticity also has the probability value, 0.1299 that is greater than 0.05, which confirms that there is no Heteroskedasticity. The model

is also correctly specified with the probability of 0.7431, greater than 0.05. Lastly, this model is normally distributed, seen by the probability of 0.893011 greater than 0.05.

Table 5.10: M2 to GDP Diagnostic Test Results

Test	**Test statistic value**	**Probability***
Breusch-Godfrey: serial correlation LM test	*18.67759*	*0.0050***
Breusch-Pagan-Godfrey Heteroskedasticity	*2.038694*	*0.1670*
Ramsey reset test: Specification	*0.052717*	*0.9597*
Jarque-Bera test: Normality	*0.157350*	*0.924340*

Indicates p<0.05, ** indicates p<0.01 and * indicates p<0.10 respectively*

When M2 to GDP is used as the dependent variable, the diagnostic results provided in Table 5.7 above show that the model has autocorrelation, seen by the value 0.0050, less than 0.05. This means that the null hypothesis of no serial correlation cannot be rejected. There is no heteroskedasticity on the model, seen by the 0.1670 probability, greater than 0.05 and the model is correctly specified with the probability of 0.9597, greater than 0.05. The probability of the normality test is also greater than 0.05 which shows that the model is normally distributed.

Table 5.11: MCLC to GDP Diagnostic Test Results

Test	**Test statistic value**	**Probability***
Breusch-Godfrey: serial correlation LM test	2.027487	0.2276
Breusch-Pagan-Godfrey Heteroskedasticity	0.611000	0.8182

Ramsey reset test: Specification	2.805708	0.0485*
Jarque-Bera test: Normality	0.235760	0.888803

Indicates p<0.05, ** indicates p<0.01 and * indicates p<0.10 respectively*

The diagnostic test results of MCLC to GDP as a dependent variable, shows that the model has no autocorrelation, with the probability, 0.2276, greater than 0.05. There is no heteroskedasticity on the model, seen by the probability 0.8182, greater than 0.05 and the model is normally distributed, seen by the probability, 0.888803, greater than 0.05. The model however, seems to be incorrectly specified, seen by the probability value 0.0485, less than 0.05.

Table 5.12: DST to MC Diagnostic Test Results

Test	**Test statistic value**	**Probability***
Breusch-Godfrey: serial correlation LM test	0.039649	0.8435
Breusch-Pagan-Godfrey Heteroskedasticity	1.465068	0.2046
Ramsey reset test: Specification	0.126884	0.8999
Jarque-Bera test: Normality	0.144415	0.930338

Indicates p<0.05, ** indicates p<0.01 and * indicates p<0.10 respectively*

When DST to MC is used as a dependent variable, the diagnostic tests results also show no evidence of autocorrelation with the probability of 0.8435, more than 0.05. The Breusch-Pagan-Godfrey test was applied on the test for heteroskedasticity, and the results also sustain that the residuals are homoscedastic with no heteroskedasticity, seen by the probability of 0.2046, greater than 0.05. The Ramsey reset test was also applied, and the results show that the model is correctly specified, with the probability value, 0.8999, greater than 0.05 and lastly the

Jarque-Bera test was applied to test the stability of the model and the results show that the model is stable with the probability of 0.930338, greater than 0.05.

5.6 Conclusion

The different tests conducted in the study, including the ADF stationary test, the P-P stationary test, the ADRL model tests, the Granger Causality, and the diagnostics tests of the ARDL model. Each test was provided in the tables above with interpretation following each one of the tests. From the ADF and P-P unit root tests for stationarity, we find the variables to be stationary at first difference on both the ADF and the P-P test except for the MCLC to GDP variable that proved to be stationary at both levels and after first difference. The results of the ADRL long-run bound test showed evidence of a long-run relationship between the variables only when the parameter, GDP per capita is used as the dependent variable. The results showed a less significant relationship between the variables when the other parameters were used as explanatory parameters. The short-run coefficients also confirmed an existence of a short-run relationship between financial intermediation and economic growth with some exceptions on two of the study variables. The Granger causality test also confirmed a one-sided causality among the variables and proved that growth in the financial sector enhances economic growth in South Africa, whilst economic growth appears to have less impact on the financial sector. In other words, the relationship between the two variables of concern comes from the financial intermediaries, not economic growth.

The diagnostic tests also validated the models' significance except in a few cases, such as when MCLC to GDP was used as the dependent variable where some test results fell within the probability region. The next chapter will contain the summary and conclusions of the study, given the results presented in this chapter.

Chapter 6: Summaries and Conclusions

6.1 Introduction

The previous chapter outlined the results of the estimated models and the overall results of the tests conducted in the study. The focus of the study was to investigate the causal relationship between financial intermediation and economic growth in South Africa using the

Autoregressive Distributed Lag qualitative and the Granger causality methodologies. This chapter provided the summary, conclusion and the contribution of the study based on the outcomes achieved in the previous chapter. The summary and conclusions began this chapter, followed by the policy recommendations and areas of further study. Specifically, summary of results, contribution of the study, recommendations and study limitations were presented in this chapter.

