

# **The role of Private Capital Flows and Financial Deepening in the economic growth of South Africa**

A Dissertation

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By

**Sharon Karimatsenga**

**(KRMSHA003)**

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*Supervisor:* Abdul Latif Alhassan, Ph.D.

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Most importantly I would like to thank God for his provision and guidance.

## **ABSTRACT**

This research examines the role of Private Capital Flows (PCF) and Financial Deepening in the economic growth of South Africa. Using secondary data obtained from the South African Reserve Bank and the World Bank online databases for the period 1990 to 2015, we examine the relationship between these three variables using the Autoregressive Distributed Lag (ARDL) bounds testing procedure. The causal relationship between the variables is further investigated using the Granger Causality test. Where previous studies mainly focus on investigating the relationship between capital flows and economic growth; and that of financial deepening and economic growth in South Africa independently; this study looks at the interrelationship between these three variables.

Contrary to our expectations, the findings from the research suggest that there is no significant long run relationship between these variables in South Africa; however we found significant unidirectional short run causal relationships between the variables. The study established that in the short run, economic growth granger causes private capital flows; financial deepening granger causes private capital flows and that economic growth granger causes financial deepening. These findings imply that putting in place policies that encourage economic growth will lead to improvements in both PCF and financial deepening in the short run. In turn, improvements in financial deepening will also foster improvements in PCF in the short run. The results, policy implications, and future research are discussed.

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## **GLOSSARY OF TERMS**

ARDL –	Autoregressive Distributed Lag
FDI –	Foreign Direct Investment
GDP –	Gross Domestic Product
IMF –	International Monetary Fund
OECD -	The Organisation for Economic Co-operation and Development
PCF –	Private Capital Flows
SARB –	The South African Reserve Bank

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the Study Research Area

Private Capital Flows (PCF) have generally been associated with domestic investment and economic growth (The World Bank, 2002). Private capital flows are made up of “Foreign Direct Investment, portfolio equity, remittances sent home by migrants and private sector borrowing” (OECD, 2017). A few studies have been conducted to establish the nature of the relationship between PCF and economic growth in South Africa. One such study established that there is a negative relationship between PCF and economic growth. In the presence of a strong financial market, however, PCF stimulate economic growth (Agbloyor, Abor, Adjasi, & Yawson, 2014).

The studies by Agbloyor, Abor, Adjasi, & Yawson (2014) however failed to conclusively identify a causal relationship between PCF and economic growth. Strauss (2015) studies focussed on Foreign Direct Investment (FDI) and economic growth in South Africa over the period from 1994 to 2013. Their findings were characterised by ambiguity on the existence of a causal relationship between the two variables. From the few studies that have been conducted so far there is no evidence of gains to economic growth as a result of PCF and the findings are characterised by uncertainty on the conclusions.

In 2015, South Africa was the third largest economy in Africa as well as the largest economy in Sub-Saharan Africa, with a GDP of USD 314.6 billion (The World Bank, 2017). The size of the country’s economy gives it a pivotal role in the economic growth in the region. South Africa experienced a period of sanctions and low capital flows prior to 1994. Since 1994, the country experienced an increase in capital flows. For example, in 1993 there was a net outflow of R13,7 billion, yet in 1994 there was a net inflow of R2,6 billion (Wesso, 2001).

Following democratisation, South Africa received a large portion of the total PCF to Africa. For instance, in 2005, South Africa received 54.4% of the FDI in Africa, whilst 45.6% were distributed among the rest of the other countries (Orji, Uche, & iHori, 2014).

The nature of international capital flows is such that they move to countries perceived to potentially give high returns on investment (de Beer, 2015). PCF are known to be highly volatile and susceptible to market sentiment. This makes the recipients of these capital flows vulnerable to capital flight and reduced capital inflows, in the event of a financial crisis (United Nations Development Programme, 2011). In an effort to liberalise its financial market, South Africa started using a floating exchange rate in 1995. The flexible exchange rate has been attributed to helping to manage volatile capital flows in South Africa (de Beer, 2015).

PCF contribute to investment in fixed capital formation. This in turn increases the country's potential to increase future income streams and to smooth consumption in the long run (de Beer, 2015). In South Africa's case, the country has become increasingly reliant on PCF to cover the gap between gross savings and gross fixed capital formation since 2003 (de Beer, 2015).

The country is also reliant on PCF to finance the current account deficit. Based on international standards, South Africa's current account deficit is regarded as large and it is one of the largest deficits among the emerging market economies. The main components of PCF financing the current account deficit are other investment flows and unrecorded transactions (IMF, 2016).

The external financing mix for South Africa has been shifting from portfolio and direct investment flows towards other investment flows and unrecorded transactions. The reasons for the shift include:

- a) The decline in portfolio debt flows, resulting in a moderation of net portfolio flows, in line with other emerging economies; and
- b) The rise in outward FDI by South African companies, which negated the net FDI flows for the country (IMF, 2016).

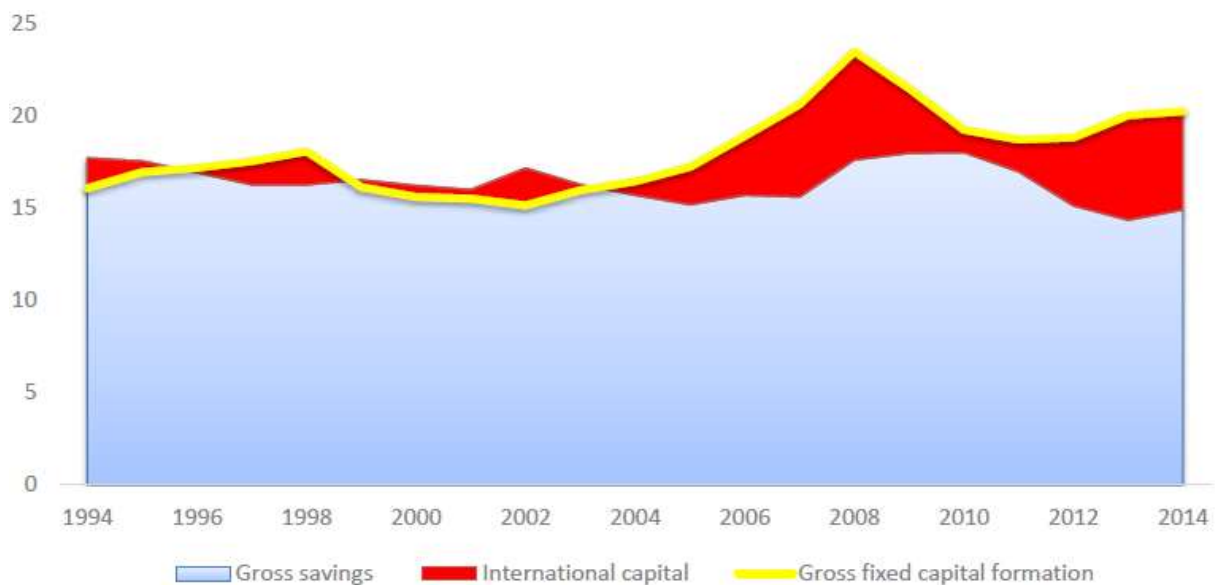
In light of the above, there is need to establish the relationship between PCF and economic growth in South Africa, as well as the role that the strength of the financial market (financial deepening) plays in this relationship.

## 1.2 Problem Statement

The increased reliance of South Africa on PCF, to cover the gap between gross savings and gross fixed capital formation and to finance the current account deficit, makes the country's economy vulnerable to changes in this form of financing (de Beer, 2015).

PCF are characterised by volatility and abrupt reversals due to panic and economic down turn or collapse. South Africa is no exception to experiencing the volatility of these flows. The graph below shows the impact of PCF on the gap between gross savings and gross fixed capital formation.

**Figure 1: Financing South Africa's gross fixed capital formation (ratio to GDP)**



Source: (de Beer, 2015, p. 3)

According to the International Monetary Fund (IMF), the mix of external financing or PCF has been changing in recent years from the main components being portfolio and direct investment flows, to mainly comprising of other investment flows and unrecorded transactions. The change of the mix of the components of PCF to South Africa is of great concern, and there is need to find out the long term impact of these changes on the economy as a whole and in particular, on economic growth (IMF, 2016).

It is important to understand the relationship between PCF and economic growth, as well as the role of financial deepening in this relationship. This knowledge will help to inform the

process of developing policies to promote economic growth and to harness the right mix of PCF that will contribute to stabilizing the economy and fostering economic growth.

It is therefore important to establish the nature of the relationship between PCF and economic growth for South Africa, over the 1990-2015 period, as well as the effect of financial deepening on this relationship.

This study will try to answer the question:

1. What impact do PCF and financial deepening have on economic growth in South Africa?

### **1.3 Research Objectives and Hypothesis**

The objectives of this study are as follows:

- To examine the interrelationship between PCF, financial deepening and economic growth in South Africa.

