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ESSAYS ON SAVINGS IN SOUTH AFRICA

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DECLARATION

I, ATOKO KASONGO (3105942), hereby declare that the thesis for DOCTOR OF PHILOSOPY in ECONOMICS is my own work and that it has not previously been submitted to another university or for another qualification.

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ABSTRACT

Savings is essential for boosting economic growth. Low savings in a country will have negative consequences for both investment and economic growth. South Africa has continued to experience declining saving rates and in recent years, accompanied by declining economic growth. The study evaluated savings in South Africa by decomposing it into household saving, corporate saving and public saving. The focus was to investigate the determinants of household savings, corporate and public savings. In addition to examining the determinants of savings, the research has also analysed the saving-investment relationship for South Africa. The study used a Bayesian vector auto regressive model to investigate the determinants of household saving from 1980Q1 to 2017Q4. The results of the investigation on household saving showed that GDP, inflation rate, and financial deepening determine household saving in South Africa.

The Bayesian VAR was also used to identify the determinant of budget deficit between 1980Q1 to 2017Q and found Real GDP, inflation rate, total government debt, investment by general government and the inflation rate to be determinants. The Blundel-Bond Generalized Method of Moment (GMM) was used to investigate the determinants of corporate saving in form of cash holding for 80 non-financial firms listed on the JSE between 2007 and 2017. The results showed leverage, cash flow, debt maturity and previous amounts of cash holding to have significant effect on cash holding in SA. Lastly, the study examined the saving-investment nexus for South Africa using yearly data from 1980 to 2016. Using the Autoregressive Distributed lag (ARDL) and the Error Correction Model, (ECM), the study found a cointegrating relationship between domestic saving and domestic investment. It further found a positive relationship between domestic saving and domestic investment in both the short and long run. Causality analysis showed a unidirectional causality from domestic saving to domestic investment.

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Chapter 1

INTRODUCTION

1.1 Background and Problem statement

Economic theory has long recognised the fundamental role of savings, through investment, in the promotion of economic growth.

One the one hand, the Life Cycle Hypothesis illustrates the inter-temporal choice faced by an economic agent. The hypothesis states that saving is highest during the middle age, while consumption is high for younger and old ages. Therefore higher incomes result in lower current consumption and increased savings. The LCH predicts that economic growth and productivity tend to lead to increased saving rates as well as growth in the stock of wealth. More so, the Permanent Income Hypothesis posited by Friedman (1957), posits that economic agents will save if the expected future income is less than the current income. The aim is to smooth consumption over the lifetime (Deaton, 2005). Therefore, the model predicts that changes in permanent income tend to determine the changes in savings.

On the other hand, national savings facilitates the accumulation of fixed capital formation, which, in turn, increases output and economic activities as well as economic growth (Obstfeld and Rogoff, 1995). Solow (1956) explained that increased savings lead to increased investment which leads to higher economic growth. Solow's growth theory implies that saving, through the availability of loanable funds for investment, makes capital goods affordable. The more

capital goods available, the more goods and services can be produced and the higher the economic growth. Mckinnon (1973) also found that increased investment through savings leads to economic growth.

Empirically, Romm (2005) and Odhiambo (2009) found positive relationship between savings and economic growth. Romm (2005) found private savings to impact economic growth positively through private investment. Additionaly, Odhiambo (2009) found evidence of a bidirectional causality in the short-run, and long-run causality from economic growth to savings. Therefore, the importance of savings to economic growth cannot be overemphasised.

In spite of the benefits of savings, South Africa savings rate has declined since the 1980s and 1990s. For example, Gross Domestic Savings (GDS) as a percentage of Gross Domestic Product (GDP) decreased from a high of 35.5 per cent in 1980 to 17.7 per cent in 1994, before further declining to less than 15.2 per cent in 2015 (South African Reserve Bank, 2016).

Furthermore, components of domestic savings namely; household savings, corporate saving and government savings has followed similar declining trends. The greatest decline was in the household savings figure from an average of 5.9 percent of GDP year in the 1970s to 1.6 percent in the 1990s to less than 0.5 percent in the new millennium. Corporate savings had increased in the 1990s after the end of the apartheid regime. However, it started to decline in the early 2000s falling to 3 percent of GDP (South African Reserve Bank, 2016). Public savings have shown a negative trend during the period under observation.

In comparison to other emerging economies (such as Brazil, Russia, India and China), South Africa is still lagging in both savings and economic growth. Consequently, low domestic saving rates hinders investment-driven growth (Romm, 2005). Since a clear link between savings and economic growth has been established, it follows that an increase in savings should boost economic growth. Thus to boost savings it is imperative to identifity its determinants. This link has motivated the research questions for this dissertation: what are the determinants of savings?.

The dissertation aims to closely investigate the critical questions: what are the determinants

of household savings in South Africa? What are the determinants of private corporate savings in South Africa? What are the determinants of government savings in South Africa? What is the relationship between savings and investment in South Africa?

1.2 Objectives of the study

The broad objective of this study is to closely examine the determinants of savings in the South African economy between 1980 and 2018.

However, the specific objectives are:

i. To investigate the determinants of household savings in South Africa;

ii. To examine the determinants of corporate cash holding in South Africa;

iii. To identify the determinants of budget deficit South Africa;

iv. To assess the relationship between saving and investment in South Africa.

1.3 Relevance

Most empirical macroeconomic analyses of savings behaviour in South Africa treat national saving as a single entity (see Prinsloo (2000), Romm (2005), Hares and Ricci (2005) and Odhiambo (2009)). Generally, saving is obtained as a residual between GDP and consumption. However, these empirical studies make the implicit assumption that aggregate saving can be analysed as if it were the product of household decisions.

This dissertation adds to the body of knowledge by examining each individual compoment of saving. The benefit of this approach is that it provides answers to questions of Ricardian equivalence in the behaviour of households, the complementarity or substitutability between domestic and foreign savings as well as transmission of savings to economic growth through investment. These questions have important policy implications. For example, the knowledge of Ricardian equivalence will inform the government on how to raise the economy's saving rate. Also policies to stimulate savings would be unnecessary if domestic saving and foreign saving were perfect substitutes since shortfalls in domestic saving would be completely made up by saving.

Furthermore, studies, such as Raut and Vimani (1989); Collins (1991); Loazya, Schimidt-Hebbel, and Serven, (2000), focused on the role of savings either across different countries, selected regions, or areas of economic integration. These studies, however, did not account for heterogeneity, (such as political influence, population, employment) among the pool of countries as explained by Busani (2013). This dissertation will focus on one specific country (South Africa), which will be insightful as it takes into account the unique socio-economic factors peculiar to the country.

Furthermore, a study on savings is relevant and in line with South Africa's National Development Plan, launched in 2012, which is a detailed blueprint for how the country can eliminate poverty and reduce inequality by the year 2030. According to the National Development Plan (NDP), the South African economy needs to grow by 5.4 percent or more to create enough jobs to redress inequality and resolve the country's stubbornly high unemployment rate. To reach and sustain this target, South Africa needs to find investment that amounts to at least 25 percent of GDP. Investment is, therefore, the best fuel for inclusive, sustainable economic growth, and saving among the major sources of investment spending. An increase in any of three components of savings will lead to an increase domestic saving which will provide funds for investment, hence boost economic growth. There is, therefore, justification and policy relevance in the study of savings in South Africa owing to how it is important in promoting economic growth.

1.4 Structure of the thesis

This thesis consists of four standalone essays structured as follows: The first essay, outlined in Chapter 2, investigates the determinants of household saving in South Africa. The second essay discussed in Chapter 3 focused on the determinants of corporate saving (cash holding) in South Africa while the third essay espoused in Chapter 4, investigated the determinants of budget deficit (negative saving). Lastly, the fourth essay investigates the investment-saving nexus in South Africa in Chapter 5. Chapter 6 concludes with policy implications, limitation and further research.

Chapter 2

DETERMINANTS OF HOUSEHOLD SAVING IN SOUTH AFRICA

2.1 Introduction

2.1.1 Background and problem statement

Household saving plays an important role in the economic development of both developed and developing nations due to its significant influence on the circular flow of income in the economy (Iyoha, Oyefusi and Oriakhi, 2003). Savings are an important means of improving well-being, insuring against times of shocks, and providing a buffer to help people cope in times of crisis (Rutherford, 1999; Zeller and Sharma, 2000). At the household level, the benefits of saving include hedging against unforeseen circumstances, the accumulation of assets, funds available for household investment, provision for retirement, savings can help with the purchase of homes and housing, improve debt settlement, and the acquisition of social services (Zwane, Greyling and Maleka, 2016). The sustenance of household savings increases the possibility of future investment both at the micro and macro- levels in the economy.

Economic theory postulates that households' saving is the difference between households' income and consumption. Household income is the aggregate income a household earns from all

sources during a particular period. Consumption, on the other hand, is the total amount of goods and services that are consumed by households during a particular period (Rutherford, 1999). Solow (1956) suggested that savings influence economic growth, as higher savings lead to capital accumulation and hence economic growth.

Keynes (1936) stated that savings depend upon disposable income. Duesenberry (1949) proposed that consumption/saving was a function of the ratio of current income to the previous level of income. Friedman (1957) hypothesized that household saving was based on permanent income. Ando and Modigliani (1963) postulated that households were net dis-savers in their early and old age, but they saved more in their middle age. Apart from income, other variables might be responsible for households to save a sufficient part of their remuneration.

As the theories on savings determinants develop, the general model assumptions of the Life Cycle Model and Permanent Income Hypothesis have been modified to investigate other factors that impact savings (Harjes and Ricci, 2005). Jongwanich (2010) ascribed the attractiveness of the Life Cycle Model to its flexibility in incorporating other relevant theoretical features relating to developing countries without changing its basic structure. This model, therefore, allows for the consideration of variables that may be unique to South Africa to gain further insight into the respective country's household saving behaviour.

Despite these benefits, South Africa has been characterised by low and declining household savings rates. Household savings figures declined from an average of 5.9 percent of GDP per year in the 1970s to 1.6 percent in the 1990s to less than 0.5 percent in the new millennium (South African Reserve Bank, 2016). The trends of the ratio of household saving to disposable income showed a declining trend throughout the period under investigation. The highest ratio was recorded in 1980 with household saving holding 11.3 percent of household disposable income. Since then household saving continued to decline reaching its lowest in 2007 at -2.3 percent of income. Since the year 2005, the household saving to income ratio fell into negative figures and has since remained below zero. Surprisingly, during the same period household final consumption expenditure as a percentage of GDP has shown an increasing trend from a low of 50.8 percent in 1980, peaking at 63.8 percent 1998, then fluctuated around 62 percent and 59

pecent between 1999 and 2017.

Thus, low household saving implies that households are likely to have higher debt and fewer assets which inturn exacerbate the poverty problem. At macro levl, lower household saving will lower gross domestic saving and reduce the amounts available for investment. This essay aims to identify the determinants of household savings to establish the reasons for the declining trends and suggest possible solutions.

2.1.2 Objectives of the study

The specific objectives of this essay are:

• To provide an overview of household saving in South Africa between 1980 and 2016.

• To investigate the determinants of household saving.

2.1.3 Relevance of the study

Samantaraya and Patra (2014) explained that household saving constitutes a large proportion of gross domestic saving. As such, it is imperative to investigate factors that influence household saving to develop policies that target household saving growth. Sandri, Ashoka, and Oshnsorge (2012) asserted that household saving growth is not only beneficial at macro level but is also advantageous to a household. Household saving growth will reduce consumers' heavy reliance on credit, will provide a cushion for precautionary saving and will increase household wealth.

The essay adds to the growing body of literature on the determinants of household in South Africa (Simleit, Keaton and Botha (2011); Chipote and Tsegaye (2014); Mogale, Mukuddem-Petersen, Petersen, and Meniago (2013); Zwane, Greyling and Maleka (2016)) by applying the Bayesian Vector Autoregressive (BVAR) estimation and the essay also uses a quarterly data.

Whereas the studies of Simleit, et al. (2011), Chipote and Tsegaye (2014), Mogale, et al. (2013) use the conventional form the VAR, this study will use the BVAR estimation technique to identify the determinants of household saving in South Africa. The BVAR is a more advanced and recent estimation technique that uses prior knowledge and a likelihood function to provide esti-

mation results (Sarantis and Steward, 1995). The advantage of BVAR over the other forms of the VAR is that it does not suffer from over parameterization, which results in multicollinearity and loss of degrees of freedom. Besides Gupta and Kabundi (2009) posited that BVAR places more emphasis on the prior distribution of the model instead of on the parameters of the model. It is also forward-looking and produces more accurate results in comparison to the structural and unrestricted VAR. This study will, therefore, add to the body of knowledge in South Africa with this estimation technique.

Secondly, this essay will contribute to the body of knowledge by using a longer time frame. Prior studies on South Africa (Simleit et al. (2011), Chipote and Tsegaye (2014), Mogale, et al. (2013) and Zwane, et al. (2016)) considered a relatively shorter timeframe, with the longest being 21 years. This essay will fill in this gap by using a period of 37 and also quarterly data from 1980Q1 to 2016Q4, which, will provide more observations as well as more information for analysis. Moreover, when using yearly data, a lot of fluctuations during the year are lost in yearly averages. However, the use of quarterly data provides for within year analysis as well as more information for trend analysis.