6.2 Summaries and Conclusions on the Findings

The aim of the study was analysing the relationship between financial intermediation and economic growth in South Africa. A quantitative approach was followed guided by Granger causality and Autoregressive Distributed Lag methodologies. The time series secondary data covering periods from 1975 to 2018 was applied in the study sourced from the World Bank. 43 observations were utilised.

Furthermore, the study intended to determine the long-run, as well as the short-run, relationship between financial intermediation and economic growth in South Africa using six different variables to proxy both financial intermediation and economic growth. These variables include GDP per capita, to proxy economic growth, the domestic credit extended to the private sector by banks as a percentage of GDP (CPS B to GDP) and domestic credit extended by the financial sector as a percentage of GDP (CPS FS to GDP) and the ratio of broad money to GDP (M2 to GDP) to proxy the banks and other financial institutions. Market capitalisation of domestic listed companies as a percentage of GDP (MCLC to GDP) and the domestic stock traded divided by the market capitalisation (DST to MC) were used as proxies of the stock market.

The results of the ARDL f-statistic bounds test showed evidence on the long-run relationship between financial intermediaries and economic growth. However, the long run relationship was only confirmed when the GDP per capita was used as the dependent variable. This implies that financial markets contribute significantly to the growth of the economy and that economic growth has no significant impact on the growth of the financial sector. The Granger causality test results also confirmed a short run relationship between financial intermediation and economic growth that is unit directional and comes from financial intermediation. In other

words, financial intermediation plays a significant role in stimulating economic growth whilst the role of economic growth in stimulating growth in the financial sector is less significant.

These results, therefore, support the study objectives and confirm that there is a long-run, as well as the short-run, relationship between financial intermediaries and economic growth. From the results, it is seen that the relationship between financial intermediaries and economic growth depends on the country's economic conditions and the variables used to analyse the relationship. It also depends on the methods applied in the study and the role of the financial sector in the country. The conclusion, therefore, is that financial intermediation plays a significant role on stimulation economic growth in South Africa and that economic growth has less impact on the growth of the financial sector.

6.3 Main Contributions of the Study

The study aimed at analysing the causal relationship between financial intermediation and economic growth in South Africa using two broad methodologies. Specifically, the Granger causality and the Autoregressive Distributed Lag model to analyse this relationship were used for the analysis. The study took note of the few studies conducted in South Africa under the topic of interest, including the study by Odhiambo (2004) and Gondo (2009), which aimed at analysing the relationship between financial development and economic growth in South Africa. These two studies focused more on the relationship between financial development and economic growth with less emphasis given on the causal relationship between financial intermediaries and economic growth.

This study, therefore, fills such a gap by introducing the importance of both banks and stock markets as financial intermediaries, whilst also catering for the role of other financial institutions than bank on economic growth. This was done by introducing variables in the study, not seen in the previous studies reviewed, that proxy the banks, the stock market and the other financial institutions. Additionally, results of the study confirmed a long-run as well as a short-run relationship between financial intermediaries and economic growth in South Africa. The study also showed the impact of the crypto currencies on the role of financial intermediaries in the country. Lastly, the study also contributed to the existing studies on the

latest information on the relationship between financial intermediaries and economic growth by using the latest periods in literature.

6.4 Policy Recommendations

From the results of the study, it is clear to see that financial intermediation in South Africa plays a crucial role in stimulating the economic growth of the country. This role is evident and seen through the direct, as well as the indirect, impact the financial sector has on the country's economy. This role includes but is not limited to job creation as a significant number of employment opportunities comes from the financial sector. Also, the role of financial intermediation is seen through their active involvement and promotion of entrepreneurship and development in the republic. For instance, this involvement includes offering and extending credit to the private sector in support of entrepreneurship innovation.

The main role of the financial sector in ensuring greater efficiency and transformation through proper transfers of saving to investment in South Africa should always be emphasized. To ensure that this sector continues its role efficiently, it is, therefore, more the task of the economic role players than the financial sector to ensure that this role is never undermined.

To do this, in working together, the domestic savings and investments must always be encouraged as this serves as the main source of growth in the financial sector. From the consumers' perspectives, proper education and information must be conveyed to consumers, thereby encouraging and promoting domestic savings and investment. In the case of firms and investors, more domestic entrepreneurship opportunities as well as proper information should be given to encourage more innovation and entrepreneurship development, with more emphasis given to the youth. This may result in an increase in the role of financial intermediation in the country.

The government also has a role to play in insuring that the policies regarding the roles of financial institutions are clear and effective for the protection and development of both the economy and the financial intermediaries. More government intervention is still needed to preserve and protect the role of financial intermediaries, and at the same time, consumer interest still needs to be taken into consideration regarding transactional activities with the

financial intermediaries. Government can also ensure growth in the sector through different strategies of encouraging domestic investment and saving. These strategies may include more entrepreneurial opportunities, more employment and development opportunities as well as more education and information offered to the public. The role of these financial intermediaries should also be extended to cater for every citizen of the country through different projects that allow the public more opportunities with finance and savings. An example would be offering investment opportunities to the elderly group in the country, such as domestic shares trading, thereby increasing the role of financial intermediaries.

Domestic growth and development of financial intermediaries should also be encouraged and promoted by the government to encourage domestic investment. This can be done through funding and promotion of domestic financial intermediaries. The government should also investigate the rise and development of crypto-currencies and their impact on the financial sector as well as the economy as a whole and put relevant policy into place to regulate and minimize the risks and uncertainties associated with this development.