These questions were answered by testing the following Hypothesis:

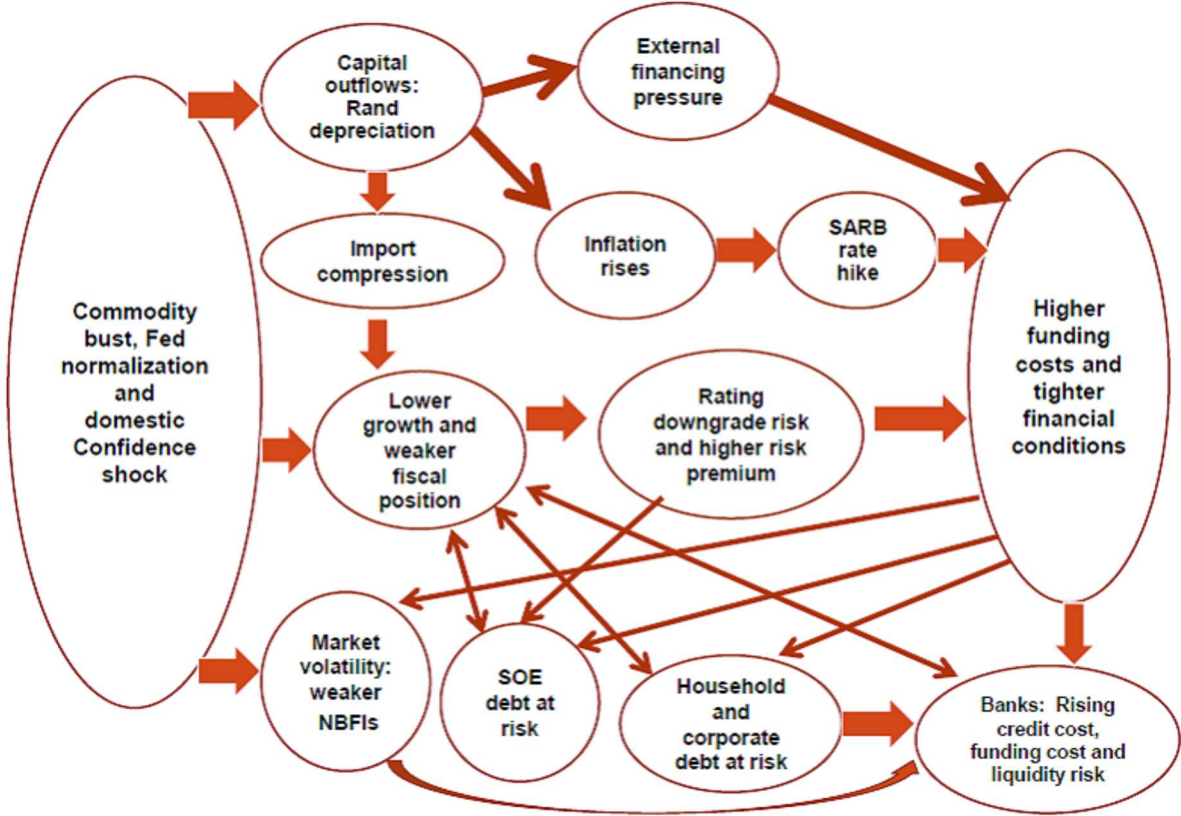
1.  $H_0$ : There is a significant relationship between PCF, financial deepening and economic growth in South Africa

### **1.4 Justification of the Research**

The results of this paper provide some insight into whether there is a causal relationship between private capital inflows, financial deepening and economic growth. The results also shed some light on what impact private capital inflows and financial deepening have on economic growth in South Africa

Figure 3 shows the linkages between macro-financials and capital flows according to the IMF's study of the macro-financial linkages between capital flows, sovereign ratings and the financial sector:

**Figure 2 : Macro-financials and capital flows**



Source: (IMF, 2016, p. 15)

The above diagram depicts the impact of an adverse domestic shock, such as a downgrade in sovereign rating, political instability or policy change that will negatively impact the economy and may trigger capital flight. It is evident that such domestic shocks impact the economy as a whole. It generally has the greatest impact on the financial sector through rising credit cost, funding cost and liquidity risk, leading to lower economic growth.

Capital flight leads to currency depreciation, which results in higher inflation and higher credit/financing costs, as a result of the South African Reserve Bank (SARB) increasing interest rates. This all impacts every citizen of South Africa, and also impacts economic activity in industry and other sectors of the economy and may result in lower economic growth.

According to the IMF’s report on South Africa, the country can expect to continue to have negative FDI as a result of lower and more volatile capital flows from developed countries, as

well as due to South African companies being in search for higher growth prospects in other countries/markets (IMF, 2016).

The change in the mix of the components of PCF; as well as lower and more volatile capital flows require South Africa to have a clear understanding of the impact these changes will have on the economy. This will enable the relevant authorities to put in place the necessary measures and policies to try minimise the negative effects of PCF and to maximise the positive impact of PCF on the economy and foster economic growth.

### **1.5 Research Assumptions**

In this study, the assumptions that apply to the data being analysed are as follows:

- The variables are normally distributed
- There is a linear relationship between the independent and dependent variables
- The variables are measured without error
- Homoscedasticity (Osborne & Waters, 2002)

### **1.6 Organization of the Study**

The dissertation is organised into five chapters. Chapter 1 focuses on the introduction to the dissertation and covers the background of the study, the statement of research problem, the objectives and research questions as well as research assumptions. In Chapter 2 we will look at the theoretical framework related to economic growth, financial deepening/development and PCF, followed by a review of the literature on the same. Chapter 3 outlines the research methodology, while Chapter 4 provides the results of this study. Chapter 5 is the conclusion and recommendation based on the findings of the study.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

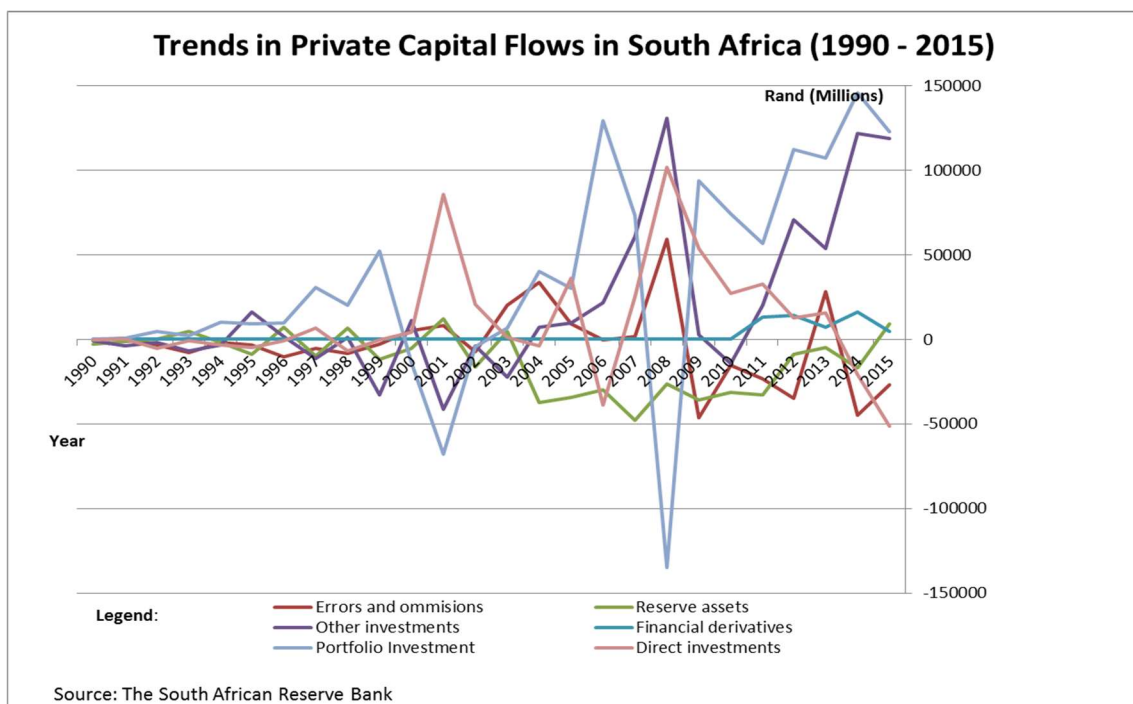
This chapter reviews the literature on the interrelationship among PCF, financial deepening and economic growth, looking at empirical studies as well as theoretical studies on this subject. It covers the theoretical framework for economic growth theories, financial deepening and PCF.

#### 2.2 Overview Capital Flows and Financial Deepening in South Africa

##### Capital Flows in South Africa

Capital flows to South Africa mainly comprise of portfolio investment flows as opposed to FDI as is the case for countries similar to South Africa. According to Ahmed et al. (2005), between 1994 and 2004, FDI was 1.5% of GDP whereas portfolio inflows made up 3.5% of GDP, meaning the country was attracting relatively low amounts of FDI. (Ahmed, Arezki, & Funke, 2005). Below is a diagram that shows the trends in components of PCF between 1990 and 2015.