2.1.4 Structure of the chapter

This study is structured as follows; section 2.2 provides an overview of household saving in South Africa, while section 2.3 summarise previous literature. Section 2.4 discusses the methodology while section 2.5 presents the empirical findings. Section 2.6 concludes the study.

2.2 Overview of household saving in South Africa

2.2.1 Introduction

Households consist of individuals, non-incorporated business enterprises and private non-profit institutions. Saving by households includes the accumulation of financial assets such as bank deposits, investments in ordinary shares, unit trusts and government securities, as well as premium payments to insurers, together with pension fund contributions (Chauke, 2011). Any portion of the current expenditure of individuals not financed by current income but instead by

the use of credit represents an increase in the financial liabilities of individuals and is counted as negative saving. Therefore, in the national accounts presented by the Reserve Bank, net household saving is defined as the surplus of gross household saving over the use of consumer credit, or as the difference between disposable income and total household consumption.

Sithebe (2014) posited that gross household saving could divided into two categories, namely contractual and discretionary saving. Contractual saving involves individuals committing themselves to a series of payments, such as premiums on insurance policies or contributions to pension funds. Discretionary saving, on the other hand, refers to deposits made with institutions such as banks as well as share investments.

Although contractual saving in South Africa has increased substantially and consistently over the years (1945 to 1990s), discretionary saving has been negative for most of this time, (Mahlo, 2011). In spite of increased saving opportunities in the form of the innovative new saving accounts available at banks and the proliferation of unit trusts, the use of consumer credit in its manifold forms exceeded the gross discretionary saving of individuals for many decades. Therefore households as a whole save contractually on the one hand and dissave (or use credit) on the other.

2.2.2 Government policy on saving

The effectiveness of monetary policy and fiscal policy is the key to encouraging or discouraging a savings culture. However, the impact of monetary policy and fiscal policy on savings is unpredictable. It is therefore imperative to implement and re-enforce government policy that could do more to encourage financial savings, such as compulsory saving policies as well as tax incentives.

Compulsory savings are savings that individuals and households are compelled to make in the form of pension and provident funds, as per the government rules. This mandatory saving, set out by the government, would be successful in increasing household saving (Sedirwa, 2015). For example, the establishment of a compulsory social security and retirement savings scheme for all citizens would greatly enhance the accumulation of savings in the country. A Sanlam

Benchmark Retirement Survey found that most of the active retirement fund members interviewed indicated that they preferred to be forced to save. A significant 73 percent would not opt out of compulsory contributions if given a choice while an overwhelming 87 percent would not reduce contributions if they had the option.

The contractual saving (compulsory saving) industry is well-developed in South Africa. The assets of insurance corporations alone amounted to over 80 percent of annual gross domestic product between 1995 and 1999. With the addition of pension funds, the ratio of these institutions' total assets to gross domestic product increase substantially and compare favourably with similar ratios in advanced economies (Chiroro, 2010). The well-developed pension system comprises old-age pension and occupational pension schemes. Also, South Africa is one of the leading economies in the world, with high levels of insurance premium payments relative to gross domestic product.

The history of retirement reforms implemented by the South African government is clouded by the negative legacy of the apartheid regime. The retirement reforms are an ongoing gradual process of improvement and updates per the development in the financial sector and needs of the citizens, (National Treasury, 2012).

The retirement reforms have five broad themes ranging from taxes, fees, annuity comparisons, and retirement capital preservation. Some of the themes proposed by National treasury have been publicly debated and implemented as policy over the years. Since the retirement reforms a perpetual process, changes are still being made. The retirement reforms will be discussed in detail below.

The first paper presented by the National Treasury was *Enabling a Better Income in Retirement*. This paper focused on annuities in South Africa and identified two types of annuities as; living annuities and conventional annuities (National Treasury, 2012a). The government was mandated to increase competition among living annuity providers in a bid to reduce fees and the level of financial advice required by retirees. Secondly, a suggestion was made for the increase of 'automation'. The notion was to create default retirement products, online or otherwise, where retirees with certain balances will be required to enrol. This was envisaged to

ease the transition from pre-retirement to post-retirement. Thirdly, it is was suggested for the increased longevity of protection.

The second paper tabled issues around *Preservation, Portability and Governance for Retirement Funds* which aimed at increasing preservation of retirement assets. The legislative proposals were; first that all pension funds be required to offer preservation of retirement capital as the default option when a fund member changes employers. The second proposal was provident funds alignment with pension and retirement annuities in the form of mandatory amortisation. This would reduce the number of people that collect their savings from provident and spend it without realising the long-term implications. Lastly the paper suggested that trustees should have financial sector training to ensure that they are in the right position.

The South African government, in a bid to address the low preservation rate applies a significant tax penalty on employees who withdraw their retirement savings above certain thresholds before actual retirement. From the 1 March 2016, all retirement funds have been treated the same and *de minimus* was increased from $R75000$ to $R150000$. This implies that if an individual's accumulated retirement capital is less than R150 000, the mandatory amortisation rule will not apply (National Treasury, 2014b).

The third paper entitled *Incentivising non-retirement savings* aimed at increasing saving among the middle to low-income households, (National Treasury, 2012c). The aim was to grow the domestic saving rate of South Africa out of the negative ranges and to raise financial security among low to middle income households. This paper proposed the tax-free saving accounts that would enable citizens to invest in a certain fund and benefit from tax-free withdrawals and growth (National Treasury, 2012c).

National Treasury (2012) introduced the Retail Savings Bonds in the 2003 Budget to provide a simple and affordable means of saving. In this scheme the tax-free interest income threshold was introduced to provide incentives for non-retirement saving as discussed above. An example of this incentive is the tax-free saving accounts provided by banks, for saving purposes up to a limit of thirty thousand rands. Another example of saving incentive was the Fundisa which was aimed at saving for higher education through a money-market unit trust. However, the existing

interest income exemption is not an effective instrument for encouraging savings amongst low to moderate-income taxpayers

National Treasury (2012) also presented the new and proposed incentives to increase savings interest-bearing accounts (Savings account; low denomination top-up retail bonds, money market funds) and equity accounts (Equity, Property assets). Both incentives will be capped at thirty thousand per annum and five hundred thousand for life, with tax-free earnings and withdrawals.

The fourth paper presented by National Treasury (2012d) was *Improving Tax Incentives for Retirement Savings* to simplify the retirement tax structure. The paper suggested the harmonisation of the tax treatment of all retirement funds (pension, provident and retirement annuity) and also to treat all employer contributions to retirement funds as fringe benefits.This implies that all employer contributions made on behalf of the employee are taxable in the hands of the employee. Besides the paper proposed the tax deductions for contributing to a retirement fund should be set according to age. Those who are 45 years and younger should be allowed a maximum of 22.5 percent while those older than 45 years old will get a maximum cap of 27 percent (National Treasury, 2012d:13). This proposal was welcomed by stakeholders and implemented as policy on the 1 March 2016.

The fifth and final paper entitled *Charges in South African Retirement Funds* focused on reducing the charges of retirement funds that are levied during the accumulation phase of individuals' working career. After an international comparison of retirement fund fees, the National Treasury concluded that South African retirement fund charges were significantly higher.

Estimates of contractual saving were obtained from the South African Reserve Bank (SARB) website, from the balance sheet of pensions and long-term insurance by households. The data showed a substantial increase in contractual saving from just over 5 percent of gross household saving in 1995 to a high of 27 per cent in 2005 before declining to 7 per cent of gross household saving (SARB, 2016).

Table 2.1 above shows the average growth rate of contractual and discretionary saving by pe-

Table 2.1: Average growth rate of contractual saving and discretionary saving

Period	contractual saving	discretionary saving
1980 - 1993	24	23.3
1994 - 2007	12.1	−34.4
2008 - 2016	8.7	2.97
1980-2016	15.6	−4.6

*Source: Own calculation using SARB Data, Note: Table is presented in percentages

riod. It can be seen that in the apartheid era, the growth of contractual saving and discretionary saving were relatively similar at 24 percent and 23.3 percent respectively. However, the immediate post-apartheid era before the global financial crisis saw a steep decline in the average growth of discretionary saving to −34.38 percent. The average growth rate of contractual saving also decreased to 12.1 percent. Post the financial crisis and the recovery period; there was an improvement in discretionary saving growth rates to around 3 percent whereas contractual savings only grew by 8.7 percent. The overall average growth rate showed that contractual saving, on average, grew by 15 percent while the discretionary saving average growth rate was recorded as −4.6 percent. This implies that between 1980 and 2016 there was no significant growth in the discretionary saving rate.

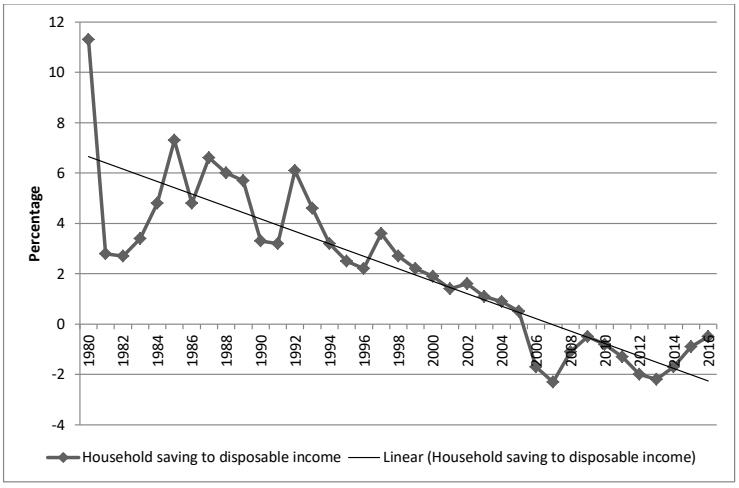
The decline of households saving, with regards to discretionary saving institutions, could be attributed to the combination of decisions made by households regarding saving and those made by institutions regarding investment (Manyama, 2007). Banks, for example, have increased the amounts of loanable funds available to households for home finance and consumer spending to such an extent that the banks' net lending to households exceeds the increase in households' deposits at banks. To fund these lending operations, banks are relying on funds obtained in the wholesale market. Contractual saving institutions invest mostly in marketable government and private-sector securities and directly allocate only limited funds to private households and individuals.

2.2.3 Trends in household saving

The data from the South Reserve Bank show that gross household saving has continued to show a downward trend for the period under observation. Figure 2.1 shows the proportion of

household saving to household disposable income. The period can be summarised into three periods, namely pre-1994 (apartheid), post-1994 and lastly post the 2008 financial crisis. This divide is significant in explaining the fluctuation as political stability has a major impact on economic outcomes.

Figure 2.1: Ratio of household saving to disposable income



Source: Author's estimations using SARB data

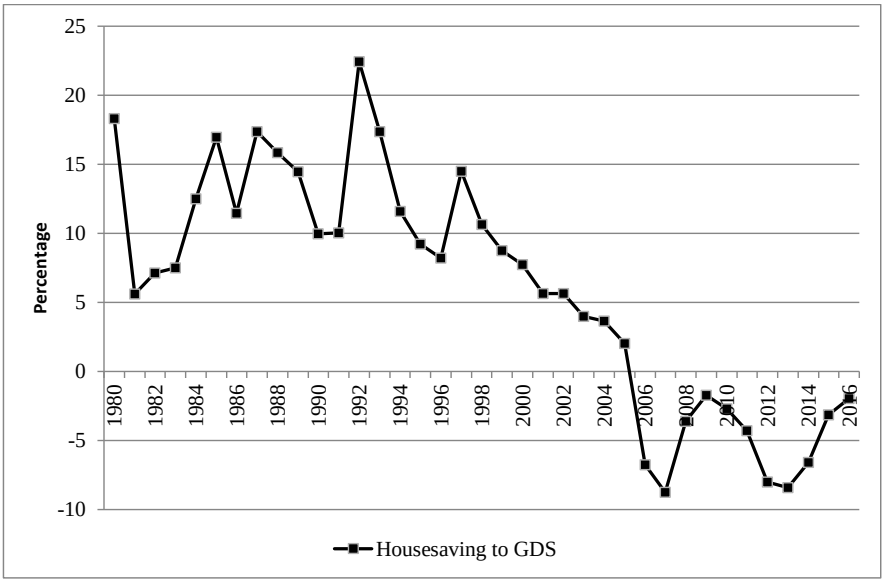
It can be seen in Figure 2.1 that there was a slow but steady increase in gross household saving between 1981 and 1994, peaking at 7.8 per cent of disposable income in 1985. After the end of the apartheid regime in 1994, households continued to save a positive , albeit fluctuating, percentage of their disposable income. The year 2005 saw negative saving from disposable income. Households did not save from their disposable income, as the financial sector became increasingly well developed with the availability of credit facilities. More so, households began depending more on available credit for unexpected future consumption and less on the amount saved. In addition, post the financial crisis of 2008, increased interest rates and payment of debt proved more challenging and placed a further strain on household disposable income. As such, a further decline in household saving was observed, dropping further between 2009 and 2013.