The World Bank (2018) reported that South Africa still struggles with low growth in private investment and poor integration into the global value chains. This prevents the country from enjoying the new economic opportunities from around the world. More work still needs to be done in improving the growth of the country, and more strategies are needed from all aspects and contributors on the economy to change the status quo of the country. Emphasis must be given to ways of promoting international trade and investment. More foreign direct investment must be encouraged and promoted, as this is also one of the major contributors to growth and employment.

According to the World Bank, South Africa needs to build its competitive edge in the global markets through higher production and innovation. This will reduce its high dependency on commodity price movements, which are currently not favourable for the country. One of the major roles of financial intermediation is to promote production and innovation through providing funding and information to entrepreneurs and ensuring growth in investment by funding the most innovative projects as they arise. This role must also be taken into consideration by the policy makers and more support should be offered to the financial institutions currently filling this role efficiently.

Lastly it should also be noted by the financial intermediaries that their part is also important in further ensuring the economic growth of the country. This means that the financial sector also needs to continue playing an effective role in the country through different ways that include more job creation, promotion and development of innovation and entrepreneurship as well as offering efficient and safer financial services, thereby encouraging, and promoting savings and investment.

6.5 Limitations and Suggestions for Areas of Further Study

The study considers the impact of crypto currency development on the role of financial intermediaries. However, less emphasis is given in this impact. Researchers interested in studying further on this topic may also consider the role of Crypto-currencies and block chain on the South African financial sector. Other researchers may also consider looking into the relationship between financial intermediation and economic growth in South Africa using different variables that are also relevant, such as the ratio of bank deposit liabilities to real GDP and using different study techniques. Lastly the results of the study seem to show a less significant relationship between the stock market variables and economic growth. This means that studying the role of the stock market in stimulating economic growth in South Africa may also serve as a revealing topic of study.

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APPENDICES

APPENDIX A: DATA

year	GDP per capita	cps by banks to GDP	cps by fs to GDP	m2 to GDP	mclc to GDP	dst to mc
1975	47899.74972	49.73568438	59.77612999	59.872277	63.2317364	3.70942967
1976	47761.0138	47.97417449	58.93996041	57.6976971	53.8240298	3.77155834
1977	46555.62839	46.55577244	57.78805624	57.1710657	59.2036984	3.47791544
1978	46796.18313	45.65238787	55.7650764	57.6800433	66.2096961	3.53532628
1979	47368.53472	43.93312594	54.63915614	56.4548095	77.1317726	4.72805636
1980	49214.52817	41.50275422	49.52512843	52.0893421	67.2779301	9.29321653

1981	50480.44662	45.87321483	53.33777819	52.6131772	83.5174386	3.47687688
1982	48923.68725	47.20350428	51.65936608	52.595211	94.1365373	3.33191604
1983	46713.70425	49.31276312	53.46760448	52.3454153	93.2079597	4.12717313
1984	47788.43589	52.42033583	55.46790647	53.5261691	60.7510873	3.43215391
1985	45999.91002	52.49138036	57.04346274	53.1648516	80.1013875	4.38252984
1986	44885.82129	48.89094492	53.06745782	49.3631756	125.020613	5.05073314
1987	44757.42007	48.09949595	52.147317	50.47785	129.207693	7.13259126
1988	45570.13256	51.1060583	54.66926394	53.4353756	106.640395	3.49119445
1989	45584.65462	50.94593918	53.5072923	53.6747765	112.827829	5.08750493
1990	44364.98524	50.8004957	53.90642905	52.156547	118.446418	6.02461249
1991	42843.98243			53.3579746	149.023386	4.37385188
1992	40894.43853	55.21717489	57.15247223	48.9519784	121.926135	4.41501093
1993	40394.93109	53.66875985	55.4109742	45.5000182	161.639438	3.64562399
1994	40731.49336	56.03799022	59.47045037	47.6123112	185.702233	5.14664534
1995	41110.72132	57.47973824	58.55587281	48.6184759	178.431025	5.74928283
1996	42061.07662	59.95688697	61.44961244	49.3672502	163.657233	11.0305809
1997	42405.3121	61.85087261	64.853929	52.4943928	150.760638	18.2877176
1998	41939.47841	66.45239727	70.6195681	55.0758516	122.32723	32.2085262
1999	42310.35287	66.26618892	69.81003003	55.7343813	190.101443	28.0353527
2000	43470.54113	67.33550031	70.5489473	52.7104956	149.822537	34.5088484
2001	44052.95538	74.43264503	79.26091341	57.3077521	121.275113	23.9790826
2002	45109.31994	56.03039355	68.54695107	58.2577561	157.236597	26.2015285
2003	45874.74707	60.77204461	71.44641083	60.6311549	148.780587	18.814587
2004	47383.58242	62.50478253	70.62743659	61.5969422	193.292927	18.9298601
2005	49270.40494	65.90210516	72.18156881	66.9700502	213.18248	20.26418