**Figure 3: Trends in components of PCF in South Africa (1990-2015)**



The external financing mix for South Africa has been shifting from portfolio and direct investment flows towards other investment flows and unrecorded transactions. Some of the reasons for the shift include; a decline in portfolio debt flows in line with other emerging economies; and the rise in outward FDI by South African companies, which negated the net FDI flows for the country (IMF, 2016).

Over the years, after 1994, South Africa has gradually liberalised capital controls and reduced the number of exchange restrictions on non-residents among many other reforms in order to encourage more capital flows. (Ahmed, Arezki, & Funke, 2007). The country had a long history of strict exchange control prior to 1995, and the relaxation of these controls have presented many opportunities for resident institutional investors, to invest abroad and for more foreign investors to invest in the local financial market. However, it is important to note that some researchers have noted that the benefits of liberalisation of exchange controls and free capital movement may have been overstated in the past (Farrell & Todani, 2004).

In light of this, in January 2016 after significant depreciation of the rand in a short space of time, there was a suggestion from the United Economic Commission for Africa, for South Africa to “introduce controls on short term capital movements in and out of the country, to prevent further large depreciations of the rand”. This is largely because the short-term capital movements are regarded as speculative moves. According to UNECA, “South Africa’s financial sector was too large relative to its real economic sector. And so South Africa needs to do a lot more to manage capital flows. SA needs to put in place measures to control disruptive short-term capital movements” (Fabricius, 2016).

### **Financial Deepening in South Africa**

Financial deepening (development) in South Africa has been increasing since the 1990s. Indicators such as domestic credit and private credit experienced the highest growth compared to all other financial development indicators. Efficiencies in credit creation in the financial sector have also shown improvement, this also serves as proof of financial development over time (Muambiri & Odhiambo, 2018).

South Africa has one of the most developed and sophisticated financial sectors in Africa, in terms of bank based financial systems as well as market based financial systems. The

evolution of the financial sector in South Africa over the years, has resulted in the country having over 70 banks, this includes local banks, foreign banks, representatives of foreign banks and a stock exchange that ranks as the 17<sup>th</sup> largest stock market in the world. (Odhiambo, 2014).

Researchers such as Odhiambo (2004),(2011), (2014), Phiri (2015), and Gondo (2009), have found that economic growth causes financial deepening in South Africa, therefore economic growth plays a pivotal role in fostering financial deepening in the financial sector of the country.

### **2.3 Theoretical Framework: Capital Flows, Financial Deepening and Economic Growth**

The theories underpinning economic growth include the classical theory of economic growth by Adam Smith, Thomas Malthus and David Ricardo, as well as the neoclassical growth theory, whose main contributors were Robert Solow and J.E. Meade (Harris, 1975). These economists' theories were as a result of the changes that were happening in their environment and economies at the time of writing.

The doctrine of laissez-faire is a common thread in the classical theory of economic growth. It is the idea of allowing the natural forces or agents of the economic system to work independently without interference such as government intervention, and they will produce results that maximise benefits to individuals and to society.

According to Adam Smith capital accumulation facilitates technological progress by making division of labour possible. It also expands markets by increasing wages, and results in continued economic growth. Smith assumes that machines complement labour and that there are constant returns to scale. However, he failed to consider that technology has impacts the demand for labour through the effect of replacing or displacing labour; and the effects of diminishing returns (Lowe, 1987). Adam Smith's focus was on aggregate wealth resulting from division of labour, economies of scale and the invisible hand; he recognised the main factors of production to be land, labour and capital (Saeed, 2008).

Ricardo's growth model however, highlighted the limiting effect of the scarcity of land on growth (Lanza, 2012). Malthus maintained that economic growth is limited by the scarcity of

land and population (labour). His assumption was that population growth would be higher than the growth of food production, thereby limiting economic growth (Saeed, 2008), (Lanza, 2012).

In the general classical economic growth model, output depends on capital stock, labour, land and the level of technology available. Economic growth is assumed to be driven by technological progress and population growth. Technological progress, though, constrained by capital stock, is assumed to carry on for a period of time. It eventually slows down resulting in lower profits, lower capital accumulation and lower economic growth (Lanza, 2012).

### ***Neoclassical theory of economic growth***

The neoclassical theory of economic growth states that, production is a function of capital, labour and technology. The general production function for the neoclassical model of economic growth is:

$$Y = AF(K, L)$$

Where:

Y – Gross Domestic Product (GDP)

A – Exogenously determined level of technology

K – Stock of capital

L – Amount of un-skilled labour

Technological progress is assumed to be independent of all the other factors of the production function, and is assumed to be determined exogenously. The neoclassical model presents the “idea that a temporary equilibrium and growth can be achieved with the right allocation mix of the three factors” (Investopedia). It is important to note that Solow’s growth model is an extension of the Harrod-Domar growth model. The model by Solow demonstrated how, the liberalisation of national markets could draw additional domestic and foreign investment, and thus increase the rate of capital accumulation which is equivalent to raising domestic savings rate. (Negishi, 2014).

At the heart of economic growth is capital, as it is one of the components that result in production. PCF increase fixed capital formation, which in turn increases the potential income streams and hence potentially lead to future economic growth (de Beer, 2015). This implies that there is a relationship between PCF and economic growth (Durham, 2004).

### ***Financial Deepening***

Financial deepening is also defined as financial development. “Financial development is defined as a combination of depth, access, and efficiency” (IMF, 2015, p. 5). According to Svirydzenka (2016), “financial development involves improvements in such functions provided by the financial systems as: (i) pooling of savings; (ii) allocating capital to productive investments; (iii) monitoring those investments; (iv) risk diversification; and (v) exchange of goods and services” (Svirydzenka, 2016, p. 4).

Generally, studies that conduct empirical studies on financial development use one of two commonly used measures for financial depth, “the ratio of private credit to GDP and, to a lesser extent, by stock market capitalization, also as a ratio to GDP” (Svirydzenka, 2016, p. 4). These indicators are said not to comprehensively capture the complexity and “multi-dimensional nature of financial development”(Svirydzenka, 2016, p. 4).

As such, efforts have been made by various bodies including the IMF to come up with more comprehensive indicators of financial development. According to the IMF the main difficulty encountered in “empirical literature is that the broad measures of financial development capture only partially the various functions of finance” (Svirydzenka, 2016). These include the capability to “facilitate risk management, exert corporate control, pool savings, allocate capital to productive investment, and facilitate exchange of goods” (Levine, 2005, p. 890).

### ***PCF and Economic growth***

There is very little literature on the relationship between PCF and economic growth in South Africa. The main of reference is that of Wesso (2001), which looked at the dynamics of capital flows in South Africa. It investigates the determinants of capital flows in South Africa, using commonly used determinants for developing countries (Wesso, 2001).

A lot of research has been conducted on the relationship between PCF and economic growth for groups of countries in Sub-Saharan Africa or developing countries in general (Orji, Uche, & iHori, 2014), (The World Bank, 2002), (Ocharo, Wawire, Ng'ang'a, & Kosimbei, 2014), (Agbloyor, Abor, Adjasi, & Yawson, 2014), (Bhinda, Leape, Martin, & Griffith-Jones, 1999). Alley & Poloamin (2015) found that there is a weak linkage between PCF and economic growth in Sub-Saharan Africa, simimilarly Adu (2013) also found a weak linkage (Alley & Poloamina, 2015) (Adu, 2013).

Combes et al. (2017) found that capital inflows are associated with higher economic growth, after netting out the negative impact of real exchange rate appreciation in their analysis of capital flows and economic growth in developing countries Mclean and Shretha (2002) concluded that there is also some evidence that the positive impact of foreign investment on growth is conditional upon the existence of relatively developed domestic institutions and sound macroeconomic policy.

Bailliu (2000) found evidence that capital inflows foster higher economic growth, above and beyond any effects on the investment rate, but only for economies where the banking sector has reached a certain level of development. This suggests that the domestic financial sector plays a pivotal role in ensuring that international capital flows promote economic growth in developing countries.

Ibrahim Alley (2017) studied the impact of PCF shocks on economic growth as opposed to the evaluation of the flows in general PCF. He found that shocks to gross inflows of portfolio investment per capita, as well as gross inflows of bank lending per capita, reduced GDP per capita, while shocks to gross inflows of FDI per capita, increased GDP per capita. He found that volatile financial flows like bank lending and portfolio flows hamper economic growth of countries, especially those with weak financial system; whereas, stable flows like FDI prove beneficial to growth.

### ***Financial Deepening and Economic growth***

“Financial development is defined as a combination of depth, access, and efficiency” (IMF, 2015, p. 5). The relationship between financial deepening (financial development) and economic growth has been investigated by many researchers and it has been found that financial deepening has a positive effect on economic growth by researchers such as Levine (1997), Rosseau (2002) and Odhiambo (2011) among many others. Initial work on the

financial deepening and economic growth nexus was done by Schumpeter (1912). Empirical research on this subject has been done by de Gregorio & Guidotti (1995), Patrick (1966) and (Calderon & Liu, 2003), amongst others.