Household saving and Gross domestic saving

The trends shown in Figure 2.2 reveal a declining trend over the period under consideration. The highest recorded contribution was in 1992 at 22.4 percent of gross domestic saving. This implied that household saving was a significantly large proportion of domestic saving. However,

post 1995 the contribution of household saving gradually dwindled, into negative contribution in 2005. Table 2.3 shows the average contribution of household saving to gross domestic saving per period. The proportion of household saving as a percentage of gross domestic saving has shown a declining trend on average. It declined from a high of 12.11 percent of GDS between 1980 and 1993 to 5.44 percent before falling to the negative values between 2008 and 2016.

Figure 2.2: Ratio of household saving to gross domestic saving, 1980−2016

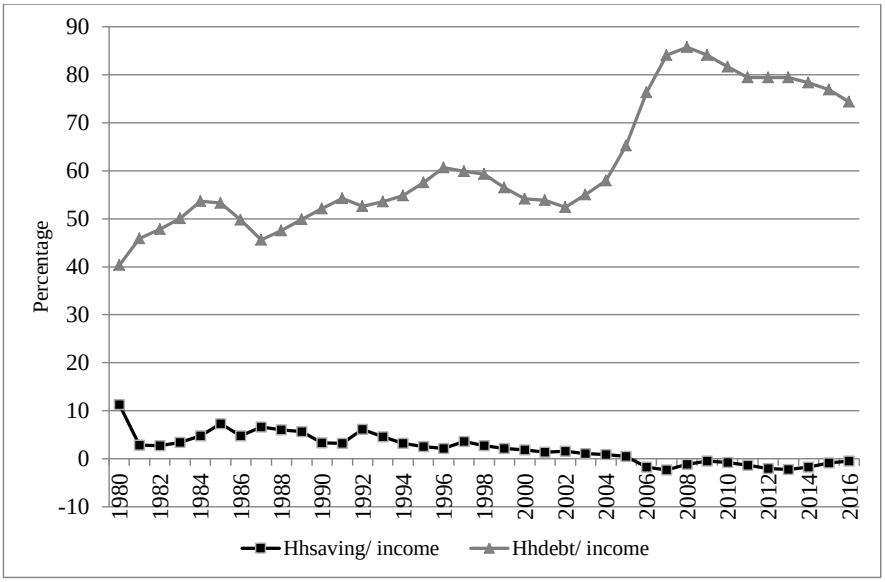


Source: Author's estimations using SARB data

Household saving and Household Debt

The average percentage of household saving to household disposable income has also shown a downward trend since 1980, as indicated in Table 2.4 below. It shows that the household saving from disposable income has been decreasing while household debt has increased over the period. The availability of the credit card and accessibility to loans, as well as a tax squeeze have been major contributors to this gradual decline. Household debt rose sharply from 57.9 percent in 2004 to a high of 84.1 percent in 2008. Part of the high debt in 2008 and 2009 can be attributed to the global financial crisis. It can be seen that there was a downward trend in household saving while at the same time there was an increase in household debt as seen in Figure 2.4 above.

Figure 2.3: Ratio of household saving and debt to income, 1980−2016



Source: Author's estimations using SARB data

2.2.4 Conclusion

Household saving in South Africa general declined between 1980 and 2016. The advent of democracy impacted the political arena and increased employment and accessibility to previously discriminated minorities. However, a lack of knowledge of the use of the banking sector implied that many previously disadvantaged household groups could not save and thus effect a huge change in the gross household saving. Households had a percentage of disposable income, and gross domestic saving declined to negative values throughout the period under consideration. Also, there was a large increase in household debt with a large proportion of disposable income spent on financing loans. Therefore, a significant decline in household saving has been shown throughout the period.

2.3 Literature review

This section will provide the theoretical and empirical literature review on the determinants of household saving.

2.3.1 Theoretical literature

Ramsey (1927) explained that savings could be analysed as an inter-temporal choice and as such, savings are chosen so that future generations would enjoy the same level of bliss (consumption). This implies that consumers divide their income between savings and consumption to maintain the same level of consumption in the next period. This principle further informed models of saving such as the life cycle hypothesis (LCH) and the permanent income hypothesis, (PIH).

The LCH was proposed by Modigliani and Brumberg (1954). The hypothesis assumes that economic agents spend a constant percentage of their expected income on consumption. The individual aims to smooth the consumption throughout their lifetime. For example, the LCH assumes that individuals save for retirement while young and consume in their old age. Besides, Modigliani and Brumberg (1954) noted that a major motive to save is to put money aside for retirement provision. This implies that the youth will save so that they have funds to spend when they are old. The very young have little wealth, middle-aged people have more, and peak wealth is reached just before retirement. Retirees sell off their assets to provide for necessities in retirement. The assets sold by the old are taken up by the young who are still in the accumulation part of the cycle. Therefore, economic agents have a high propensity to save in middle age and a similar propensity to consume in the young and old ages.

The LCH reflects socio-economic aspects of the economy. For example, as the population grows, there are more young people than older people, which implies that there are more people that are saving than are dissaving. This means the total dissaving of the old will be less than the total saving of the young, and therefore there will be net positive saving. On the other hand, income growth implies that the young will be saving on a larger scale than the old are dissaving so that economic growth, like population growth, causes positive saving; and thus the faster the growth, the higher the saving rate.

However, in an economy with no growth, wealth will be passed around, and no new wealth will be created. The total wealth in the economy depends on the length of retirement, and in simple cases, the ratio of a country's wealth to its income is half of the average length of retirement. Furthermore, the LCH can be modified to explain the impact of taxation on income and therefore savings. Bernheim (1999) explained that savings are calculated by the difference between total income (including returns on investment) and consumption. This implies that tax reduces the income available for saving and also decreases the after-tax returns on investment. Ramsey (1927) posited the inverse-elasticity rule for optimal taxation. This rule states that tax on goods should be inversely related to the demand elasticity. This is to minimise welfare losses and avert the double taxation effects on economic agents.

Friedman's (1957) permanent income hypothesis (PIH) states that individuals will smooth consumption to cover their life span. The hypothesis assumes that individuals can determine what their long-term needs are and then proportion consumption accordingly. It assumes people appreciate that income will decline sometime in the future (Wang, 2005). People will, therefore, value precautionary saving, since they do not know what the future holds. The literature supports this view in that when wealth decreases, precautionary saving increases.

There are four components of Friedman's model namely: permanent consumption, permanent income, transitory consumption, and transitory income. Measured income is the sum of permanent and transitory income, and measured consumption is the sum of permanent and transitory consumption. Also, permanent consumption is the sum of permanent income and transitory income, which means that to reduce total permanent income one can reduce transitory income. This requires adjustment to current transitory income.

The Ricardian equivalence theorem asserts that individuals recognise the spending by government through borrowing that may need to be financed through higher taxes in the future. As households would like to allocate resources to smoothen consumption as under the LCH and PIH, they realise in this case that they have to save more to accommodate higher taxes in the future and maintain the level of consumption.

Mikesell and Zinser (1973) explained the Duesenberry's relative-income hypothesis. The hy-

pothesis relates saving to the ratio of previous and present income. It emphasises that saving behaviour can be understood by considering relative income rather than absolute income. Therefore the ratio of saving to income is dependent on the level of present income relative to previous peak income.

In conclusion, this section has discussed four major theories that explain household saving. On the one hand lie the classical economic theories of life cycle hypothesis and permanent income hypothesis; and on the other hand, are the Keynesian theories as well as motives for saving and the Ricardian equivalence. The classical economic theories assert that higher household saving leads to higher income, whereas the Keynes theory asserts that higher income will lead to higher savings. The Ricardian equivalence relates household saving to government policy. Together these theories provide the basis for empirical variables in the methodology.

2.3.2 Empirical Literature

Empirical literature covers studies from all over the world and includes both the microeconomic as well as the macroeconomic perspective.

Primary data/ Survey

Kelley and Williamson (1968) surveyed 490 households between August 1958 and August 1959 in Indonesia to investigate the determinants of household saving. They used the ordinary least square method to estimate a saving function based on the LCH. The variables included were; income age, education and interest rate. They found that income and age had a significant effect on household saving while education and the interest rate provided ambiguous results perhaps due to the method of data collection. In contrast Abid, Udoh and Aya (2011) andAbid and Afridi (2010) found education to have a significant negative impact in their respective surveys in Paskistan and Nigeria.

Cross-sectional data analysis

For Turkey, Aktas, Guner, Gursel and Uysal (2012) used household budget survey data between 2003 and 2008 to estimate the structural determinants of household saving. They found

that increased female labour force participation, higher employment rates, as well as income increased with saving. On the other hand, the dependency ratio, age, inflation and interest rate negatively influenced household saving. The authors concluded that saving was precautionary in nature for households in Turkey, and the results showed households to be forward looking.

Beckman, Hake and Urvova (2013) used a three step Heckman model to investigate the characteristics of household saving in Central, Eastern and Southeast Europe for the period 2010 to 2011. The variables included age, gender, household size, household head, income and education. They found that age, education and income were the main drivers of the propensity to save and revealed a hump-shaped relationship between age and savings as predicted by the life cycle hypothesis. The dependency ratio and household size were negative while having an income earning household head increased the likelihood of saving. However, this research focused on internal household factors.

Bebezuk, Gasparini, Amendolaggine and Garbero (2015) used baseline median regression on pooled data for Latin American countries to determine factors of household saving. Caution must be taken as the quality of the data across the different countries is questionable. However, the estimations highlighted the overriding positive role of income on shaping household decisions. Government transfers, remittances, self-employment, capitalisation pension systems, access to financial services, urban location and education expenses had a negative impact on household saving, whereas labour formality and homeownership had a positive effect. Price and Finlay (2014) used descriptive statistics to analyse household saving behaviour for Australia between 2003 and 2009. The paper showed that income had a positive impact while wealth and gearing had a negative effect on household saving. Credit constraint also showed a negative trend while education was insignificant for Australia.

Panel Data analysis

Horiaka and Wan (2007) used the generalized method of moments (GMM) estimator applied to panel data to investigate the household saving behaviour in China. The variables included were lagged saving rate, income growth rate, real interest rate, inflation rate and the age structure of the population. They posited that in the short run the lagged saving coefficient

was positive. This implies that the higher the saving in the previous period the higher the current saving would be. Income growth was positive and highly significant while real interest rate was insignificant. The age structure and inflation rate were both insignificant.

In 2010, Kim analysed the determinants of personal saving in the USA for the period 1950 – 2007. Kim (2010) used OLS and found similar results to those of Kulikov, Paabut and Staehr (2007) for Estonia. Kim (2010) further found that the coefficients of lagged private saving, tax, and real estate loan were negative. This implies that the higher the amount of personal savings in the period, the lower the amount of private savings in the current period. Kim (2010) however, found the old dependency ratio to be insignificant in determining personal saving, while the employment rate was only significant at 5 percent. Kim (2010) found thus that economic growth negatively impacted personal saving. This implies that during good economic times, people save less and during bad economic times, people save more as they expect the bad economic times to prevail and therefore take precautions for the future. The use of the OLS estimation technique can produced biased estimators.

For South Africa Mahlo (2011) investigated the relationship between household savings and income, consumption, interest rate and debt using panel regression. With a time span 19 years from 1990 to 2009, the author showed a positive relationship between household savings and income, yet the nexus between savings, consumption and debt was negative. Mahlo (2011) thus concluded that household income was the key factor in household saving behaviour in South Africa.

Bayoumi (1993) analysed the impact of financial regulation using panel data for eleven regions of the United Kingdom. The results showed that financial deregulation had a strong positive impact on household saving. This is because more households were encouraged to put some income away for the future. In addition, the wealth and dependency ratios were found to have a positive impact on saving. The real interest rate showed that the substitution effect was greater than the income effect. Income and inflation were both reported to have a positive effect on household saving.

Callen and Thimann (1997) also used panel regression to analyse the characteristics of household

saving in 21 OECD countries. The focus of the research was on the impact of tax and social security on the saving rate of households. The authors included both direct tax and indirect tax as well the amount of social grants as variables in the panel regression. They found that tax had a negative impact on saving rates, such that the higher the tax the lower the saving rates. They also found income growth to have had a strong positive influence to saving, while the dependency ratio had a negative impact, which is not consistent with economic theory. The authors found inflation to have a positive in contrast to the authors initial expectations. The results of the inflation variable in this study is due to the effect specification bias as a result of measurement. Lastly debt was found to be negative while real interest rate was positive.

For China, Kraay (2000) used the panel regression method to examine household saving for the period 1978 to 1995. The focus of the paper was to analyse the impact expected future income had on the household saving in China's rural and urban areas. Kraay (2000) found that the expected future income had a higher impact on the households in the rural areas in comparison to urban areas. The control variable of dependency ratio and consumption expenditure were both negative for both urban and rural areas of China. The comparision of expected future incomes will significantly be different between urban and rural areas. As the comparison in this study is flawed as individuals in urban areas are more likely to have higher expected future income than those in rural areas.