2006	51378.08611	73.62444727	77.94261819	73.1850993	261.830469	24.427983
2007	53437.57692	78.29413478	82.27304069	79.0859515	276.600679	31.1191836
2008	54412.0045	76.68677469	84.4220539	80.799888	168.323133	41.9799997
2009	52834.74689	74.59646003	84.08071927	77.6779052	269.998391	27.2224374
2010	53654.25213	70.35180226	81.44515041	75.7996131	246.43893	29.9699078
2011	54577.48851	67.58549747	75.80391745	74.635628	189.481596	28.6210853
2012	54909.29185	68.6289006	77.5986525	72.9424353	229.033398	24.9926464
2013	55377.49503	67.27127519	73.07472933	71.0136098	257.147017	24.633799
2014	55514.43185	67.05985472	74.4653605	70.870282	266.353183	26.3077999
2015	55324.75167	68.21328391	75.60073701	73.4378553	231.766869	31.7942708
2016	54737.82897	66.73558188	76.9407588	72.5500901	321.667377	38.3680195
2017	54736.11077	65.5921515	78.69586081	72.2079165	352.845293	25.737846
2018	54422.97632	65.73862304	79.06301241	72.7763448	234.958902	34.0925705

APPENDIX B: UNIT ROOT TESTS RESULTS

ADF UNIT ROOT TEST RESULTS

GDPPC

Null Hypothesis: GDPPC has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.608207	0.7728
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

D(GDPPC)

Null Hypothesis: D(GDPPC) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.031074	0.0150
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

CPSB

Null Hypothesis: CPSB has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.525526	0.3149
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

D(CPSB)

Null Hypothesis: D(CPSB) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.009104	0.0000
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

CPSF

Null Hypothesis: CPSF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.583266	0.2895
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

D(CPSF)

Null Hypothesis: D(CPSF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.489933	0.0000
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

M2GDP

Null Hypothesis: M2GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.102368	0.5295
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

D(M2GDP)

Null Hypothesis: D(M2GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.431745	0.0053
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

MCLC

Null Hypothesis: MCLC has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.546094	0.0002
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

D(MCLC)

Null Hypothesis: D(MCLC) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.475737	0.0000
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

DSTMC

Null Hypothesis: DSTMC has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.139817	0.1104
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

D(DSTMC)

Null Hypothesis: D(DSTMC) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.050221	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

PP UNIT ROOT TEST RESULTS

GDPPC

Null Hypothesis: GDPPC has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.343425	0.8632
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1110956.
HAC corrected variance (Bartlett kernel)	1760205.

D(GDPPC)

Null Hypothesis: D(GDPPC) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.016480	0.0156
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	989491.8
HAC corrected variance (Bartlett kernel)	974809.1

CPSB

Null Hypothesis: CPSB has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.639994	0.2657
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	13.76392
HAC corrected variance (Bartlett kernel)	15.11312

D(CPSB)

Null Hypothesis: D(CPSB) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.010778	0.0000
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	16.29822
HAC corrected variance (Bartlett kernel)	16.23645

CPSF

Null Hypothesis: CPSF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.622681	0.2729
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	9.914893
HAC corrected variance (Bartlett kernel)	10.49900

D(CPSF)

Null Hypothesis: D(CPSF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.409016	0.0000
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	11.57378
HAC corrected variance (Bartlett kernel)	13.31151

M2GDP

Null Hypothesis: M2GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.063960	0.5505
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	5.666235
HAC corrected variance (Bartlett kernel)	8.423113

D(M2GDP)

Null Hypothesis: D(M2GDP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.460474	0.0050
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	5.580560
HAC corrected variance (Bartlett kernel)	5.774577

MCLC

Null Hypothesis: MCLC has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.498417	0.0003
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

D(MCLC)

Null Hypothesis: D(MCLC) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.28563	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

DSTMC

Null Hypothesis: DSTMC has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.082934	0.1232
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

D(DSTMC)

Null Hypothesis: D(DSTMC) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.977175	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

APPENDIX C: ADRL BOUND AND DIAGNOSTICS TEST RESULTS

GDPPC

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	8.287274	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	35	Finite Sample: n=35		
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-6.343538	10%	-2.57	-3.86
		5%	-2.86	-4.19
		2.5%	-3.13	-4.46
		1%	-3.43	-4.79

CPSB

EC = CPSB - (-0.0003*GDPPC + 0.4872*CPSF + 0.1907*M2GDP + 0.0238 *MCLC + 0.0201*DSTMC)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	1.911598	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	41		Finite Sample: n=45	
		10%	2.458	3.647
		5%	2.922	4.268
		1%	4.03	5.598
			Finite Sample: n=40	
		10%	2.483	3.708
		5%	2.962	4.338
		1%	4.045	5.898

CPSF

EC = CPSF - (0.7331*CPSB -0.0001*GDPPC + 0.5405*M2GDP -0.0389 *MCLC + 0.0103*DSTMC)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	2.165297	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04

t-Bounds Test Null Hypothesis: No levels relationship

M2GDP

EC = M2GDP - (0.8790*CPSF -1.1029*CPSB + 0.0024*GDPPC + 0.0674 *MCLC + 0.0947*DSTMC)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	1.616907	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04

MCLC

EC = MCLC - (21.7722*M2GDP -40.6675*CPSF + 23.3771*CPSB -0.0082 *GDPPC + 5.0374*DSTMC)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	0.944345	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04