The relationship between financial deepening and economic growth in South Africa was investigated by Odhiambo (2004) & (2014), Gondo (2009) and Phiri (2015). Gondo (2009) looked at the relationship between financial development and economic growth in South Africa over the period 1970 -1999. He used two proxies for financial deepening: credit extension to the private sector and stock market liquidity. He found that both proxies had a positive impact on economic growth; however, he emphasised the need for strengthening institutions so as to give both rich and poor citizens equal opportunity to participate in the financial sector.

Phiri (2015) found “an abrupt asymmetric co-integration relationship between banking activity and economic growth” while he found that for stock market activity and economic growth, there was a normal co-integration relationship (Phiri, 2015, p. 464). Causality tests showed that there was a unidirectional causal relation between banking activity and economic growth, where “banking activity tends to Granger cause economic growth” (Phiri, 2015, p. 464). For the relationship between stock market activity and economic growth, causality analysis revealed that stock market activity is Granger caused by increases in economic growth.

In his study of the causal relationship between financial development and economic growth in South Africa, Odhiambo (2004), used three proxies for financial development; the ratio of broad money ( $M_2$ ) to gross domestic product (GDP), the currency ratio and the ratio of bank claims on the private sector to GDP. He found that for all three proxies, economic growth granger causes financial development and that the finance growth nexus for South Africa support the Demand Following theory of financial development.

Odhiambo’s (2014) study examines the relationship between banks, stock markets and economic growth in South Africa. Three proxies for stock market development where used and credit to the private sector was used as the proxy for the banking sector development. . The results of the ARDL Bounds testing procedure showed that “complementarity between stock market development and bank-based financial development is weak and sensitive to the proxy used to measure stock market development” (Odhiambo, 2014, p. 94).

Other research on the financial deepening and economic growth include Agbloyor, Abor, Adjasi, & Yawson (2014), who investigated the relationship between PCF and economic growth, as well as the role of domestic financial markets in Africa. They concluded that there is a negative relationship between the PCF and economic growth. They also found that the countries with stronger financial markets benefit more from PCF by being able to transform this negative impact into a positive one.

Odhiambo (2011) also looks at the relationship between PCF, economic growth and financial deepening in Tanzania. He uses a different approach to find a causal relationship between the variables, using a multivariate model. The results showed a two-way causality relationship between financial development and foreign capital inflows, as well as a one-way causality from foreign capital inflow to economic growth.

In their investigations Rousseau and Wachtel (2009), found that the incidence of financial crises is related to the dampening of the effect of financial deepening on growth and that there is little evidence that the growth of equity markets in recent years, has substituted for debt financing and led to a reduced role of financial deepening on growth.

Hassan et al. (2009) in their research on financial deepening and economic growth in China concluded that the development of financial markets, legal environment, awareness of property rights and political pluralism are associated with stronger growth.

Apergis et al. (2007) conducted a study to investigate whether a long-run relationship between financial development and economic growth exists in 15 Organization for Economic Co-operation and Development (OECD) and 50 non-OECD countries. The authors made use of three different measures of financial deepening, in an attempt to capture the variety of different channels through which financial development can affect growth. The authors found a single long-run equilibrium relation between financial deepening, economic growth and a set of control variables; as well as a bi-directional causality between financial deepening and growth.

Darrat (2006) investigated the causal link between the degree of financial deepening and economic growth in Saudi Arabia, Turkey and the United Arab Emirates. Their results support the view that financial deepening is a necessary causal factor of economic growth,

although the strength of the evidence varies across countries and the proxies used to measure financial deepening.

Demetriades and Hussein (1996) conducted a similar study on 16 countries. They found little support to the view that finance is a leading sector in the process of economic development. They found considerable evidence of bi-directionality and some evidence of reverse causation. These findings also clearly demonstrate that causality patterns vary across countries.

Generally, most authors found evidence of a relationship between financial deepening and economic growth; however, the nature of the relationship varies from country to country and varies with the proxy used to measure financial deepening. With regards to South Africa, it was found that there is a causal relationship between economic growth and financial deepening, where economic growth granger causes financial deepening.

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents the strategy that was adopted in the collection and analysis of the data to achieve the objectives of the study. It covers the sampling method used for the study, the data analysis methods adopted as well as the equations used in the analysis.

#### **3.2 Research Approach and Strategy**

The study of the relationship between PCF, economic growth and financial deepening was quantitative. Secondary data was used for the quantitative analysis. Given the nature of the study to be conducted, it would not have been feasible to conduct primary research for the data required.

#### **3.3 Data Collection, Frequency and Choice of Data**

The secondary data used was obtained from The South African Reserve Bank (SARB) and The World Bank online databases. The data used for each of the variables is as follows:

- GDP per capita data was used as a proxy for economic growth. Annual GDP per capita data (current values, in local currency) was obtained from the World Bank Databank online database.
- Domestic Credit to Private Sector (DCP) represented financial deepening. This data was obtained from the SARB website. It was available as monthly data; however, the data was combined to come up with annual data which was used for this study. Domestic credit to the private sector per unit of GDP was the measure to be used to measure financial development.
- PCF were represented by the financial account indicator from the SARB. The data for the financial account is quarterly data. The data was combined to come up with annual data. The financial account indicator values include reserve assets but exclude unrecorded transactions, therefore adjustments need to be made to incorporate unrecorded transactions (recorded as “net errors and omissions” on the SARB website). The adjustments entailed subtracting ‘reserve assets’ and adding ‘net errors and omissions’ (unrecorded transactions).

The data used in this analysis is tabulated in Appendix 1, Table 15 and Table 16. The data was transformed using natural logs. The data for PCF had negative values; in order to transform the data using natural logs, the data was transformed as follows:

$$-\ln(-x)$$

\* Where x is the negative value

As suggested by Cox (2005) as the method of transformation of negative values of data with positive and negative values (Cox, 2005). This was done to reduce the skewness of the data and for ease of interpretation since small changes in the transformed variable can be interpreted as approximate percentage changes.

The Sampling period for the analysis is 1990-2015. Similar to the method used by Odhiambo (2009) who chose a sample of 15 years from 1980 to 2005, we chose the most recent 15 year period for which we could obtain a full set of data for South Africa. The chosen period was 1990 – 2015 therefore; annual data for the variables mentioned in section 3.2 was obtained for this period.

### **3.4 Data Analysis Methods**

The quantitative analysis looked at the relationship between private capital inflows, financial deepening and economic growth using the Autoregressive Distributed Lag (ARDL) bounds testing procedure, similar to the model used by Odhiambo (2001) in his investigation on the same relationship in the case of Tanzania. This testing procedure is based on the ARDL co-integration approach and can be used to analyse data regardless of whether the underlying regressors are integrated of order one (I (1)), order zero (I (0)) or fractionally integrated (Odhiambo, 2011) (Nkoro & Uko, 2016).

This approach of analysis was introduced by Pesaran and Shin (1999), improving on the work by Phillips and Hansen (1990), and was later extended in 2001 by Pesaran et al (2001). The ARDL co-integration technique is robust when there is a single long run relationship between the underlying variables in a small sample size.

In the event that there are multiple long run relationships, the ARDL approach cannot be applied, and alternative approaches such as the Johansen and Juselius (1990) can be considered. We use the F-statistic or the Wald test to detect the long run relationship of the

underlying variables. When a long run relationship of the series exists, its F statistic will exceed the predefined critical value band (Nkoro & Uko, 2016).

The general ARDL (p,q) model equation is as follows:

$$y = \alpha_0 + \alpha_1 t + \sum_{i=0}^p \varphi y_{t-i} + \beta' x_t + \sum_{i=0}^{q-1} \beta_i^* \Delta x_{t-i} + u_t$$

$$\Delta x_t = P_1 \Delta x_{t-1} + P_2 \Delta x_{t-2} + \dots + P_s \Delta x_{t-s} + \varepsilon_t$$

where:

- $x_t$  is the k-dimensional I(1) variables that are not co-integrated among themselves,
- $u_t$  and  $\varepsilon_t$  are serially uncorrelated disturbances with zero means and constant variance-covariances, and
- $P_i$  are  $k \times k$  coefficient matrices such that the vector autoregressive process in  $\Delta x_t$  is stable.
- $u_t$  and  $\varepsilon_t$  are assumed to be uncorrelated
- the roots of  $1 - \sum_{i=1}^p \varphi_i z^i = 0$  all fall outside the unit circle
- there is a stable unique long-run relationship between  $y_t$  and  $x_t$  (Pesaran, Shin, & Smith, 2001)

According to Pesaran et al, when  $u_t$  and  $\varepsilon_t$  are correlated, there is need to augment the ARDL specification with an adequate number of lagged changes in the regressors before estimation and inference is carried out. The degree of augmentation required depends on whether  $q > s + 1$  or not. (Pesaran, Shin, & Smith, 2001)

### **Unit Root Testing**

Before proceeding with the time series analysis, the data was tested for stationarity using Unit Root Testing. If a time series is stationary, its mean, variance and co-variance do not change over time. If non-stationary variables are used in a model, the results of that regression are likely to be misleading (Nkoro & Uko, 2016). We used the Augmented Dickey fuller test for this purpose.