Kulikov et al. (2007) studied how household characteristics affected saving behaviour in Estonia by using household budget surveys for 2002-2005. Using the panel regression method, they control for income and income variability measures such as wealth and credit access as well as household composition, education and the employment status of the household head and of other members of the household. Two different saving measures were used, the saving rate and the log saving rate. They found that higher levels of income led to higher levels of saving. However, wealth related variables such as home ownership and possession of durable goods such as cars had negative effects, if any at all, on savings. The proxies for credit access negatively affected saving rates. Bank deposits, financial assets, access to liquidity, household debt and leasing liabilities led to lower savings. Their results showed for the age effects, younger and older households had higher saving propensities than the middle aged. In their model, households

with higher education saved less. They pointed out that highly educated households faced higher and less volatile income streams and therefore needed to save less.

Hondroyiannis (2006) estimated the linear saving function based on the Life Hypothesis, using panel data for 13 European countries, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Sweden and the United Kingdom. The results showed that the countries' private saving was precautionary in nature, since the demographic variable of age was positive. Furthermore an increase in government surplus led to a decrease in private saving for four countries, revealing that government saving did crowd out private saving. In addition, the results showed liquidity constraints to have had a negative impact while interest rate, income and inflation had a positive impact on private saving. This study did not take into account the heterogeneity among the selected countries. This is important because financial sector development are different in these country and as such will have a substantial influence of saving.

Harris, Lounders and Webster (1999) used a probit model to analyse household saving for Australia between 1994 and 1999. The variable used included gender, age, interest rate and a precautionary variable of optimism. The authors posited that males were more likely to save than females. The age coefficient showed that all other age groups were more likely to save in comparison to the over 65s. The number of children per household had a negative impact on saving. Interest rate and geographical parameters were found to be insignificant. The model was conditioned on the income of the household.

For South Africa, Zwane, Greyling and Maeka (2016) used the NIDS data to investigate the determinants of household saving. They used the two waves of the NIDS data of 2008 and 2012. The benefit of the panel method, for South Africa, is that it overcomes the endogenous bias and controls for heterogeneity across households. The variables used include income, age structure, household size and head, gender, education and province. The authors found that higher income would result in higher savings. They also found that a household with an employed head of house increased the likelihood of saving. Moreover, the older an individual became, the higher the likelihood of saving. In addition the household size exerted a negative

effect on household saving while the level of education was positive. This implies that the more educated an individual is the higher the chances of saving. This study did not include a proxy for financial sector development, even though, this variable provides insights into other financial variables that influence household saving (such as availability of credit).

Time series data

Bérubé and Côté (2000) used quarterly time series data for Canada between 1965 and 1998 to analyse long run trends between household saving and its determinants. To obtain more precise results, the authors used a Cointegration technique using 5 different estimation methods, namely Engle and Granger's (1987) error-correction framework; Philips and Loretan (1991); Stock and Watson (2005) leads-and-lags procedure, and the fully modified procedure developed by Philips and Hansen (1990). These different procedures enabled the authors to compare the validity of the results across different estimation methods. The variables used included expected long run interest rates, expected inflation, all-government fiscal balances as a share of nominal GDP (a proxy for the public pension benefit replacement rate), unemployment rate, ratio of net worth to personal disposable income, and the dependency ratio. They found that inflation had a strong positive impact on a household indicating a measurement problem as inflation was expected to negatively impact household saving. In addition they also found that persistent increase in government dissaving would be offset by household saving.

Metin-Ozcan, Gunay and Ertac (2003) investigated the empirical determinants of private savings behaviour in Turkey for the period 1968-1994 using the ordinary east squares (OLS) estimation method. They identified six explanatory variables including government policies proxied by public savings; income variables; financial variables measured as the ratio of M2 to gross national product (GNP), and real interest rate on saving deposits; external variables measured as the terms of trade and current account deficit; demographic factors such as urbanization ratio, youth dependency ratio, old dependency ratio and life expectancy ratio and uncertainty variables (inflation). The study also reported that the ratio of government savings to Gross Private Domestic Investment ratio (GPDI) and the Turkish economic crisis had significant negative effects on saving behaviour. In addition, the study found that a deeper financial system,

inflation and terms of trade shocks all had a positive impact on private savings. The effect of the current account deficit as well as the growth of income was statistically insignificant in Turkey. The study found that that financial market development, macroeconomic stability, life expectancy, external factors and economic crises had a significant impact on household saving in Turkey. This study used OLS to estimate time series data and as such the results are not reliable as the OLS could produce biases estimators.

Prema-Chandra and Pang-long (2003) analysed the relationship between social service payment and household saving for Taiwan from 1952 to 1999. They used time series data from Taiwan's statistical data book. The authors used the unrestricted error correction modelling because it minimised the possibility of spurious results while retaining long run information. They found that household saving rose with both the level and the rate of growth of household disposable income. The real deposit rate had a significant positive impact on household saving. Increased availability of social security provision and enhanced credit availability had a negative impact on household saving. Furthermore they found that both the old and young dependency ratio in the population had a negative impact on the saving rate. Lastly the study concluded that public saving crowded out private saving.

Bulir and Swiston (2006) investigated the determinants of private saving rate in Mexico using annual data for the period 1980–2004. They used public savings, external savings, real growth, the level of development, private credit and dependency ration as the explanatory variables. Results obtained using the OLS method showed that saving in Mexico was also influenced by the degreel of financial development, incomes, GDP growth, and demographics. The paper detected that private saving were uncorrelated to investment as changes in public saving and external saving crowded out private saving.

Nwachukwu and Egwaikhide (2007) used an error-correction model to identify factors influencing private saving in Nigeria using annual data for the period 1970-2005. The model reported on both long and short run effects of various factors on the saving rate. The explanatory variables included in the model were real per capita gross national disposable income (GNDI); growth rate of real per capita GNDI; real interest rate; rate of inflation; public saving rate; external

debt service ratio; terms of trade and the degree of financial depth. The study revealed that real interest rate showed that the real rate of return on bank deposits had a statistically significant negative effect on saving behaviour in Nigeria. On the other hand the variables' terms of trade changes, external-debt-service ratio and the inflation rate showed a strong positive relationship with the private saving rate, and lastly the income growth variable was found to have had a significantly negative impact on the private savings rate. This result is not in line with economic theory espoused in the LCH and PIH. More so, the coefficient for public saving rate was both positive and significant, thus rejecting any substitutability between public and private saving. Results indicated that the coefficient for real per capita was positive and statistically significant which provided support for the argument that, for countries in the initial stages of development, the level of income was an important determinant of the capacity to save.

Larbi (2013) used fully modified OLS (FMOLS) based on the Philips and Hansen (1990) theory to investigate the determinants of private saving in Ghana. Using data collected from the World Bank, and the Ministry of Finance and Economic Planning, Larbi (2013) posited that the Ricardian Equivalence was confirmed for Ghana, since fiscal deficit had a positive relationship to private saving. In addition, income, inflation and financial development positively influenced private saving, while the interest rate and dependency ration were both negative. The variable of real exchange rate was statistically insignificant in explaining private saving. Mansoor and Khattak (2014) used a short time span of 5 years to assess the determinants of household saving. They used OLS regression to analyse how per capita income, inflation rate, employment status, and tax burden impacted household saving in Pakistan. They found that income and employment had a strong positive influence on household saving while tax and inflation had a negative impact on saving. Caution should to be used in the results as the time span of 5 years is too short to analyse trends and determinants of saving.

Simleit, Keeton and Botha (2011) used quarterly data to investigate the determinants of household saving in South Africa from 1981Q1 to 2009Q4. They used data collected from the Thomson DataStream and the South African Reserve Bank (SARB) and the Vector Error Correction Model (VECM) to analyse the data. The variables included were real GDP in logarithm, government budget balance as a percentage of GDP (proxy for government policy), interest rate

(91-day treasury bill rate), inflation rate proxied as the real housing price index, and corporate saving as a percentage of GDP. The result revealed that South African household saving was counter cyclical in that Real GDP and household saving were negatively related. This implies that during good economic times, households save less in anticipation that the good times will continue, while in bad economic times households will save more. They also found that interest rate inversely impacted on household savings, pointing to the income effect being greater than the substitution effect. The authors also found that the Ricardian equivalence held true for South Africa as the government budget balance was negatively related to household saving. Lastly they also found an inverse relationship between household saving and corporate saving.

Mishi (2012) studied the trends and determinants of household saving in South Africa using a VECM method between 1963 and 2011. The variables included in the VECM were ratio of household saving to household disposable income, growth rate of real disposable income (GDP per capita), interest rate (proxy: risk premium), public saving (proxy was government debt to GDP) and financial deepening (ratio of M2 to GDP). In contrast to the results by Simleit, et al. (2011), the income variable (disposable per capita income) was found to be positive. However, this difference could stem from the different proxy used to measure income in the two studies. Government debt to GDP ratio and inflation had also had a positive impact on household saving. In addition, financial deepening was reported to have had a negative impact, which echoed the results of Simleit, et al.(2011), and Mahlo (2011) with a negative coefficient for interest rate.

Still in South Africa, Mongale, Mukkedem-Petersen, Petersen and Meniago (2013), used Cointegration Vector Autoregressive (CVAR) to analyse data sourced from the SARB between 1994 and 2010 to investigate household saving. They used household disposable income, household debt, real GDP growth rates, foreign savings, inflation and interest rate as variable in the model. They found the presence of a long run relationship between the dependent variable of household savings and the independent variables. They echoed the results of Mahlo (2011) and Mishi (2012) with positive signs for disposable income, and real GDP and countered the results of Simleit, et al. (2011). The interest rate and inflation were positive while the higher the household debt the lower the household saving rate.

Chipote and Tsegaye (2014) used the error-correction model to investigate determinants of household saving in South Africa. They collected data from the SARB and the World Bank data between 1990 and 2011. The variables included were household disposable income (GDP per capita), age dependency ratio, real interest rate (GDP deflator) and the inflation rate (as CPI excluding food and non-alcoholic beverages for all urban areas). They echoed the findings of Simleit, et al.(2011) in that the level of income and household saving are negatively related. These two studies used the same the proxy for income which is GDP per capita and concluded that household saving in South Africa was counter cyclical. This can be attributed to the heavy reliance on debt to finance spending which results in very little saving. In addition, they found that the age dependency ratio, inflation and real interest rate showed positive relationship with household saving.

Ehikioya and Mohammed (2014) investigated the determinants of private saving in Nigeria using annual data from 1981 to 2010. They used the VECM to analyse data collect from the Central Bank of Nigeria, and the African Development Bank. The variables used included the budget deficit ratio GDP, Financial Deepening (M2/GDP), real interest rate, GDP per capita, population, inflation rate and terms of trade. The results revealed that income, financial deepening and interest rate had a positive effect on household saving, while inflation, budget deficit and population negatively impacted saving. Population was to found to be insignificant.

Samantaraya and Patra (2014) used the Autoregressive Distributive Lag (ARDL) to investigate factors influencing household saving in India from 1992 – 2012. The variables included real GDP, age dependency ratio, interest rate, inflation, gross fiscal deficit-GDP ratio, personal income tax to GDP ratio, share of agriculture in total GDP, and external terms of trade. They also found the variables in the model to have a long run relationship. Income and age dependency showed a positive impact while interest rate and inflation were negative. The terms of trade and fiscal were insignificant in explaining household saving in India. These results were in line with economic theory.

In 2008, Du Plessis studied the determinants of private savings in South Africa using qualitative analysis. The qualitative study was conducted with reference to primary data in the form of

opinions of senior South African economists, with data gathered during in-depth exploratory interviews. Results of the study indicated that the declining household savings could not simply be attributed to low income levels and the country's large population, but also to a large number of variables as well. For example the study revealed that household savings in South Africa were negatively affected by the expectation of future income, increased access to credit, negative impact of HIV/AIDS on life expectancy and lastly inequality. However, qualitative studies provide a narrow perspective of the analysis in comparison to empirical studies.

2.3.3 Conclusion

Samantaraya and Patra (2014) highlighted the importance of country-specific research because of the flawed assumption of homogeneity in countries combined in cross country research. Institutions and structural features differ significantly across countries' aggregates in cross country research. This research will add to the already existing scanty body of country-specific research on household saving. The research will focus on South Africa and consider institutional and structural factors that are peculiar to the country.

In addition, the literature revealed a research gap in terms of time frame. Firstly, country-specific research on South Africa has focused on the use of yearly data. Secondly, the research also considered a shorter time with the longest being 21 years. This research intends to fill in this gap by using quarterly data from 1980Q1 to 2016Q4. This will provide more observations as well as more information for analysis. Moreover, when using yearly data a lot of fluctuations during the year are lost in yearly averages; however, the use of quarterly data provides for within year analysis as well as more information for trend analysis.