DSTMC

EC = DSTMC - (0.0250*MCLC -0.9464*M2GDP + 1.2809*CPSF -0.0386 *CPSB + 0.0012*GDPPC)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	2.495238	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	41		Finite Sample: n=45	
		10%	2.458	3.647
		5%	2.922	4.268
		1%	4.03	5.598
			Finite Sample: n=40	
		10%	2.483	3.708
		5%	2.962	4.338
		1%	4.045	5.898

DIAGNOSTIC TESTS RESULTS

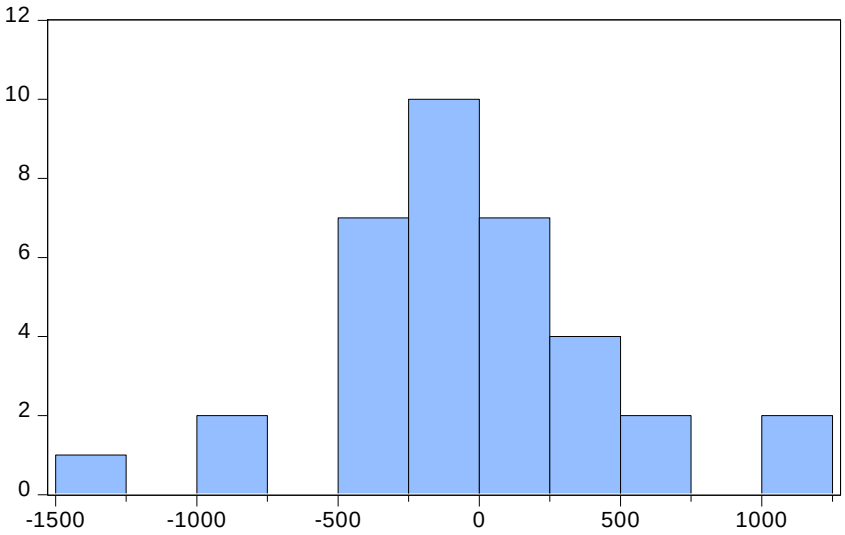
GDPPC

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	1.147429	Prob. F(1,17)	0.2991
Obs*R-squared	2.212987	Prob. Chi-Square(1)	0.1369

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.443698	Prob. F(16,18)	0.2252
Obs*R-squared	19.67122	Prob. Chi-Square(16)	0.2354
Scaled explained SS	7.220931	Prob. Chi-Square(16)	0.9688



Series: Residuals
Sample 1979 2018
Observations 35

Mean	1.77e-11
Median	-46.32652
Maximum	1187.537
Minimum	-1250.457
Std. Dev.	497.4365
Skewness	0.128226
Kurtosis	3.775766
Jarque-Bera	0.973556
Probability	0.614603

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: GDPPC GDPPC(-1) CPSB CPSB(-1) CPSB(-2) CPSB(-3) CPSB(-4) CPSF CPSF(-1) CPSF(-2) CPSF(-3) CPSF(-4) M2GDP MCLC MCLC(-1) DSTMC DSTMC(-1) C

	Value	df	Probability
t-statistic	0.244034	17	0.8101
F-statistic	0.059552	(1, 17)	0.8101
Likelihood ratio	0.122394	1	0.7265

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	29368.79	1	29368.79
Restricted SSR	8413066.	18	467392.5
Unrestricted SSR	8383697.	17	493158.6

LR test summary:

	Value
Restricted LogL	-266.4869
Unrestricted LogL	-266.4257

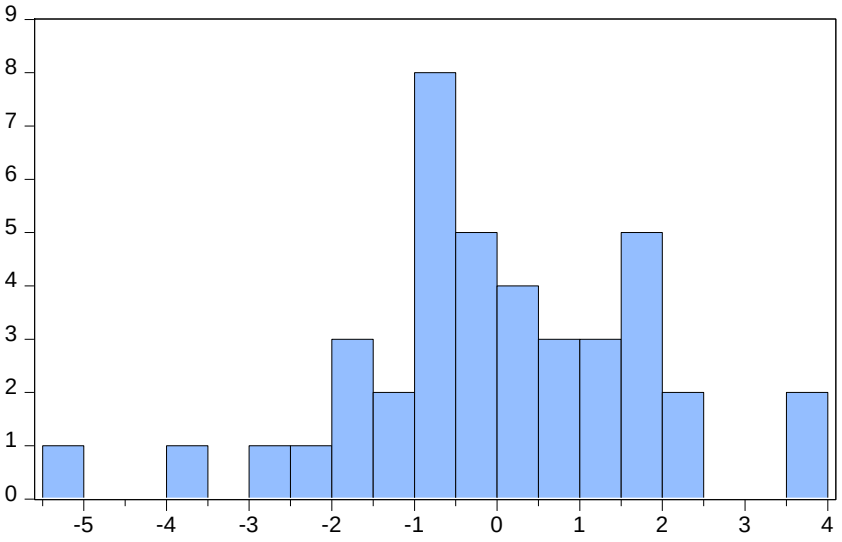
CPSB

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.037892	Prob. F(1,32)	0.8469
Obs*R-squared	0.048492	Prob. Chi-Square(1)	0.8257

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	4.455532	Prob. F(7,33)	0.0014
Obs*R-squared	19.92153	Prob. Chi-Square(7)	0.0057
Scaled explained SS	16.62548	Prob. Chi-Square(7)	0.0200