### ARDL co-integration test

For this analysis the equations used for the ARDL model were as follows:

$$\begin{aligned}\Delta \ln \left( \frac{y}{N} \right)_t &= \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta \ln \left( \frac{y}{N} \right)_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta \ln \left( \frac{DCP}{GDP} \right)_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta \ln(PCF)_{t-i} \\ &+ \alpha_4 \Delta \ln \left( \frac{y}{N} \right)_{t-i} + \alpha_5 \ln \left( \frac{DCP}{GDP} \right)_{t-i} + \alpha_6 \ln(PCF)_{t-i} + \mu_t\end{aligned}\tag{1}$$

$$\begin{aligned}\Delta \ln \left( \frac{DCP}{GDP} \right) &= \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta \ln \left( \frac{DCP}{GDP} \right)_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta \ln \left( \frac{y}{N} \right)_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta \ln(PCF)_{t-i} \\ &+ \beta_4 \Delta \ln \left( \frac{DCP}{GDP} \right)_{t-i} + \beta_5 \Delta \ln \left( \frac{y}{N} \right)_{t-i} + \beta_6 \Delta \ln(PCF)_{t-i} + \mu_t\end{aligned}\tag{2}$$

$$\begin{aligned}\Delta \ln(PCF) &= \delta_0 + \sum_{i=1}^n \delta_{1i} \Delta \ln(PCF)_{t-i} + \sum_{i=0}^n \delta_{2i} \Delta \ln \left( \frac{y}{N} \right)_{t-i} + \sum_{i=0}^n \delta_{3i} \Delta \ln \left( \frac{DCP}{GDP} \right)_{t-i} \\ &+ \delta_4 \Delta \ln(PCF)_{t-i} + \delta_5 \Delta \ln \left( \frac{DCP}{GDP} \right)_{t-i} + \delta_6 \Delta \ln \left( \frac{y}{N} \right)_{t-i} + \mu_t\end{aligned}\tag{3}$$

Where:

ECT<sub>t-1</sub> = Error correction term lagged one period

y/N<sub>t-1</sub> = real per capita income

DCP/GDP<sub>t-1</sub> = financial depth (domestic credit to the private sector per unit GDP)

PCF<sub>t-1</sub> = Private capital flows (PCF)

After establishing the order of integration of the variables, the optimal lag length for the model is obtained using model order selection criteria. There are various such criteria, for example the Likelihood Ratio (LR) the Akaike Information Criterion (AIC); the Final Prediction Error (FPE), the Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion (HQC) (Nkoro & Uko, 2016).

The output from the running equations (1) to (3) is used to establish whether or not there is a long run relationship between the variables under consideration, by conducting the ARDL bounds test on the F test statistic values obtained. The F test statistic is compared to critical

values by Pesaran(2001), where the lower bound assumes that all the variables are integrated I(0) and the upper bound assumes that all the variables are integrated I(1).

If the test statistic is lower than the lower bound, we conclude that there is no long run relationship between the variables. When the test statistic falls between the lower and upper bound, the test is indeterminate. However, if the test statistic is larger than the upper bound I(1) then we reject the null hypothesis and conclude that there is evidence of a long run relationship. (Odhiambo, 2011)

In order to ensure that valid inferences are made from the estimated model, the model should be tested for serial correlation before performing the bounds test. In the event that there is serial correlation, additional lags will need to be added to the model until no serial correlation is present.

#### **Granger causality test: Short run and long run dynamics**

Once we obtain results of whether or not there are long-term relationships from the ARDL bounds testing procedure, the short run and long run Granger causality relationships need to be investigated. This is done using a tri-variate model following the method used by Odhiambo (2011), Odhiambo (2010), Odhiambo (2009), and Narayan and Smyth (2008). The following tri-variate model is used:

$$\frac{y}{N}_t = \lambda_0 \sum_{i=1}^m \lambda_{1i} \left(\frac{y}{N}\right)_{t-i} + \sum_{i=1}^n \lambda_{2i} \left(\frac{DCP}{GDP}\right)_{t-i} + \sum_{i=1}^n \lambda_{3i} PCF_{t-i} + \lambda_4 ECT_{t-1} + \mu_t \quad (4)$$

$$\frac{DCP}{GDP}_t = \sum_{i=1}^m \varphi_{1i} \left(\frac{y}{N}\right)_{t-i} + \sum_{i=1}^n \varphi_{2i} \left(\frac{DCP}{GDP}\right)_{t-i} + \sum_{i=1}^n \varphi_{3i} PCF_{t-i} + \varphi_4 ECT_{t-1} + \varepsilon_t \quad (5)$$

$$PCF_t = \delta_0 + \sum_{i=1}^m \delta_{1i} \left(\frac{y}{N}\right)_{t-i} + \sum_{i=1}^n \delta_{2i} \left(\frac{DCP}{GDP}\right)_{t-i} + \sum_{i=1}^n \delta_{3i} PCF_{t-i} + \delta_4 ECT_{t-1} + v_t \quad (6)$$

Where:

$ECT_{t-1}$  = Error correction term lagged one period

$\frac{Y}{N_{t-1}}$  = real per capita income

$\frac{DCP}{GDP_{t-1}}$  = financial depth (domestic credit to the private sector per unit GDP)

$PCF_{t-1}$  = Private capital flows (PCF)

The Error correction model captures both the long run and short run Granger causality amongst the three variables. It also shows the direction of the causal relationships between the variables. According to Odhiambo (2011), the short run causal dynamics are illustrated by “the F test and the significance of the lagged changes in the independent variables” (Odhiambo, 2009); whereas the long run causal dynamics are shown by the “the significance of the t-test of the lagged Error Correction Term” (Odhiambo, 2011, p. 68).

Equations (4), (5) and (6) will be used in estimating the error correction models. The coefficient of the error correction term represented by  $\lambda_4$ ,  $\varphi_4$ ,  $\delta_4$  in equations (4), (5), (6), indicates “the extent to which any disequilibrium in the previous period is being adjusted” (Nkoro & Uko, 2016, p. 85) in the dependent variable ; as well as shows the speed with which the model adjusts to equilibrium from disequilibrium. Negative coefficients result in adjustments that converge toward equilibrium, whereas positive coefficients result in divergence from equilibrium (Nkoro & Uko, 2016).

### **Vector Autoregressive model and Granger Causality test based on VAR framework**

In the event that there is no evidence of co-integration, we will need to estimate a short run VAR model and then proceed to run the Granger Causality test based on the VAR framework. VAR models are used for times series analysis, including multivariate time series. Under this model each variable’s function is made up of past lags of its self and those of other variables, similar to the ARDL model.

A VAR (p) model includes p number of lags for each variable in the function. (The Pennsylvania State University, 2017). According to Toda and Yamamoto (1995); there is need to test for unit roots and co-integration before estimating a VAR model. In addition to this, if the variables are integrated of order (k) they will need to be differenced to the order (k) in order to be able to make valid inferences from the model. (Toda & Yamamoto, 1995)

The tri-variate VAR model to be used for this study is as follows:

$$\begin{bmatrix} PCF_t \\ \frac{y}{N_t} \\ \frac{DCP}{GDP_t} \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix} + \begin{bmatrix} b_{11}^1 & b_{12}^1 & b_{13}^1 \\ b_{21}^1 & b_{22}^1 & b_{23}^1 \\ b_{31}^1 & b_{32}^1 & b_{33}^1 \end{bmatrix} \begin{bmatrix} PCF_{t-1} \\ \frac{y}{N_{t-1}} \\ \frac{DCP}{GDP_{t-1}} \end{bmatrix} + \dots + \begin{bmatrix} b_{11}^n & b_{12}^n & b_{13}^n \\ b_{21}^n & b_{22}^n & b_{23}^n \\ b_{31}^n & b_{32}^n & b_{33}^n \end{bmatrix} \begin{bmatrix} PCF_{t-n} \\ \frac{y}{N_{t-n}} \\ \frac{DCP}{GDP_{t-n}} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (7)$$

Where:

t: The subscript of time

$b_{ij}$ : The coefficients of Matrices associated with the VAR model

$\sum \varepsilon = \varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t}$  : Vector of uncorrelated disturbances

$d_1, d_2$ : Constants

n: The superscripts show the order of the matrix

The system of equations represented by these matrices will be used in Granger Causality testing for the variables  $PCF_t$ ,  $\frac{y}{N_t}$  and  $\frac{DCP}{GDP_t}$ . The testing process will involve estimating each of the equations individually. (Sunde, 2012)

### **Constraints and limitations**

- A lot of the research on financial deepening or financial development and growth makes use of stock market development data as opposed to Domestic credit to private sector data. As previously mentioned the relationship between financial deepening varies from country to country and varies with the proxy used for financial deepening. Therefore the use of Domestic credit to the private sector as a proxy for financial deepening may impact the results of the study, in terms of the findings on the relationship between financial development and economic growth for South Africa in this study compared to other studies.
- The frequency of the data used in this analysis was constrained by the GDP per Capita data which is only available as annual data. All other data was converted to annual data for uniformity.