Furthermore, this essay will use a Bayesian Vector Autoregressive (BVAR) model to estimate the relationship between household saving and its determinants. The BVAR model eliminates the problem of over-parameterisation that is faced with an unrestricted VAR. This is because the BVAR model makes use of restrictions based on prior knowledge of the parameters. Also, the BVAR model has been shown to produce more accurate results and forecasts in comparison

to unrestricted VAR as well as improving out-of-sample performance. In addition, this study will be the first of its kind to use the BVAR model to identify the determinants of household savings, as no other study has so far used this method.

The review of literature has shown that income, government policy, interest rate, inflation, external financing, and availability of credit through financial deepening has a significant impact on household saving in South Africa.

2.4 Methodology

Having reviewed the literature in the previous chapter, the current chapter offers a detailed discussion of the research methodology which is used to determine factors influencing household saving in South Africa. The discussion of the research methodology is structured as follows: The theoretical framework is discussed in subsection 2.4.1, followed by subsection 2.4.2 which discusses the model specification. Subsection 2.4.3 discusses the estimation techniques, which is followed by subsection 2.4.4 which discusses the diagnostic test and section 2.4.5 will focus on the data description.

2.4.1 Theoretical Framework

The Life Cycle Hypothesis has provided economic researchers with a wide range of possible determinants of household saving which can be tested empirically. The LCH can be explained using the Over-Lapping generations model (OLG) developed by Allais (1947) and Samuelson (1958). OLG captures the changes in behaviour of economic agents throughout their lifetime. The OLG model assumes that an individual lives for n-period and divides the population into young and old. The young people are the consumers while the old people are the workers. These groups are relevant because of the contracting decisions with regards to labour supply, saving decisions hence consumption, and tax payment.

The model assumes that time is discrete and goes on forever. Individuals can live for two time periods and in each time period a new generation is born. Furthermore the model assumes that economic agents work in the first period and consume their savings in the second period. The underlying assumption is that individuals aim to maximise utility.

The preference of agents is described by a utility function that is separable in time and is concave in each period's consumption. The individual utility is given by the sum of current consumption and discounts future consumption. Therefore the generation born in time t will have the following utility function:

$$U_t = U_{(C_{1t})} + \beta.U_{(C_{2t+1})}, \theta \leq 0, U^{'} > 0, U^{''} < 0 \tag{2.1}$$

Lifetime utility depends on consumption today and consumption in the future. The parameter β is a number, such as 1 or 0.9, that captures the weight that an individual places on the future relative to today. For example, if β=1, then the individual treats utility flows today and equally in the future. Alternatively if β<1 a given flow of utility is worth more when it occurs today. The bigger β is, the more patient the household is in the sense that the household places more value on future utility relative to current utility.

Future consumption is given by the assumption that individuals consume from their savings. Therefore the future consumption is the total of the rate of return on savings, such that consumption (C) and income (Y) is given in the second period by the equation:

$$C_{(2t+1)} = (1 + r_{t+1}).S_t \tag{2.2}$$

The household faces the problem of choosing current and future consumption to maximise lifetime utility subject to the budget constraint. Essentially, the household aims to choose current consumption and current saving, with saving determining how much consumption can be done in $t + 1$. Therefore, in a decentralised economy, the household will maximise utility as follows:

$$maxU_t = U_{(C_{1t})} + \beta.U_{(C_{2t+1})} \tag{2.3}$$

Subject to:

$$(C_{1t}) + S_t = w_t \tag{2.4}$$

and

$$(C_{2t+1}) = r_{t+1}.S_t \tag{2.5}$$

Where:

(C_{1t}) = consumption of generation born in time t in the first period.

(C_{2t+1})= second period consumption of the same generation.

S_t = saving of the young generation in period t.

w_t = wage of the young generation in period t.

r_t = the interest rate from t - 1 to t.

Assuming the saving S_t is the only decision variable, the above equation can be re-written as:

$$U_t = U(w_t - S_t) + \frac{1}{1+\theta}.[(1 + r_{t+1}).S_t] \tag{2.6}$$

To maximise this function, take the first order condition (F.O.C) and set it equal to zero;

$$\frac{\partial U_t}{\partial S_t} = U(w_t - S_t) + \frac{1}{1+\theta}.U^{'}[(1 + r_{t+1}).S_t].(1 + r_{t+1}) = 0 \tag{2.7}$$

Simplifying the F.O.C

$$U^{'}(C_{1t}) - (\frac{1 + r_{t+1}}{1+\theta}).U^{'}(C_{2+1}) = 0 \tag{2.8}$$

Thus first-order condition for maximisation or optimal condition can be written as:

$$U^{'}(C_{1t}) = \beta.r_{t+1}[U'(C_{2t+1})] \tag{2.9}$$

The first order condition of equation (2.9) implies that, at the optimum the marginal utility from consuming a little extra in the present, $U^{'}(C_{1t})$, must be equal to the marginal utility of saving a little extra today. i.e. Saving a little extra today will leave you with r_{t+1} , which will yield $r_{t+1}[U'(C_{2t+1})$. This then suggests that at the optimum, household must be indifferent between consuming some more and saving some more. However, if this equilibrium condition does not hold true, the a household could increase utility by either consuming or saving more. From equation 2.8, it can be concluded that saving varies positively wage but has an ambiguous relationship to interest rate.

On the other hand, firms aim to maximize profit given the wage, w_t and interest rate, r_t. Assume a competitive market, where the wage is equal to the marginal productivity of labour

and interest rate equal the marginal productivity of capital.

$$MPL_t = f(k_t) - k_t.f'(k_t) = w_t \tag{2.10}$$

And

$$MPK_t = f(k_t) = r_t \tag{2.11}$$

The **goods market equilibrium** is that demand equals supply which is equivalent to investment equals saving.

The equality between net investment and net saving is simple because all the capital stock consists of the savings of the young generation:

$$K_{t+1} - K_t = N_t.s(w_t.r_{t+1}) - K_t \tag{2.12}$$

$$k_{t+1} = \frac{s(w_t.r_{t+1})}{1+n} \tag{2.13}$$

Solving for consumption and thus for savings, the saving function will be;

$$S_t = (w_t.r_{t+1}) \tag{2.14}$$

Savings is a function of wage and interest rate. This saving function will be augumented to include gross domestic product (GDP), the interest rate (R), government policy (GP) measured as government budget balance as a percentage of GDP, financial deepening (FD), measured as the ratio of M2 to GDP, and macroeconomic stability measured by inflation (INF) in accordance with the empirical literature review.

2.4.2 Model Specification

With reference to the theoratical framework, the BVARs estimated can be written in equation form as:

$$HHS_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_\rho Y_{t-\rho} + e_t \tag{2.15}$$

Where,

$$HHS_t = \begin{bmatrix} CE_{i,t} \\ GP_{i,t} \\ FD_{i,t} \\ R_{i,t} \\ INF_{i,t} \end{bmatrix}$$

HHS = household savings.

CE = compensation of employees.

R = interest rate.

GP = government Policy.

FD = financial deepening.

INF= inflation rate.

2.4.3 Estimation techniques

Vector Autoregressive (VAR) model is a theoretical model used to examine linear interdependence between time series (Woźniak, 2016). The VAR was introduced by Sims (1972), capturing stylised facts about time series such as dynamic linear interdependence, robust autocorrelations at annual frequencies, and the deteriorating pattern in the values of autocorrelations when the lag order increases (Woźniak, 2016). When using the VAR model, it is not essential to specify variables as exogenous or endogenous as all variables are treated as endogenous. Furthermore,

each variable is defined as a linear function of its past lags and the lags of other variables included in the model. Thus, they seem most appropriate when modelling data collecting vectors of observation for N variables for a time period t going from 1 to T.

A simple VAR equation in its general form is written as:

$$y_t = \mu + A_1 y_{t-1} + ... + A_k y_{t-k} + u_t \tag{2.16}$$

where y_t is a $Nx1$ vector of variables included in the model;μ is a $Nx1$ vector of the constant term; A is a NxN vector of autoregressive coefficients; and u_t is a $Nx1$ vector of error terms. u_t is assumed to be normally distributed with a zero mean and a covariance matrix Σ denoted as:

$$u_t \sim \mathcal{N}_N(0, \Sigma) \tag{2.17}$$

Woźniak (2016) explained that the dynamic interdependence between series which is analysed through the Granger causality hypothesis is efficiently captured by the VAR, making it a crucial tool for empirical macroeconomic research, based on the unrestricted VAR model other models such as Structural VAR models and the Vector Autoregressive Moving Average models. Additionally, with the introduction of an econometric technique named parameter shrinkage, the Bayesian VAR was developed.

Pioneered by Thomas Bayes, the Bayes' theorem was presented as an answer to the inverse probability problem. A simple representation of Bayes' rule is written as:

$$p(\theta|Y) = \frac{p(Y|\theta)p(\theta)}{p(Y)}, \tag{2.18}$$

where θ is a collection of all the parameters included in the model; Y is the data used for the estimation of the parameters; and p is some probability distribution.

The left-hand side of equation 2.17 gives the posterior distribution; that is, a conditional distribution of the collection of parameters θ given the data Y. This distribution is a full designation of the information gathered about the parameters of the model after observation of the data (Woźniak, 2016). The first element of the numerator on the right-hand side of equation 2.17 presents the likelihood function. This is the conditional distribution of the data given the parameters of the model as:

$$p(Y, \theta) = p(Y|\theta)p(\theta) \tag{2.19}$$

The main differences between the Bayesian and frequentist[1] inference rules are highlighted when analysing the likelihood function. On the one hand, from the frequentist perspective, the data generating process represents the model, and when the process and its parameters θ are known, the data can be randomly drawn from the conditional distribution of the data given θ. Thus, the frequentists suggest that an estimation being a function of the data is random, as Y (i.e. the available data) is solely a single representation of the data generating process. The parameters θ are not random, even though their values are unidentified (Woźniak, 2016). On the other hand, the Bayesian approach considers the observed data as given and non-random. Alternatively, the parameters and all the unknown values are random, and are therefore characterized by a probability distribution.

Hence, equation 2.17, the second element of the numerator on the right-hand side represents the prior distribution of the parameters θ. This represents the uncertainty about θ before the data is observed; and is outlined as a marginal distribution of θ. The specification of this distribution by an investigator is required, as it is the information about the parameters that is being included in the statistical inference. When both the prior and the likelihood functions are known for all hypothesis the exact posterior can be computed using Bayes' formula. However, in most cases the prior probabilities are unknown and they have to be made up as subjective beliefs about the parameters. While the Bayesian inference lies on the prior and the likelihood of the observed

[1]The frequentist is the school that only employs conditional distributions of data given specific hypotheses (Orloff and Bloom, 2014)

data, the frequentist inference solely relies on the likelihood function for both unobserved and observed data. In frequentist inference, a prior is not required and the probability of hypothesis is never given. Instead, the frequentists seek to maximise the likelihood which is believed to approach the one true θ as the data sample grows. However, the Bayesian view considers that there is not just one model but many, over which a prior probability is formed and the data is used to form a posterior. Importantly, the subjectivity of the interpretation of probability does not render the inference subjective.

In equation 2.17, the computation of the posterior distribution involves the division of the joint distribution of the data and the parameters by a denominator called the marginal data density (or marginal likelihood in statistics). This is the total probability of the data considering all the possible hypotheses that substantiate the model embodied in the data. The marginal density can be obtained from an integral of the joint distribution of the data and the parameters, with respect to the parameters. This is written as:

$$p(Y) = \int p(Y|\theta)p(\theta)d(\theta) \tag{2.20}$$

From the above equation, it can be seen that the marginal data density is a normalising constant of the essence of the posterior distribution (i.e. the product of the prior distribution and the likelihood function). Although it does not integrate to one, it is only a fundamental part of the posterior distribution and not a probability density function. Hence, Bayes' rule could alternatively be formulated as:

$$p(\theta|Y) \propto L(\theta;Y)p(\theta) \tag{2.21}$$

where $\propto$ represents the proportionality up to the marginal likelihood.

The likelihood function of an m variable VAR(q) In this section, it is assumed that the VAR is of the form:

$$y_t = A(L)y_{t-1} + C\bar{y}_t + e_t, \quad e_t \sim (0, \Sigma_e) \tag{2.22}$$

where y_t includes m variables with q lags each; and $\bar{y}_t$ is a $m_c x1$ vector of the constant and other. deterministic variables.

Thus, there are $k = mq + m_c$ number of regressors in each equation and the VAR has mk coefficients.

The VAR can also be rewritten in two alternative formats:

$$\mathbf{Y} = \mathbf{XA} + \mathbf{E} \tag{2.23}$$

$$y = (I_m \otimes X)\alpha + e \quad e \sim (0, \sigma_e \otimes I_T) \tag{2.24}$$

where $\mathbf{Y}$ and $\mathbf{E}$ are $T \times m$ matrices; $\mathbf{X}$ is a $T \times k$ matrix; $\mathbf{X}_t = [y'_{t-1}, ..., y'_{t-q}, \bar{y}'_t]$; y and e are $mT \times 1$ vectors; I_m is the identity matrix of dimension m, and $\alpha = vec(\mathbf{A})$ is a $mk \times 1$ vector.