Series: Residuals
Sample 1976 2018
Observations 41

Mean	-2.65e-16
Median	-0.240254
Maximum	3.789686
Minimum	-5.046303
Std. Dev.	1.792483
Skewness	-0.298037
Kurtosis	3.576448
Jarque-Bera	1.174643
Probability	0.555814

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: CPSB CPSB(-1) GDPPC CPSF CPSF(-1) M2GDP MCLC DSTMC C

	Value	df	Probability
t-statistic	0.346485	32	0.7312
F-statistic	0.120052	(1, 32)	0.7312
Likelihood ratio	0.153529	1	0.6952

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.480356	1	0.480356
Restricted SSR	128.5199	33	3.894542
Unrestricted SSR	128.0395	32	4.001235

LR test summary:

	Value
Restricted LogL	-81.59797
Unrestricted LogL	-81.52120

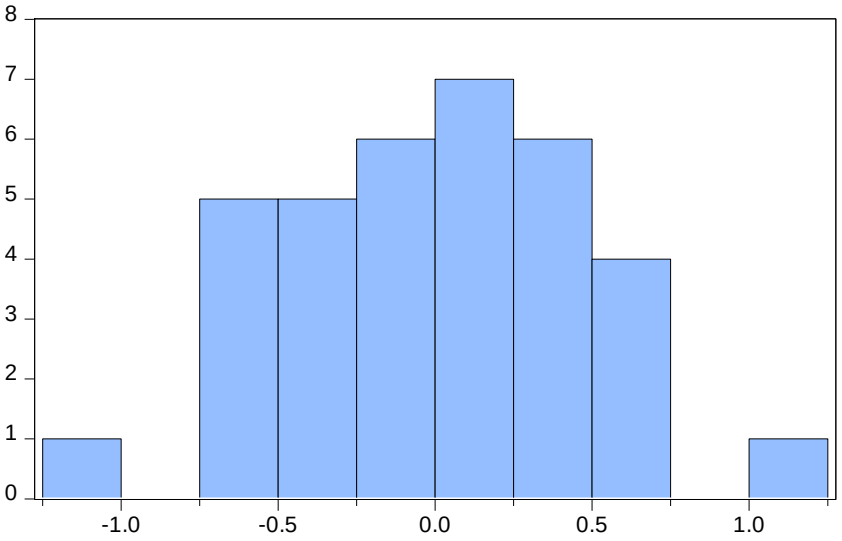
CPSF

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	5.462716	Prob. F(1,4)	0.0796
Obs*R-squared	20.20509	Prob. Chi-Square(1)	0.0000

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	2.761075	Prob. F(29,5)	0.1299
Obs*R-squared	32.94290	Prob. Chi-Square(29)	0.2800
Scaled explained SS	0.553055	Prob. Chi-Square(29)	1.0000



Series: Residuals
Sample 1979 2018
Observations 35

Mean	9.27e-15
Median	0.004733
Maximum	1.100054
Minimum	-1.093252
Std. Dev.	0.475171
Skewness	-0.085643
Kurtosis	2.645252
Jarque-Bera	0.226312
Probability	0.893011

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: CPSF CPSF(-1) CPSF(-2) CPSF(-3) CPSF(-4) CPSB CPSB(-1) CPSB(-2) CPSB(-3) CPSB(-4) GDPPC GDPPC(-1) GDPPC(-2) GDPPC(-3) GDPPC(-4) M2GDP M2GDP(-1) M2GDP(-2) M2GDP(-3) M2GDP(-4) MCLC MCLC(-1) MCLC(-2) MCLC(-3) MCLC(-4) DSTMC DSTMC(-1) DSTMC(-2) DSTMC(-3) DSTMC(-4) C

	Value	df	Probability
t-statistic	0.351261	4	0.7431
F-statistic	0.123384	(1, 4)	0.7431
Likelihood ratio	1.063296	1	0.3025

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.229712	1	0.229712
Restricted SSR	7.676766	5	1.535353
Unrestricted SSR	7.447054	4	1.861763

LR test summary:

	Value
Restricted LogL	-23.11273
Unrestricted LogL	-22.58108

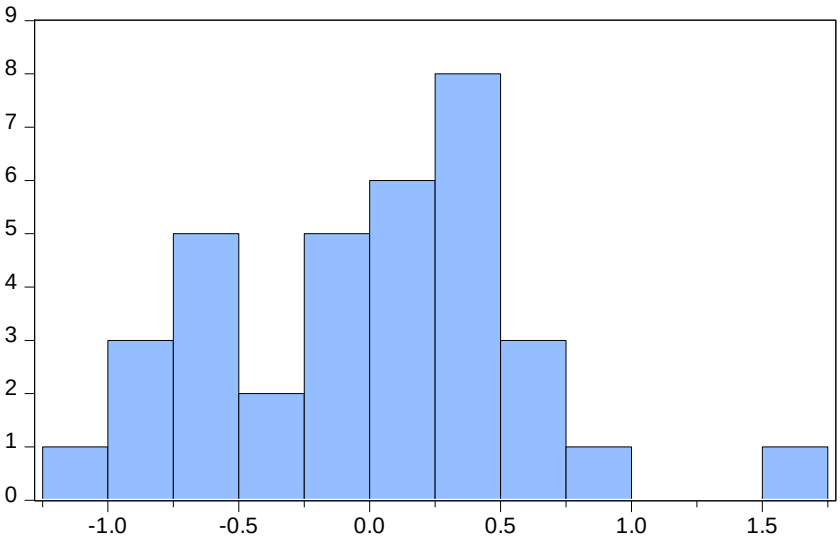
M2GDP

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	18.67759	Prob. F(1,6)	0.0050
Obs*R-squared	26.49026	Prob. Chi-Square(1)	0.0000