## CHAPTER 4

### RESULTS, ANALYSIS, DISCUSSION

#### 4.1 Introduction

This chapter presents the results of the strategy that was adopted in the collection of data and analysis of the data to achieve the objectives of the study. It covers the descriptive statistics of the data used in the analysis, the analysis of the data and a discussion of the results of this study.

#### 4.2 Descriptive Statistics

Table 1 gives a summary of the properties of the variables analysed in this study. The table shows that the skewness and kurtosis of PCF is close to that of the uniform distribution which is -1 and 1.8 respectively. The Jarque-Bera test statistics for economic growth (GDP per Capita-y/N), financial development (domestic credit to private sector - DCP/GDP) and PCF (PCF) have p values of 40.4%, 39.7% and 7.50% respectively. The Jarque-Bera test, tests data for normality taking into account the skewness and the kurtosis of the distribution of the data. The null hypothesis under the Jarque-Bera test is that the data follows a normal distribution. The p values for the Jarque-Bera test statistics of the variables under study were higher than 5% therefore, we could not reject the null hypothesis that the transformed variables are normally distributed.

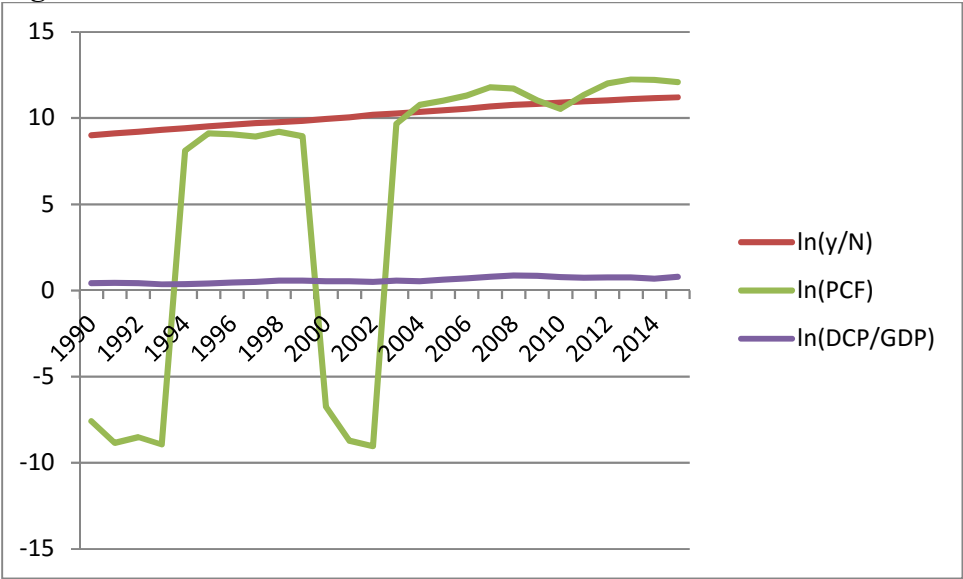
**Table 1: Table of Descriptive Statistics**

	Variables		
	ln(y/N)	ln(PCF)	ln(DCP/GDP)
Mean	10.19003	5.49056	0.596681
Median	10.22322	9.442511	0.572183
Maximum	11.20662	12.24475	0.863109
Minimum	9.002781	-9.0367	0.356354
Std. Dev	0.696731	8.647128	0.157262
Skewness	-0.117012	-0.99039	0.151849
Kurtosis	1.727894	2.073356	1.730555
Jarque-Bera	1.81244	5.180701	1.845699
Probability	0.404049	0.074994	0.397385

Figure 4 below shows the trends of the transformed variables to be used in the study. From the diagram we can see that there seems to be correlation between ln(y/N) and ln(DCP/GDP), whereas for ln(PCF), it follows a similar trend to the other two variables, but its trajectory

seems to have a lot more movement from equilibrium. The correlation between the variables is also reflected in the correlation matrix in Figure 5.

**Figure 4: Trends of transformed Variables**



Source: Own Calculations

**Table 2: Correlation Matrix**

	ln(y/N)	ln(PCF)	ln(DCP/GDP)
ln(y/N)	1.000000	0.659495***	0.903521***
ln(PCF)	0.659495***	1.000000	0.643828***
ln(DCP/GDP)	0.903521***	0.643828***	1.000000

Source: Own Calculations

Where:  
 $\ln(y/N_t) = \log(\text{GDP per Capita})$   
 $\ln(\text{DCP}/\text{GDPT}) = \log(\text{Domestic credit to the private sector per unit of GDP})$   
 $\ln(\text{PCF}_t) = \log(\text{PCF})$   
 \* Significance at 10%  
 \*\* Significance at 5%  
 \*\*\* Significance at 1%

**4.2 Stationarity Test Results**

The Augmented Dickey fuller test was used to check for stationarity of all 3 variables. All 3 variables were not stationary at level as depicted in Table 3 below. In such cases when the variables are not stationary at level, the variables are differenced once in order to conduct stationary test at first difference. The results in Table 3 showed that the first difference of  $\ln(\text{PCF}_t)$ ,  $\ln(y/N_t)$  and  $\ln(\text{DCP}/\text{GDPT}_t)$  were stationary with p-values below 5%, therefore we concluded that the variables were all stationary at first difference and are all integrated to the order of one (I(1)).

**Table 3: Table of results of the tests for Stationarity**

Variables	Augmented Dickey Fuller test			
	I(0)		I(1)	
	T-statistic	P- value	T-statistic	P- value
ln(y/Nt)	-2.93774	0.0552*	-3.15317	0.0359 **
ln(DCP/GDPt)	-2.09301	0.2488	-4.47728	0.0018***
ln(PCFt)	-0.81792	0.7965	-3.70233	0.0108***

Where:

ln(y/Nt) = log (GDP per Capita)

ln(DCP/GDPt) = log (Domestic credit to the private sector per unit of GDP)

ln(PCFt) = log(PCF)

\* Significance at 10%

\*\* Significance at 5%

\*\*\* Significance at 1%

### 4.3 Co-integration Analysis Results

The Co-integration analysis involved the evaluation of equations (1) to (3) separately as per the steps detailed in the methodology. The objective of this analysis was to establish whether or not there was a significant long run relationship between the variables. In this section we discuss the results of the co-integration analysis for the three equations.

After establishing the order of integration for all 3 variables, the study proceeded to investigate whether or not there was a co-integration relationship between the variables. We used the ARDL bounds testing procedure to test for this relationship. This procedure involved establishing the optimal lag structure for each equation, before proceeding to conduct the Bounds test on the F test statistics obtained from running the ARDL model for each of the three equations, using critical values from Pesaran et al. (2001).

The optimal lag structure for Equation (1) was one (1) lag. For Equations (2) and (3) the optimal number of lags was three (3) and seven (7) respectively. Table 4 below shows the results of the Bounds test for cases where each of the three variables was taken as a dependent variable. The results showed that none of the 3 models showed evidence of co-integration as shown by the F test statistics, which were below the lower bound Pesaran (2001) critical value I(0) in all cases. This indicates that there is no significant long run relationship between PCF, financial deepening and economic growth.

**Table 4: Co-integration test results**

Bounds results for level relationship

k = 2	Asymptotic critical values			
	90%		95%	
	I(0)	I(1)	I(0)	I(1)
Pesaran et al (2001, p. 300 Table CI(ii) Case III	3.17	4.14	3.79	4.85

Dependent Variable	Function	F-test statistic
$\Delta \ln(y/N)$	$y/N$ (PCF, DCP/GDP)	1.595127
$\Delta \ln(\text{DCP}/\text{GDP})$	DCP/GDP ( $y/N$ , PCF)	2.457734
$\Delta \ln(\text{PCF})$	PCF(DCP/GDP, $y/N$ )	0.503314

Where:

 $\ln(y/N_t) = \log(\text{GDP per Capita})$  $\ln(\text{DCP}/\text{GDP}_t) = \log(\text{Domestic credit to the private sector per unit of GDP})$  $\ln(\text{PCF}_t) = \log(\text{PCF})$ 

\* Significance at 10%

\*\* Significance at 5%

\*\*\* Significance at 1%

Based on the Pesaran (2001) table critical values, it is evident that there was no distinct significant long run relationship and no co-integration between PCF, financial deepening and economic growth for South Africa for all 3 equations. This does not support the results of previous research on financial deepening and economic growth in South Africa by Odhiambo (2004) and Phiri (2015). The lack of a long run relationship implied that there was no need to proceed to run a long run model and to test for long run causality (Nkoro & Uko, 2016) (Odhiambo, 2011).