Based on equation 2.22, the likelihood function is:

$$L(\alpha, \Sigma_e) \propto |\Sigma_e \otimes I_T|^{(} - 0.5)exp{-}0.5(y - (I_m \otimes X)\alpha)'(\Sigma_e^{(} - 1) \otimes I_T)(y - (I_m \otimes X)\alpha) \tag{2.25}$$

After careful decomposition, equation 2.23 becomes:

$$
\begin{aligned}
L(\alpha, \Sigma_e) \propto & |\Sigma_e \otimes I_T|^{-0.5} exp\{-0.5(\alpha - \alpha_{ols})'(\Sigma_e^{-1} \otimes X'X)(\alpha - \alpha_{ols}) \\
& - 0.5[(\Sigma_e^{-0.5} \otimes I_T)y - ((\Sigma_e^{-0.5} \otimes X)\alpha_{ols})'][(\Sigma_e^{-0.5} \otimes I_T)y - ((\Sigma_e^{-0.5} \otimes X)\alpha_{ols})]\} \\
& = |\Sigma_e|^{-0.5k} exp{-0.5}(\alpha - \alpha_{ols})'(\Sigma_e^{-1} \otimes X'X)(\alpha - \alpha_{ols}) \\
& \times |\Sigma_e|^{-0.5(T-k)} exp\{-0.5tr[(\Sigma_e^{-0.5} \otimes I_T)y - ((\Sigma_e^{-0.5} \otimes X)\alpha_{ols})'(\Sigma_e^{-0.5} \otimes I_T)y \\
& - (\Sigma_e^{-0.5} \otimes X)\alpha_{ols}]\} \\
& \propto \mathbb{N}(\alpha|\alpha_o ls, \Sigma_e, X, y) \times \mathbb{W}(\Sigma_e^{-1}|y, X, \alpha_{ols}, T - k - m - 1)
\end{aligned}
\tag{2.26}
$$

where tr is the trace of a matrix.

From equation 2.25, it is observed the possibility to decompose the likelihood function of a VAR(q) into the product of a Normal density for α, conditional on its OLS estimate α_{ols} and on Σ_e, and a Whishart density for Σ_e^{-1}, also conditional on α_{ols}, with (T–k–m–1) degrees of freedom and $[(y - (I_m \otimes X)\alpha_{ols})'(y - (I_m \otimes X)\alpha_{ols})]^{-1}$ as a scale matrix.

Consequently, with a combination of the appropriate prior restrictions, the conditional posterior distribution for the VAR coefficients and the covariance matrix of the reduced form shocks can be analytically derived. Under the assumptions of the Normal-Wishart prior, which combines the two blocks of the likelihood, the conditional posterior of Σ_e^{-1} will be Wishart, while the conditional posterior of α will be Normal (Canova, 2007). There also exist other prior assumptions that permit analytical computation of conditional posteriors.

Priors for the VARs Canova (2007) focuses on four alternative types of prior specification which are: (i) a Normal prior for α with fixed Σ_e; (ii) a non-informative prior for both α and Σ_e; (iii) a Normal prior for α and a non-informative prior for Σ_e; and (iv) a Conditionally conjugate prior, that is a Normal prior for α and a Wishart for Σ_e^{-1}.

When examining the derivation of the posterior distribution for the VAR coefficients in the first alternative prior specification, let the prior be $\alpha = \bar{\alpha} + v_a, \quad v_a \sim N(0, \bar{\Sigma}_a)$, where $\bar{\Sigma}_a$ is fixed. In this case,

$$\begin{aligned} g(\alpha) &\propto |\bar{\Sigma}_a|^{-0.5} exp[-0.5(\alpha-\bar{\alpha})'\bar{\Sigma}_a^{(}-1)(\alpha-\bar{\alpha})] \\ &\propto |\bar{\Sigma}_a|^{-0.5} exp[-0.5(\bar{\Sigma}_a^{-0.5}(\alpha-\bar{\alpha}))'\bar{\Sigma}_a^{-0.5}(\alpha-\bar{\alpha})] \end{aligned} \tag{2.27}$$

Let $Y = [\bar{\Sigma}_a^{-0.5}\bar{\alpha}, (\Sigma_e^{-0.5} \otimes I_T)y]'$; $X = [\bar{\Sigma}_a^{-0.5}, (\Sigma_e^{-0.5} \otimes X)]'$. Hence:

$$\begin{aligned} g(\alpha|y) \propto\ & |\bar{\Sigma}_a|^{-0.5} exp{-}0.5(\bar{\Sigma}_a^{-0.5}(\alpha-\bar{\alpha}))'\bar{\Sigma}_a^{-0.5}(\alpha-\bar{\alpha}) \times |\Sigma_e \otimes I_T|^{-0.5} \\ & exp((\Sigma_e^{-0.5} \otimes I_T)y - (\Sigma_e^{-0.5} \otimes X)\alpha)'((\Sigma_e^{-0.5} \otimes I_T)y - (\Sigma_e^{-0.5} \otimes X)\alpha) \\ & exp{-}0.5(Y - X\alpha)'(Y - X\alpha) \\ & exp{-}0.5(\alpha-\tilde{\alpha})'X'X(\alpha-\tilde{\alpha}) + (Y - X\tilde{\alpha})'(Y - X\tilde{\alpha}) \end{aligned} \tag{2.28}$$

where

$$\tilde{\alpha} = (X'X)^{-1}(X'Y) = [\bar{\Sigma}_a^{-1} + (\Sigma_e^{-1} \otimes X'X)]^{-1}[\bar{\Sigma}_a^{-1}\bar{\alpha} + (\Sigma_e^{-1} \otimes X)'y] \tag{2.29}$$

Because Σ_e and $\bar{\Sigma}_a$ are fixed, then the second term in equation 3.13 is an independent constant of α and

$$g(\alpha|y) \propto exp[-0.5(\alpha-\tilde{\alpha})'X'X(\alpha-\tilde{\alpha})] \propto exp[-0.5(\alpha-\tilde{\alpha})'\tilde{\Sigma}_a^{-1}(\alpha-\tilde{\alpha})] \tag{2.30}$$

Therefore, α has a Normal posterior density with mean $\tilde{\alpha}$ and variance $\tilde{\Sigma}_a = [\bar{\Sigma}_a^{-1} + (\Sigma_e^{-1} \otimes X'X)]^{-1}$. Both Σ_e and $\bar{\Sigma}_a$ are needed in order for equation 3.15 to be operational. Naturally, $\bar{\Sigma}_a$ is chosen arbitrarily while $\Sigma_{e,ols} = \frac{1}{T-1}\Sigma_{t=1}^{T} e'_{t,ols}e_{t,ols}$, $e_{t,ols} = y_t - (I_m \otimes X)\alpha_{ols}$, for example, is used in the formulas (Canova, 2007: 354).

The Minnesota prior This is a commonly used class of prior distribution. It is a special case of the first alternative type of prior distribution explained above. In this case, α and Σ_α are functions of a small number of hyperparameters (Canova, 2007). Particularly, the assumption of the Minnesota prior is that $\bar{\alpha} = 0$ except for $\bar{\alpha}_{i1} = 1, i = 1, ..., m$; that Σ_a is diagonal, and it also assumes that the $\sigma_{ij,l}$ element that corresponds to lag l of variable j in equation i is of the form:

$$\begin{aligned}\sigma_{ij,l} &= \frac{\phi_0}{h(l)} \text{ if } i = j, \forall l \\ &= \phi_0 \times \frac{\phi_1}{h(l)} \times (\frac{\sigma_j}{\sigma_i})^2 \text{ otherwise when } i \neq j, j \text{ endogenous, } \forall l \\ &= \phi_0 \times \phi_2 \text{ for } j \text{ endogenous.}\end{aligned} \tag{2.31}$$

In this case, the hyperparameters are ϕ_i, $i = 0, 1, 2$; the scaling factor is $\frac{\sigma_j}{\sigma_i})^2$; and $h(l)$ represents a deterministic function of l. The features of interest are captured in the prior (i.e. equation 2.30). These are, the tightness of the variance of the first lag as represented by ϕ_0; the relative tightness of the exogenous variables as represented by ϕ_2; and the relative tightness of the variance of lags other than the first one as represented by $h(l)$. Generally, either a harmonic decay $h(l) = l^{\phi 3}$ or a geometric decay $h(l) = \phi_3^{-l+1}, \phi_3 > 0$, is assumed. With $\sigma_i, i = 1, ..., m$ being unknown, equation 2.30 makes use of consistent estimates of standard errors of the variables i, j.

Canova (2007) explains that the logic of a prior can be understood by noting the fact that the m time series are a-priori characterized as random walks. This is due to the typical appropriateness of univariate random walk models when forecasting macroeconomic time series. However, while the imposition of the random walk hypothesis is done a-priori, each time series may represent a more complex process a posteriori, if the data contains sufficient information to require it (Canova, 2007).

A priori, the variance-covariance matrix is characterized as diagonal. As a result, the coefficients of various VAR equations are not related. Because of the expectation more information about a variable's current value is contained in the most recent lags of a variable than in earlier lags, the variance of the first lag would be bigger than the variance of the second lag if $l_1 < l_2$ for every of the model's endogenous variables (Gupta, 2007). Moreover, $\phi_1 \leq 1$ because a variable's own lags typically have more information than the lags of other variables. Notably, the VAR is a-priori folded into a vector of univariate models if $\phi_1 = 0$. Additionally, the relative importance of the information carried by the independent variables is regulated by ϕ_2; and the relative importance of sample and prior information is controlled by ϕ_0. Therefore, it can be concluded from equation 2.30 that, while a small ϕ_0 proves the dominance of prior information; a large

ϕ_0 means that prior information disperses such that the posterior distribution reflects sample information (Canova, 2007).

Substantial advantages are drawn from the specification of $\bar{\Sigma}_a$ as being a diagonal. With similar variables found on the right-hand side of each equations, such specification of $\bar{\Sigma}_a$ infers a diagonal $\tilde{\Sigma}_a$, leading to a similar $\tilde{\alpha}$ as the vector of $\tilde{\alpha}_i$ calculated equation by equation. Other prior specifications, irrespective of the assumption made on the variance-covariance matrix, lose this property. Furthermore, the Minnesota prior makes the typically large dimension of α for moderate VARs reliant on a smaller vector of hyperparameters. This allows the expectation of a better precision, since the dimensionality is reduced, and this also improves out-of-sample forecasts. Even in the event that the prior is inaccurate and is a bad reflection of the sample information, the Minnesota prior still lessens the MSE of the estimates. Since it has been proven that superior forecasts are produced using VARs with Minnesota prior, compared to traditional multivariate simultaneous equations or univariate ARIMA models, for instance, the BVARs are regularly employed in international institutions and central banks for short-term macroeconomic forecasting (Gupta, 2006).

It is important to note that, restrictions need to be introduced in order to deal with the "curse of dimensionality". The Minnesota prior imposes probability distributions on the coefficients of the VAR, effectively reducing the dimensionality of the issue while simultaneously reasonably accounting for the uncertainty faced by the researcher (Canova, 2007). Besides, it is crucial to choose the appropriate $\phi = (\phi_0, \phi_1, \phi_2, \phi_3)$, as a prior that is too loose will make it harder to avoid overfitting and a prior that is too tight, will not allow the data to speak. Thus, three approaches may be used. The first two approaches obtain estimates of ϕ which are plugged into expressions for $\bar{\Sigma}_a$ and $\bar{\alpha}$. Equation 2.30 is then used in an Empirical Bayes way to obtain the posterior distribution of α, based on the ϕ estimates. For instance, experience or simple rules of thumbs could be used to choose ϕ; such as the RATS manual suggesting $\phi_0 = 0.2, \phi_1 = 0.5, \phi_2 = 10^5$ as default values; and $\phi_3 = 1$ or 2 in a harmonic specification of $h(l)$. This implies that the prior on the VAR coefficients is relatively loose and the one on the exogenous variables is uninformative (Gupta and Sichei, 2006). These values are advised as a benchmark or starting points for further examinations, as they produce reasonably good

results in a number of financial and macroeconomic forecasts.

Another alternative would be to employ the information carried by the data in the estimation of ϕ. More specifically, one could use the predictive density $f(\phi|y) = \int L(\alpha|y,\phi)g(\alpha|\phi)d\alpha$, built on a training sample $(-\tau, ..., 0)$. Finally, the third approach has ϕ treated as random, assuming a prior distribution and computing completely hierarchical posterior estimates of α.

2.4.4 Diagnostics test

Unit Root Test: Time series data is prone to non-stationarity and can provide spurious results. The unit root test is done to determine if a variable is stationary or not. There are a number of tools or tests that can be used to determine stationarity, namely Elliot, Rothenberg and Stock, 1996; Dickey and Fuller, 1979; Kwatkowski-Philips-Schmidt-Shin, 1992; Ng and Perron, 2001; and, Philips and Perron, 1998. This study uses the ADF and KPSS to test variables for stationarity. There are two steps used to test for stationarity. First is to the test the variable at level and second is to test the same variable after differencing. If the variable becomes stationary after first differencing then it is concluded that the series are intergrated of order (I).