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	2.038694	Prob. F(27,7)	0.1670
Obs*R-squared	31.05124	Prob. Chi-Square(27)	0.2690
Scaled explained SS	1.300275	Prob. Chi-Square(27)	1.0000



Series: Residuals
Sample 1979 2018
Observations 35

Mean	2.48e-14
Median	0.139298
Maximum	1.534408
Minimum	-1.076242
Std. Dev.	0.558656
Skewness	0.157406
Kurtosis	3.093757
Jarque-Bera	0.157350
Probability	0.924340

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: M2GDP M2GDP(-1) M2GDP(-2) M2GDP(-3) CPSF CPSF(-1) CPSF(-2) CPSF(-3) CPSF(-4) CPSB CPSB(-1) CPSB(-2) CPSB(-3) GDPPC GDPPC(-1) GDPPC(-2) GDPPC(-3) GDPPC(-4) MCLC MCLC(-1) MCLC(-2) MCLC(-3) MCLC(-4) DSTMC DSTMC(-1) DSTMC(-2) DSTMC(-3) DSTMC(-4) C

	Value	df	Probability
t-statistic	0.052717	6	0.9597
F-statistic	0.002779	(1, 6)	0.9597
Likelihood ratio	0.016208	1	0.8987

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.004913	1	0.004913
Restricted SSR	10.61127	7	1.515896
Unrestricted SSR	10.60636	6	1.767727

LR test summary:

	Value
Restricted LogL	-28.77780
Unrestricted LogL	-28.76970

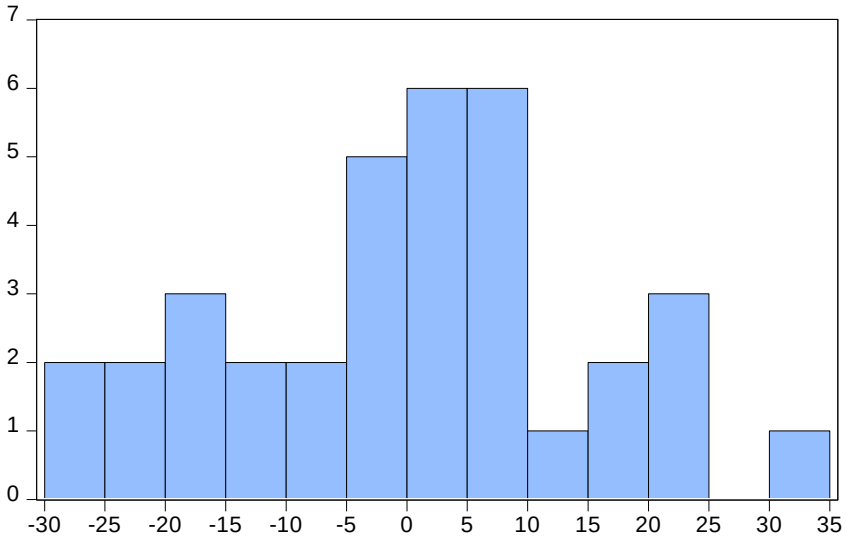
MCLC

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	2.027487	Prob. F(1,4)	0.2276
Obs*R-squared	11.77308	Prob. Chi-Square(1)	0.0006

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.611000	Prob. F(29,5)	0.8182
Obs*R-squared	27.29720	Prob. Chi-Square(29)	0.5557
Scaled explained SS	0.448200	Prob. Chi-Square(29)	1.0000



Series: Residuals
Sample 1979 2018
Observations 35

Mean	-2.42e-14
Median	0.532046
Maximum	34.67112
Minimum	-27.76586
Std. Dev.	14.91190
Skewness	-0.047043
Kurtosis	2.609089
Jarque-Bera	0.235760
Probability	0.888803

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: MCLC MCLC(-1) MCLC(-2) MCLC(-3) MCLC(-4) M2GDP M2GDP(-1) M2GDP(-2) M2GDP(-3) M2GDP(-4) CPSF CPSF(-1) CPSF(-2) CPSF(-3) CPSF(-4) CPSB CPSB(-1) CPSB(-2) CPSB(-3) CPSB(-4) GDPPC GDPPC(-1) GDPPC(-2) GDPPC(-3) GDPPC(-4) DSTMC DSTMC(-1) DSTMC(-2) DSTMC(-3) DSTMC(-4) C

	Value	df	Probability
t-statistic	2.805708	4	0.0485
F-statistic	7.871996	(1, 4)	0.0485
Likelihood ratio	38.07608	1	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	5013.094	1	5013.094
Restricted SSR	7560.400	5	1512.080
Unrestricted SSR	2547.305	4	636.8264

LR test summary:

	Value
Restricted LogL	-143.7311
Unrestricted LogL	-124.6931

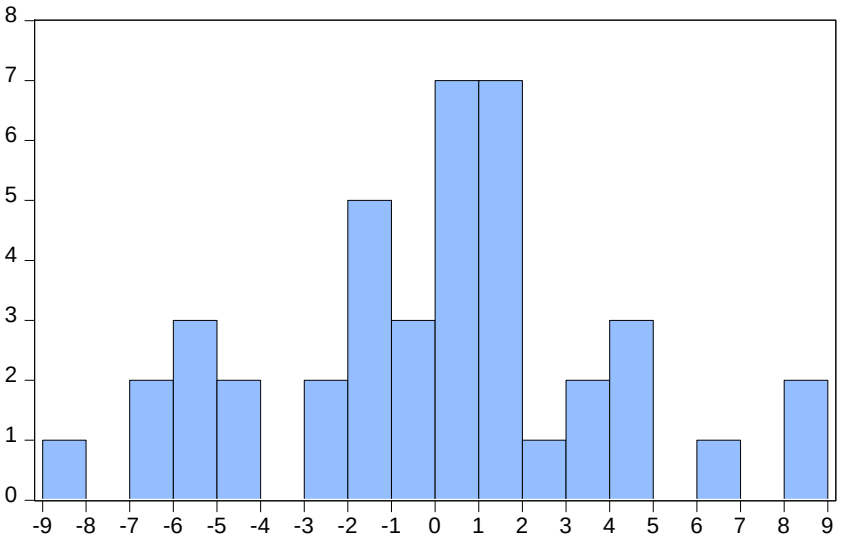
DSTMC

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.039649	Prob. F(1,30)	0.8435
Obs*R-squared	0.054116	Prob. Chi-Square(1)	0.8161

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.465068	Prob. F(9,31)	0.2046
Obs*R-squared	12.23498	Prob. Chi-Square(9)	0.2004
Scaled explained SS	6.945419	Prob. Chi-Square(9)	0.6428



Series: Residuals
Sample 1977 2018
Observations 41

Mean	-5.79e-15
Median	0.333251
Maximum	8.928415
Minimum	-8.115542
Std. Dev.	3.836456
Skewness	0.145205
Kurtosis	2.985956
Jarque-Bera	0.144415
Probability	0.930338

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: DSTMC DSTMC(-1) MCLC MCLC(-1) M2GDP M2GDP(-1) M2GDP(-2) CPSF CPSB GDPPC C

	Value	df	Probability
t-statistic	0.126884	30	0.8999
F-statistic	0.016100	(1, 30)	0.8999
Likelihood ratio	0.021997	1	0.8821

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.315776	1	0.315776
Restricted SSR	588.7359	31	18.99148
Unrestricted SSR	588.4201	30	19.61400

LR test summary:

	Value
Restricted LogL	-112.7968
Unrestricted LogL	-112.7858

APPENDIX D: *GRANGER CAUSALITY TEST RESULTS*

Pairwise Granger Causality Tests
Date: 01/19/20 Time: 16:51
Sample: 1975 2018
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
CPSB does not Granger Cause GDPPC	41	4.00625	0.0525
GDPPC does not Granger Cause CPSB		0.03971	0.8431
CPSF does not Granger Cause GDPPC	41	6.78654	0.0130
GDPPC does not Granger Cause CPSF		0.10973	0.7423
M2GDP does not Granger Cause GDPPC	43	6.96722	0.0118
GDPPC does not Granger Cause M2GDP		0.38445	0.5387
MCLC does not Granger Cause GDPPC	43	5.06427	0.0300
GDPPC does not Granger Cause MCLC		1.21457	0.2770
DSTMC does not Granger Cause GDPPC	43	4.66927	0.0368
GDPPC does not Granger Cause DSTMC		0.09250	0.7626
CPSF does not Granger Cause CPSB	41	0.75537	0.3902
CPSB does not Granger Cause CPSF		3.88164	0.0561
M2GDP does not Granger Cause CPSB	41	0.07256	0.7891
CPSB does not Granger Cause M2GDP		4.76864	0.0352
MCLC does not Granger Cause CPSB	41	4.91552	0.0327
CPSB does not Granger Cause MCLC		5.32461	0.0266
DSTMC does not Granger Cause CPSB	41	2.48299	0.1234
CPSB does not Granger Cause DSTMC		16.5373	0.0002
M2GDP does not Granger Cause CPSF	41	0.11884	0.7322
CPSF does not Granger Cause M2GDP		4.12552	0.0493
MCLC does not Granger Cause CPSF	41	6.19852	0.0173
CPSF does not Granger Cause MCLC		4.66127	0.0372
DSTMC does not Granger Cause CPSF	41	10.0931	0.0030
CPSF does not Granger Cause DSTMC		10.1511	0.0029
MCLC does not Granger Cause M2GDP	43	6.13824	0.0176
M2GDP does not Granger Cause MCLC		3.10146	0.0859
DSTMC does not Granger Cause M2GDP	43	3.38984	0.0730
M2GDP does not Granger Cause DSTMC		1.61061	0.2117
DSTMC does not Granger Cause MCLC	43	6.77881	0.0129
MCLC does not Granger Cause DSTMC		11.5236	0.0016