#### 4.4 Model Diagnostics

**Table 5: Summary of Model diagnostic test results**

Dependent variable	Function	LM Test		CUSUM test
		P value	Significance	Stable/Unstable
$\Delta \ln(y/N_t)$	$y/N$ (DCP/GDP, PCF)	0.9834	No serial correlation	stable
$\Delta \ln(\text{DCP}/\text{GDP}_t)$	DCP/GDP( $y/N$ , PCF)	0.2357	No serial correlation	stable
$\Delta \ln(\text{PCF}_t)$	PCF(DCP/GDP, $y/N$ )	0.2503	No serial correlation	stable

## Wald Test

Dependent variable	Function	Test statistic	P value	Significance
$\Delta \ln(y/N_t)$	$y/N(\text{DCP/GDP, PCF})$	1.595127	0.2275	No significant long run relationship
$\Delta \ln(\text{DCP/GDP}_t)$	$\text{DCP/GDP}(y/N, \text{PCF})$	2.457734	0.1029	No significant long run relationship
$\Delta \ln(\text{PCF}_t)$	$\text{PCF}(\text{DCP/GDP, } y/N)$	0.503314	0.6878	No significant long run relationship

The above table indicates that the models in all 3 equations are stable, they have no significant long run relationships and there is no serial correlation among their residuals. The CUSUM graphs for equations (1), (2) and (3) are shown in Figure 4, Figure 5 and Figure 6 respectively, in Appendix 1.

### 4.5 Short run dynamics and Granger causality test

After establishing that PCF, economic growth and financial deepening are not co-integrated and have no significant long run relationship; we therefore proceeded to run the short run VAR model in order to establish if there were any short run causal relationships between the three variables under consideration and to analyse the short run dynamics. For this purpose, we used an unrestricted VAR model and the Granger causality test based on the VAR framework.

In order to a run an unrestricted VAR model, the variables under consideration should not be co-integrated and should not have any long run association between themselves. The data to be used needs to be stationary; therefore in this case, since the data was integrated of order 1, differenced variables were used. The assumption under this model is that the variables have short run association and have short-run causality.

Having established that the optimum lag is 1 for the model, in order to ensure that the model was stable and that valid inferences could be made from it, we tested to check whether the model has the best linear unbiased estimators. To do this we tested for autocorrelation using the portmanteau autocorrelation test and the LM test, we tested for normality of the residuals as well as test for heteroskedasticity. The results of these tests are shown in Table 6:

**Table 6: Residual tests for VAR model**

Model Diagnostics for VAR (1)			
	Test statistic	p-value	Significance
Portmanteau test	12.04281	0.2109	No residual autocorrelations
LM test	3.432797	0.9446	No serial correlation
Normality test - Jacque-Bera test	3.202507	0.783	The model is normally distributed
Heteroskedasticity	29.66385	0.7629	The residuals are Homoskedastic

The table shows that there is no serial correlation amongst the residuals, they are normally distributed and homoskedastic. Having established that the residuals are the best linear unbiased estimators we proceed to conduct the Granger Causality test. Table 7 shows the results of the Granger Causality test, and the short-run causality between economic growth, financial deepening and PCF.

**Table 7: Granger Causality test results**

Granger Causality Test Chi-sq [P-value]			
Dependent variable	$\Delta \ln y/Nt$	$\Delta \ln PCFt$	$\Delta \ln DCP/GDPt$
$\Delta \ln y/Nt$	-	8.174004 [0.0042]***	3.815224 [0.0508]*
$\Delta \ln PCFt$	0.213454 [0.6441]	-	0.093554 [0.7597]
$\Delta \ln DCP/GDPt$	0.360588 [0.5482]	4.368786 [0.0366]**	-

Note:  
 $\ln(y/Nt) = \log(\text{GDP per Capita})$   
 $\ln(DCP/GDPt) = \log(\text{Domestic credit to the private sector per unit of GDP})$   
 $\ln(PCFt) = \log(\text{PCF})$   
 \* Significance at 10%  
 \*\* Significance at 5%  
 \*\*\* Significance at 1%

The Granger Causality test results show that there were three (3) significant unidirectional short-run causal relationships between the 3 variables.

- There was a unidirectional causal relationship between economic growth and PCF, economic growth granger causes PCF. The p-value for the test statistic was less than 5% therefore we can reject the null hypothesis that economic growth does not granger cause PCF and conclude that is a short run causal relationship.
- There was a unidirectional causal relationship between financial deepening and PCF, financial deepening granger causes PCF. The p-value for the test statistic

is less than 5% therefore we can reject the null hypothesis that financial deepening does not cause PCF and conclude that is a short run causal relationship.

- There was a slightly significant unidirectional short run causal relationship between economic growth and financial deepening; economic growth granger causes financial deepening. The p-value for the test statistic slightly over 5% at 5.08%. However, we can reject the null hypothesis that financial deepening does not granger causes PCF and conclude that is a short run causal relationship. This is in line with the findings of Phiri (2015) and Odhiambo (2004).

The results of the VAR model estimation and the Granger Causality test showed that although the variables in this model are not co-integrated and show no significant long run relationships, there are significant short run causal relationships between the variables.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

The final chapter of this paper presents a summary of the results of the study as well as the conclusions. It also looks at the policy implications of the findings and discusses possible avenues for future research.

#### 5.2 Summary and Conclusions of the study

The aim of this study was to examine the relationship between PCF and economic growth in South Africa, as well as to examine the effect of financial deepening in moderating the relationship between economic growth and PCF. Using GDP per capita, domestic credit to the private sector per unit of GDP and financial account data adjusted for reserve assets and unrecorded transactions to represent: economic growth, financial deepening and PCF respectively. The ARDL co-integration approach to establish whether or not there is a long run relationship between all three variables,

This entailed establishing the optimal lag structure for each equation, running the ARDL model and using the resultant F statistic to establish whether or not a long run relationship exists using the Pesaran Bounds test. After establishing whether or not a long run relationship exists, the causal relationship between the variables was investigated using the Granger Causality test.

The results in Chapter 4 show that after performing the Pesaran bounds test using the F statistics obtained after running the model for the three equations, it was found that there was no significant long run relationship between PCF, financial development and economic growth in equations (1), (2) and (3). Based on these results we therefore conclude that based on the ARDL co-integration model there are no significant long-run relationships between PCF, economic growth and financial deepening.

Following the ARDL co-integration analysis, an unrestricted VAR model was estimated and the Granger Causality test was performed using the results of the estimates of the VAR model

The results of this test show that there are three (3) significant unidirectional short-run causal relationships between the 3 variables namely:

- There is a unidirectional causal relationship between economic growth and PCF, such that economic growth granger causes PCF.
- There is a unidirectional causal relationship between financial deepening and PCF, where financial deepening granger causes PCF.
- There is a slightly significant unidirectional short run causal relationship between economic growth and financial deepening; economic growth granger causes financial deepening.

From the results we conclude that even though there are no long run causal relationships between economic growth, financial development and PCF in South Africa, there are significant short run causal relationships. It is important to note that Granger causality means that one variable is a leading indicator in determining the other variable, such that when we say economic growth granger causes financial deepening, it just means economic growth is a leading indicator in determining financial deepening.

The null hypothesis stated that: there is a significant relationship between PCF, financial deepening and economic growth in South Africa. The results of our analysis show that there is no significant long run relationship between PCF, financial deepening and economic growth, based on Pesaran Bounds test. However, based on the VAR based Granger Causality test; there are significant unidirectional short run causal relationships between PCF and economic growth, financial deepening and PCF as well as between economic growth and financial. Where economic growth and financial deepening granger cause PCF; and economic growth causes financial deepening. Therefore we cannot reject the null hypothesis and conclude that there is significant short run relationship between PCF, financial deepening and economic growth in South Africa,

In a similar study the case of Tanzania, Odhiambo (2011) found that there was a significant long run relationship between the economic growth, financial deepening and PCF, based on the bounds F-test for co-integration. He also found a long run causal relationship from economic growth to financial development; as well as a two-way causal relationship between financial development and economic growth and lastly a one way short run causal relationship between foreign capital flows and economic growth. (Odhiambo, 2011)

### **5.3 Policy Implications of the findings**

The results of this study established that there are no significant long run relationships between the variables under consideration. However, there are significant short run causal relationships between PCF, economic growth and financial deepening.

From the results it is evident that economic growth plays a significant role in luring PCF and in the development of the financial markets (financial deepening). According to Ahmed et al. (2007), the main determinants of capital flows are macroeconomic performance, quality of institutions, investment environment, infrastructure and resources, financial development and global factors. (Ahmed, Arezki, & Funke, 2007). This assertion supports these findings.

Given that economic growth granger causes PCF and financial deepening, putting in place policies that encourage economic growth will lead to improvements in both PCF and financial deepening in the short run. In turn, improvements in financial deepening will also foster improvements in PCF in the short run.