Strutural breaks: A structural break is an unexpected shift in in time series data. Gardea, Loscos, and Montanes (2016) explained that the presence of structural breaks can lead to forcast errors, and model instability. Sturutal break tests determines when and whether there are abrupt changes in our data. This study will use the Bai and Perron (2003) strucutral break test which test for multiple breaks, consistently determining the number of break points over all possible partitions, as well as their location, and it is based on the principle of global minimizers of the sum of squared residuals.

Lag length selection: Before estimation can be done, determination of the optimal lag length is always a prerequisite when dealing with VAR models. In this case, statistical criteria and economic theory are combined to determine the lag length. For the statistical criteria, the VAR lag choice selection criterion is used which is incorporated in the E-views 9.0 statistical package.

Serial correlation: serial correlation also known as autocorrelation, is a serious problem in

time series data. Serially correlated error terms underestimate the standard errors, thereby making the t-values overestimated. This renders the estimates biased. We use the Breusch-Godfrey serial correlation LM test to test for serial correlation. The null hypothesis for this test states that there is no serial correlation in the model.

Normality test: the normality test investigates whether the residuals in a model are normally distributed. Estimates derived from a model whose residuals are not normally distributed are invalid. The researcher therefore had to undertake this test. The Jarque-Bera normality test to ascertain the distribution of the residuals in the model was used. The null hypothesis for this test states that the residuals are not normally distributed.

Heteroskedasticity: Heteroskedasticity means that residuals do not have a constant variance. This results in a model which has different probability distributions. Such a model cannot yield reliable estimates. The Breusch-Pagan-Godfrey test for heteroskedasticity to analyse heteroskedasticity was used in the model. The null hypothesis for this test states that the residuals have no heteroskedasticity.

Model Stability test: The AR root graph and CUSUM of squares test is used to test the model stability. If the model is unstable then the IRF and variance decomposition cannot be interpreted as it is indicative of the presence of nonstationarity in the variables of the model. The study also shows results of the more restrictive stability test, the CUSUM of squares.

2.4.5 Data, sources and description

The time-series data used for analysis was sourced from the South African Reserve Bank (SARB) website. This study makes use of quarterly data from 1980 Q1 to 2016 Q4. Quarterly data is used because it provides a larger number of observations and allows for intra year dynamics. The variable household saving was obtained from the SARB and is represented as the ratio of household savings to GDP.

The income variable is represented compensation of employees. The is adjusted for tax on production and products as well as subsidies. The life-cycle hypothesis posits that an increase in income would increase aggregate savings through increasing the savings of people that partici-

pate in the labour force compared to the negative savings of people who are not in the labour force (Loayza, Schmit-Hebbel and Serven, 2000).

The variable, real interest rate is proxied by prime overdraft rate adjusted for inflation. This variable is reported monthly, and the value corresponding to the quarter has been included. Firstly, an increase in real interest rates reduces the present value of future income flows and therefore has a negative impact on savings (income effect). However, it increases the net return on savings and makes savings more attractive today (Loayza, et al., 2000). In other words, it leads to a postponement of consumption and has a positive impact on savings (substitution effect). Therefore, the net impact of interest rates is determined by the relative strength of these two opposing effects and is an empirical question.

The government policy variable was used as government budget balance as a percentage of GDP and it was obtained from the SARB database. Fiscal policy has an impact on savings as it has a bearing on disposable income through taxation. In addition, details and features of taxation, government spending and government borrowing are also relevant for aggregate savings (Johnson and Babalola, 2014). The government budget balance as a percentage of GDP is used as proxy to test the Ricardian Equivalence for South Africa. Johnson and Babalola (2014) explained that the Ricardian Equivalence theorem hypothesises that consumers are forward-looking and internalise government's budget constraints when making consumption and saving decisions.

Financial deepening represents financial sector development of the economy. The proxy was used as the ratio of M2 form of money to GDP. It represents the speed of money circulation in the financial sector. According to Dirschmid and Glatzer (2004), financial trends have a positive impact on saving behaviour as the deeper and broader the financial markets, the more people save. Financial liberalisation has played a major part in the low savings in South Africa. Financial liberalisation often results in higher interest rates, which theoretically should encourage private saving. However, the negative impact of higher interest rates on disposable income tends to neutralise the attractiveness of higher returns on savings (Simleit et al., 2011). The availability to credit has provided households the opportunity to maintain higher levels of

consumption than would otherwise have been possible, which has naturally discouraged savings.

Macroeconomic Stability: In order to safeguard against future unexpected negative income shocks, individuals prefer saving today (Aric, 2015a). The paper will use the inflation rate as a proxy for the instability of the economy and expect this variable to have a positive impact on savings. The proxy for the inflation rate was the percentage change of the total consumer price index.

2.5 Empirical Results

2.5.1 Introduction

This subsection empirically investigates the determinants of household saving. Specifically, it answers the questions raised in section 2.1: What are the determinants of household saving in South Africa? In order to answer the research question, an explanation of the relationship between household saving and each influencing factor was described.

To answer the research question, the remainder of this subsection is organised as follows: subsection 2.5.2 looks at the time series data and tests to detect the presence of unit roots and address them. The ADF and KPSS methods are used to detect unit-roots. The BVAR in subsection 2.5.3 was estimated. The impulse response functions and the variance decomposition analysis are reported. Subsection 2.5.4 discussed the residual diagnostic tests of the residuals and the stability of the model which was used in this study. This is important because the validity and reliability of the estimates and conclusions strongly depend on these tests. Subsection 2.5.5 concludes chapter.

2.5.2 Time series data tests

Unit root test

Table 2.5 shows the results of the Augmented Dickey-Fuller (ADF) and KPSS tests. The Null hypothesis for ADF is that the series contains a unit root, while the alternative hypothesis is that the series is stationary. For the KPSS, the null hypothesis is that the series is stationary. Rejection of the null hypothesis implies that the series is non-stationary. Table 2.5 indicates that HHS, LRGDP, GP, R, INF and FDEEP are I(1) based on both the ADF and KPSS tests at 5 percent significance. Since all the variables are intergrated of the same order the researcher proceeded to the Johansen test.

Optimal lag order choice

The lag length selection criteria are used to determine the optimal lag length for the model.

Table 2.2: Result of Unit root test

Variable	ADF		KPSS	
	Level	1st Difference	Level	1st Difference
HHS	-0.19	-3.96	0.002	6.66
	(-1.83)	(-48.38)	(0.21)	(0.046)
CE	0.021	-1.66	0.007	0.005
	(0.22)	(-11.62)	(0.27)	(0.007)
GP	-0.19	-2.51	-3.02	0.002
	(-2.26)	(-5.78)	(0.12)	(0.053)
R	-0.176	-1.715	9.25	0.058
	(-2.79)	(-13.4)	(1.18)	(0.061)
INF	-0.051	-0.534	14.817	-0.008
	(-2.76)	(-7.25)	(0.54)	(0.33)
FDEEP	-0.022	-0.679	2.243	-0.012
	(-2.44)	(-8.67)	(1.37)	(0.265)

Note: Critical values are in parenthesis at 5percent . The appropriate lag was selected using the Akaike Information Criteria (AIC) for ADF test and Schwert criterion and the Bartlett kernel method

The option of 'no intercept or trend' is used as trend deterministic assumption in this test. Table 2.6 below shows the lag order choice outcome. The optimal lag length indicated by four of six selection criteria (FPE, AIC, SC, and HQ) is four as such four lags are used in this essay. Given that the data is quarterly data, four lag periods imply a year of observation. However, cautioned must be stated, because theoretically some variable may take longer than four quarters for the trickle-down effect to the rest of the economy.

Table 2.3: VAR Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-526.7	NA	9.1	7.7	7.8	7.8
1	211	1400.5	3.5	-2.4	-1.6	-2.1
2	299	160.7	1.6	-3.2	-1.6	-2.5
3	365.9	114.3	1.1	-3.7	-1.2	-2.7
4	511.7	238.7	2.2*	-5.2*	-2.1*	-3.9*
5	538.4	41.5	2.6	-5.1	-1.2	-3.5
6	572.2	49.5	2.7	-5.1	-0.37	-3.2
7	600.7	39.2	3.2	-4.9	0.5	-2.7
8	654.2	69*	2.7	-5.2	1.01	-2.7

* indicates lag order selected by the criterion

From Table 2.6 for all the variables the optimal lag order was found to be 4. Thus, the BVAR(4) model is estimated next as Model one. A Minnesota/Litterman prior is specified in all cases, with univariate AR as the initial residual covariance matrix, degrees of freedom correction,

and hyper-parameters $\mu = 0$, $\lambda_1 = 0.1$, $\lambda_2 = 0.99$ and $\lambda_3 = 1$ (Gupta, Kabundi, Miller, and Uwilingiye, 2012).

Strutural breaks

The results of the multiple break show that the model consists of one structural break in 2009Q1. This could be attributed to the 2008 financial crisis. However, household saving alone showed four structural breaks, in 1989Q3, 1994Q1, 2000Q2 and 2006Q3. The year 1989 saw the dramatic political transition with release President Nelson Mandela prison. This year also saw the end of the political and economic sanctions placed on South Africa by the international community. This was extended further in 1994 when the first democratic election occurred. In the year 2000, president Thabo Mbeki vowed to accelerate economic growth, boost investment, cut interest and relax restrictive labour. The year was a significant shift in the financial sector development of South Africa. The late 2006 saw the introduction of portable phones which increased the flexibility of the mobile service industry and bolstered competition between various providers.

These dates coincide with significant dates in the history of South Africa's political economy. Since the model with the explanatory variables indicated only one structural point, this study has only accounted for one structural break by using one break dummy variable.

Table 2.4: Multiple breakpoint test

Break test	F-statistic	Scaled F-statitstic	Critical Value**
0 vs 1	8.34	50.03	20.08
1 vs 2	2.56	15.37	22.11
Break dates			
1	Sequential: 2009Q1	Repartition: 2009Q1	

* Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

2.5.3 BVAR results

Results are reported using the Impulse Response Function and Variance Decomposition.

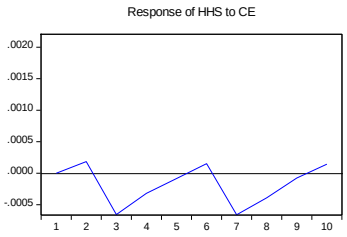
Impulse Response Function

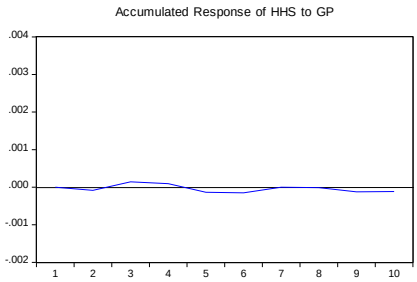
BVAR models can be interpreted with impulse response functions (IRFs). The focus is on determining whether a variable has a relationship with household saving and whether it is positive or negative. The standard 10 periods is a little over two years. In the interpretation of the IRFs, the procedure of reporting responses, using the Cholesky impulse response measure, is taken.

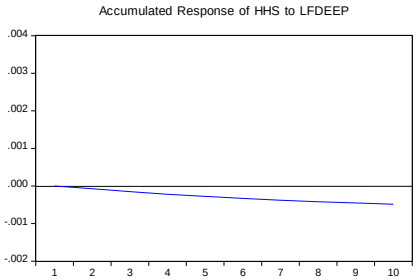
The response of HHS to CE: Results from the IRF below predominantly show a negative response of household saving to a one standard deviation shock in compensation of employees. In the first quarter income has positive and rising impact on household saving. Following the decline in the second and third quarter, the impact starts to rise, albeit negative, until sixth quarter. Although there is a fluctuating response, the predominant impact is negative. This implies a negative relationship between income and household saving in South Africa. These results are not in accordance with LCH, the a priori expectation and the results of Mongale et al (2013). However, Simleit et al. (2011) found a negative impact of income on household saving for South Africa. They explained that household saving in South Africa is countercyclical, such that during booming economic times with high incomes, households are optimistic of good times and save less, while during bad economic times, households save more as a precautionary motive for pessimistic future times. Chipote and Tsegaye (2014) also found a negative relationship between income and household saving in South Africa.