Based on recommendations from the UNECA (Fabricius, 2016) and the IMF (2016) report government should introduce controls on short term capital movements. These may include putting limits on the amounts of funds that can be taken out of the economy in a single transaction or over a certain period of time, depending on the nature of the transactions.

It is evident from Figure 3 and from research from the IMF (2016) that capital outflows have an adverse impact on the South African economy such as credit cost, which affects all borrowers; funding cost as well as increases liquidity risk within the economy. As such, there is need to monitor of capital flows and putting in place measures that will limit the chances of huge and sudden capital flows but will not frustrate foreign investors or deter them from investing in South Africa.

In order to ensure continued financial deepening in the South African financial sector and increased PCF, policy makers will have to ensure that policies that foster economic growth are in place.

#### **5.4 Avenues for future research**

This analysis showed that there is no significant long run relationship between PCF, financial deepening and economic growth in South Africa. This warrants for further research using alternative approaches, in order to investigate the long run relationship between these variables in South Africa for better understanding. Further research may include:

- The use of components of PCF as dependent/independent variables instead of using the composite PCF data as an dependent/independent variable
- The use of stock market data and other relevant financial indicator data which reflects financial development instead of using direct credit to the private sector as the only proxy of financial development.
- Given the change in the mix of PCF, it may be necessary to investigate the impact of the change in the mix on economic growth and on financial deepening, given the slightly significant short run causal relationship between PCF and financial deepening.

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## APPENDICES

### Appendix 1

**Table 8 : Raw Data to be used in analysis**

Date	y/N = GDP per capita at current prices	PCF = Private Capital Flows	DCP = Domestic credit to private sector	GDP at current prices
Year	R Millions	R Millions	R Millions	R Millions
1990	8125.649402	-1956	1871298	1234273
1991	9079.955101	-6983	2186990	1415211
1992	9928.97521	-4978	2401263	1581955
1993	11077.46357	-7662	2597676	1818956
1994	12234.99541	3365	2956145	2044622
1995	13611.23388	9097	3496763	2321067
1996	15034.53572	8571	4121830	2612359
1997	16381.46155	7514	4764984	2870571
1998	17475.62123	9991	5519519	3110065
1999	18871.41329	7707	6124086	3432927
2000	21077.73426	-849	6695035	3907941
2001	23087.09321	-6065	7368281	4324181
2002	26545.68055	-8406	8173990	5004001
2003	28561.34392	15924	9611162	5431455
2004	31416.37364	47797	10386261	6053067
2005	34433.28407	60720	12500500	6724127
2006	38135.08015	81579	15531971	7651837
2007	43153.3567	131078	19211790	8693342
2008	47804.2576	122447	22845407	9637302
2009	49898.24748	62238	23897617	10228342
2010	53904.24869	37505	24362148	11290678
2011	58451.52261	84069	25730325	12309068
2012	61970.42396	166710	27921581	13015404
2013	66397.67683	207886	30128703	14159160
2014	70321.43339	202017.0522	29933020	15230708
2015	73615.95137	177653.8609	35659087	16199036

Source: The World Bank Data and South African Reserve Bank

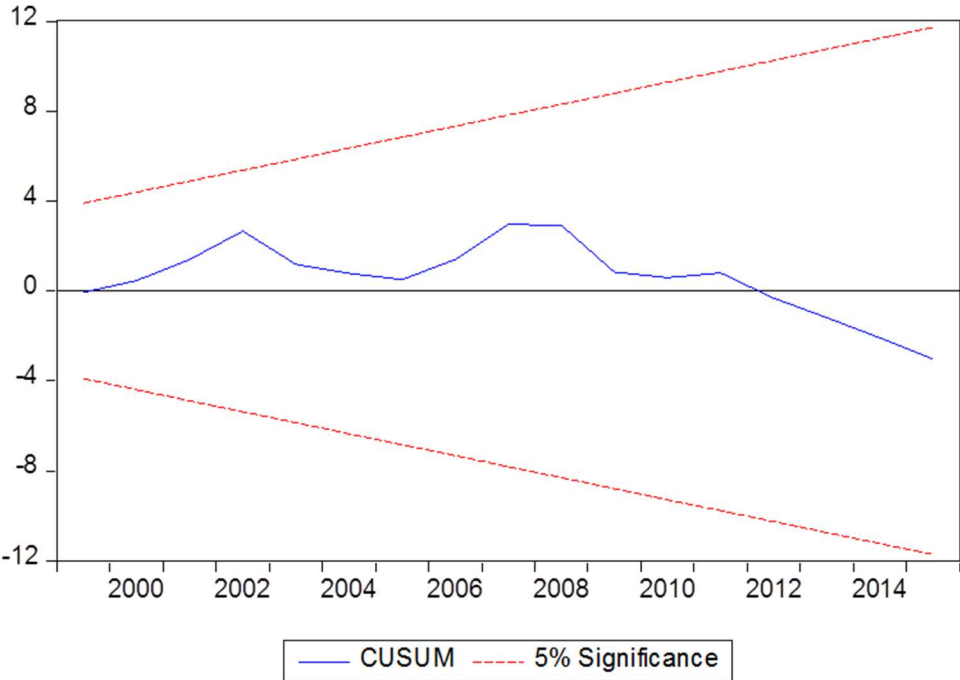
**Table 9 Transformed data to be used in analysis**

Date	ln(y/N)	ln(PCF)	ln(DCP/GDP)
1990	9.002781	-7.57866	0.41615
1991	9.113825	-8.85123	0.435248
1992	9.203213	-8.51278	0.417333
1993	9.312668	-8.94403	0.356354
1994	9.412056	8.121183	0.368673
1995	9.518651	9.1157	0.409811
1996	9.618105	9.05614	0.456044
1997	9.703906	8.924523	0.506783
1998	9.768562	9.20944	0.573647
1999	9.845404	8.949884	0.578816
2000	9.955973	-6.74406	0.538356
2001	10.04703	-8.71029	0.532962
2002	10.18662	-9.0367	0.490719
2003	10.25981	9.675583	0.570718
2004	10.35508	10.77472	0.539919
2005	10.44678	11.01403	0.620067
2006	10.54889	11.30933	0.707955
2007	10.67252	11.78355	0.792967
2008	10.77487	11.71543	0.863109
2009	10.81774	11.03872	0.848616
2010	10.89496	10.53223	0.769053
2011	10.97595	11.33939	0.737334
2012	11.03441	12.02401	0.763266
2013	11.10342	12.24475	0.755117
2014	11.16083	12.21611	0.675649
2015	11.20662	12.08759	0.789052

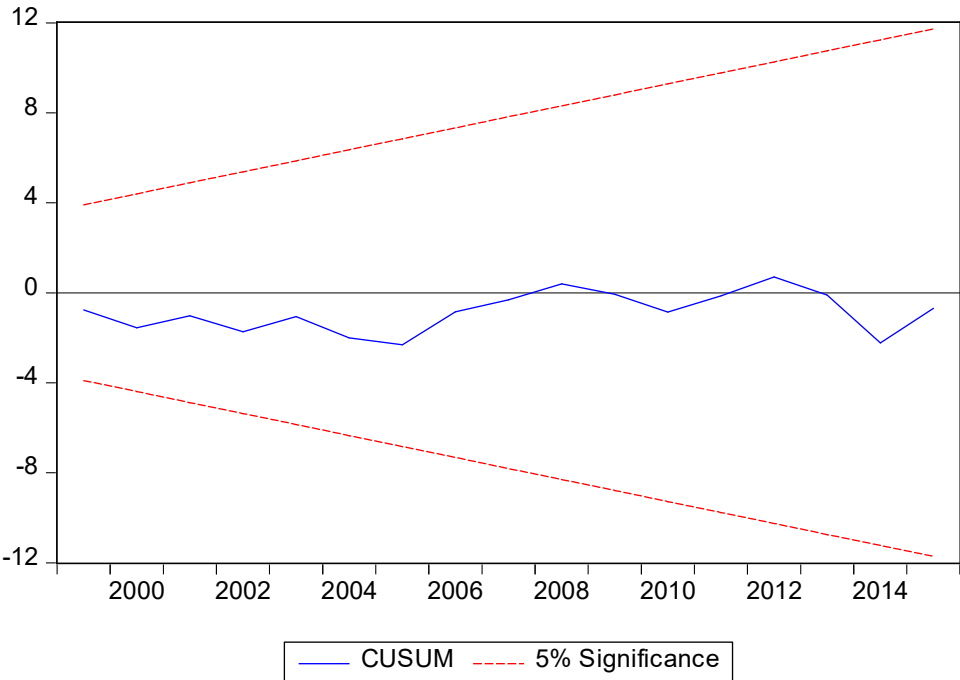
Source: Own calculations from Raw Data

**Model Diagnostic Test results**

**Figure 5: CUSUM test results for Equation 1**



**Figure 6: CUSUM test results for Equation 2**



**Figure 7: CUSUM test results for Equation 3**