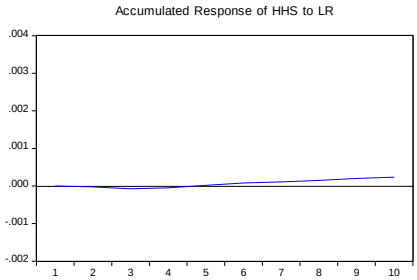
The response of HHS to GP: The results indicate a fluctuating response of household saving to one standard deviation in government policy. In the first two quarters, a negative effect and very small impact of government policy on household saving. Between the second and fourth quarter government policy has a positive impact on household saving before falling to negative for the rest of the period. The fluctuating response can be attributed to the fact that government policy is unstable due to political instability and economic swings and household savings do not hold a constant response. It implies that the Ricardian equivalence does not hold for South Africa. For example, stimulating the economy using debt financing will lead, on the one hand, to an increase in saving in anticipation of higher taxes in the future or to less

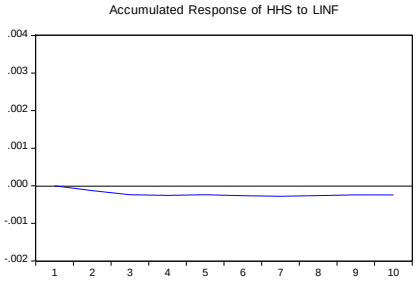
Figure 2.4: Impulse-response functions











Source: Author's estimations

household saving due to the current relief on taxes. In contrast Simlet et al. (2011) found the Ricardian equivalence holds for South Africa while Hondroyiannis (2006) found similar results for European countries and Bérubé and Côté (2000) for Canada.

Response of HHS to FDEEP: Financial deepening has a negative impact on household saving and does not revert to equilibrium in the long run. Intuitively financial deepening in South Africa has increased the availability and access to credit more than encouraging savings. As such, the better the financial system, the less the household saving, as the available sources of credit and insurance, cushions against the precautionary motive for saving. Hence the more sophisticated the financial system is the lower the household saving. Mishi (2012) found similar results for South Africa.

The response of HHS to R: The response to one standard deviation shock in interest rate is visible after one year (four quarters) when real interest rate has a positive impact on household saving. It shows that in South Africa the substitution effect is greater than the income effect. Mogale et al. (2013) also found a statistically insignificant interest rate for South Africa. Aron and Muellenberg (2000) and Simileit et al. (2011) found a negative relationship while Mahlo (2011) and Chipote et al. (2014) found a positive relationship in the South African context.

The response of HHS to INF: The effect of inflation generates a negative response. It can be said that a household generally responds negatively to a one standard deviation shock in inflation. This result is not in line with the apriori assumption, that this variable will have a positive effect on household saving. Intuitively this implies that higher current prices will increase cost of current consumption and thus reduce saving. Chipote and Tsegaye (2014) and Mongale et al. (2013) found contrasting results for South Africa.

Variance Decomposition

The forecast of variance decomposition of the six endogenous variables. Variance decomposition shows how much of a change in a variable is due to its own shock and how much of it is due to shocks to other variables. It also indicates the percentage of the fluctuation in a time series attributable to other variables at the 10 quarters time horizons. It further indicates the amount

of information each variable contributes to the other variables in the BVAR model.

Table 2.5: Variance of decomposition of Household Saving

Period	S.E.	HHS	CE	GP	LR	LINF	LFDEEP	DUMMY
1	0.0033	100.0	0.00	0.00	0.00	0.00	0.00	0.00
2	0.0033	99.26	0.42	0.06	0.01	0.15	0.05	0.06
3	0.0035	98.7	0.42	0.47	0.03	0.23	0.09	0.07
4	0.0035	98.59	0.45	0.49	0.03	0.23	0.13	0.08
5	0.0037	98.17	0.49	0.83	0.06	0.21	0.14	0.09
6	0.0037	98.04	0.57	0.83	0.09	0.22	0.16	0.09
7	0.0037	97.88	0.57	0.97	0.09	0.21	0.18	0.09
8	0.0037	97.81	0.59	0.97	0.10	0.22	0.19	0.12
9	0.0037	97.66	0.62	1.04	0.12	0.21	0.19	0.15
10	0.0037	97.61	0.64	1.04	0.12	0.21	0.20	0.16

Source: Author's estimations

The column of S.E represents the forecast error of the variable for each forecast period. The forecast error stems from the variation in the current and future values of the shocks to each variable in the system. Table 2.7 shows that own shocks variations are between 90 and 100 percent over the ten quarters of the forecast. This implies that from a contribution of 100 percent to variations in its forecast errors, the contribution of household savings fell to 99.1 percent at the beginning of the term to 96.9 percent at the end of the term. The difference was taken up by other variables. At period one household saving is 100 percent because the only source of the one period ahead of variation is its shock.

Also, the results reveal that after household savings government policy is the most significant group for the error variance. Government policy was highest in the ninth quarter at 1.1 percent in explaining the variance in household savings. The contribution of compensation of employees, increased from a low of 0.42 per cent in the second quarter increasing throughout the period to a high of 0.64 per cent. This shows that compensation of employees explains household more in the long run. Inflation, interest rare and financial deepening appear to be third in line in terms of contribution of innovation to household savings. The contributions are relatively close with minute differences. The highest contribution for inflation was 0.23 percent in the tenth period while interest rate recorded a high of 0.6 percent also in the tenth period and financial deepening a high of 0.356 percent in the sixth period.

In summary, the variance decomposition analysis shows that "own shocks" constitute the predominant source of variations in household savings in South Africa. The analysis further seems to suggest that the household savings can be explained by the disturbances in the macroeconomic variables used in this study. Furthermore, the results show that the determinant variables have a large impact on household saving in the long run. Finally, all the variables can be regarded as endogenous to the system because Sbeiti and Hadadd (2011) maintain that if the shocks do not explain any forecast error variance of one macroeconomic variable in all forecast horizons, then this variable is exogenous. At the same time if shocks can explain all the forecast error variance of the variable at all forecast horizons, this variable is entirely endogenous.

Residual Diagnostics test

The diagnostic tests show the absence of autocorrelation at four lags, while there is no evidence of heteroscedasticity using the white test (no cross term). The Jarque-Bera test suggests that there is a normal distribution. This indicates that the model is fairly well behaved and that all shocks eventually stabilise in the long run.

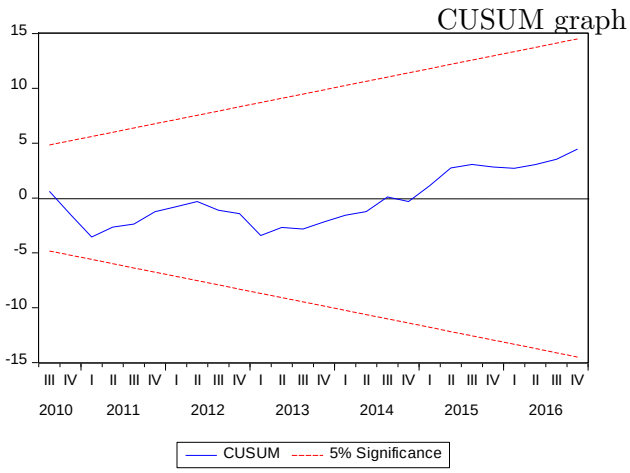
Table 2.6: Diagonistic Tests

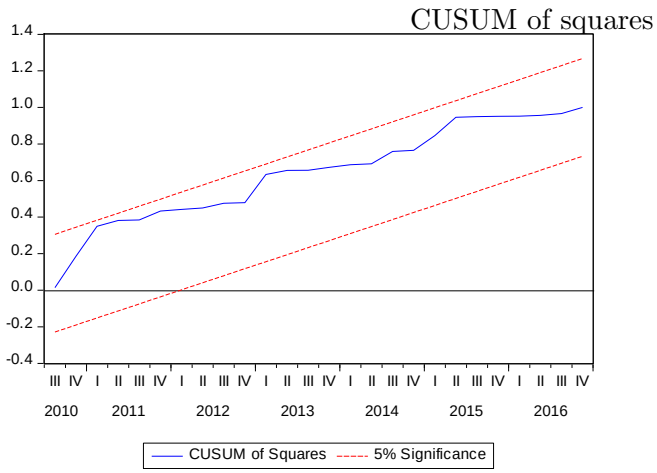
Test	Null Hypothesis	P-value	Conclusion
Lagrange Multiplier (LM)	No serial correlation	0.199	Fail to reject H0
Jarque-Bera (JB)	There is normal distribution	0.263	Fail to reject H0
White test	There is no conditional heteroscedasticity	0.621	Fail to reject H0

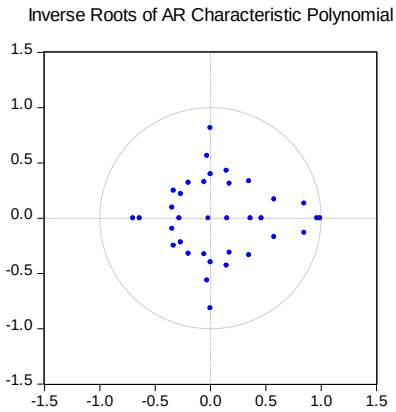
Source: Author's estimations

The CUSUM of residual indicates that the model is stable as the test line falls within the bounds of the critical values. The stricter CUSUM of squares also shows there is stability in the model as the test line falls within the bounds of the critical line for the period under consideration. In addition, the AR root graph also indicates that the BVAR model is stable. Since all roots have modulus less than one and lie inside the unit circle.

Figure 2.5: Model Stability tests







2.6 Conclusion

This study set out to identify the determinants of household saving in South Africa. The aim was to identify factors that influenced household saving in a bid to boost saving. Increased household saving is of benefit to a household through wealth accumulation, protection from unexpected future spending and also for the economy at large through increased domestic saving that is theoretically hypothesised to provide funds for investment. This analysis was estimated using the BVAR model and results were interpreted using impulse response functions and the variance decomposition.

A total of five determinants were identified from economic theory and were tested. The results have shown that there is a negative and significant correlation between the rate of household savings and compensation of employees. Furthermore, the analysis revealed that there is a fluctuating relationship between household savings and government budget balance. The results have shown that both inflation and financial deepening have a negative influence on the level of household savings. The interest rate has a positive influence on household savings in South Africa albeit it being insignificant. This model passed all the residual diagnostic and stability tests, making the conclusions efficient and reliable. The researcher reported the results using Impulse Response Functions (IRFs) and Variance Decomposition (VD).

The results of the income variable followed the prediction of the LCH; however, Simleit et al. (2011), as well as Chipote and Tsegaye (2014), found a negative relationship between household saving and real GDP or disposable income respectively. Also, Chipote and Tsegaye (2014) and Mongale et al. (2013) found the inflation rate to have a positive impact on household saving in contrast to findings in this essay. Lastly results of financial deepening are in line with the prediction of financial liberalisation theories in having a negative influence on household saving.

Based on the findings in the study, several recommendations may be made. Firstly, the government should embark on a counter-cyclical fiscal policy to avoid the development of excessive current account deficits during periods of more rapid economic growth, rising investment and falling saving. The government should increase its savings through an improvement in the

government budget balance to raise overall savings in periods of economic upswings. Secondly, the government could explore alternative means of investment such as borrowing and attracting foreign domestic investments (FDI) to fund domestic investments in periods of economic upswings as household savings will be low.

Thirdly, the government should reduce income tax in a way to improve the household's ability to save through the improvement of disposable income. Furthermore, with the increase of consumption tax in VAT announced at the budget speech of 2018, the government should increase the incentive on tax-free savings accounts, from a maximum of R30 000 to R50 000 or more. Contractual saving has also proven to encourage the saving activities of households and as such government should create new avenues of contractual savings for individuals as well as households. Lastly, government should implement policies aimed at educating the general populace on the importance of saving and the saving avenues. Financial literacy is a stumbling block to the saving culture in South Africa. Therefore, from the policymakers' perspective an optimal combination of monetary and fiscal policies would go a long way in establishing a dynamic long-run relationship between household savings and its determinants.

Chapter 3

THE DETERMINANTS OF CORPORATE CASH HOLDING IN SOUTH AFRICA

3.1 Introduction

3.1.1 Background and Problem Statement

Corporate cash holding is deemed to be an important component of a firm's current assets. Cash holding in a firm measure the corporation's ability to pay current obligations on time. In each period, firms must choose an optimal level of cash holding that maximises investment decisions and reduces chances of under-price issues. Under the assumption of perfect markets, the value of a firm is independent of the choice of financing. Hence, firms do not have to hold cash because external financing is available at a fair price on the market (Modigliani and Miller, 1958). Under imperfect markets, however, there is usually a finance premium firms have to pay to finance their production through the market. The incentive to hold cash increases as transaction costs and the cost of external finance rises or is unavailable (Opler, Pinkowitz, Stulz, and Williamson, 1999).

Traditionally, two main theories are put forward to explain a firm's capital structure decisions, namely the trade-off theory and the financing hierarchy theory. These two theories also provide a theoretical framework to incorporate liquidity literature and are used to understand firms' incentives to hold cash.

On the one hand, the trade-off model of liquid holdings postulates that firms consider the marginal costs and marginal benefits of holding cash to determine the optimal level of cash holdings (Kim, Mauer and Sherman, 1998). Highlighted benefits associated with holding cash include the decreased probability of financial distress, the low transaction cost, and the ability to finance investments when other means of financing are not available (Keynes, 1934). Moreover, the cost of holding cash is that it has a low rate of return (Baumol, 1952). This is referred to as the liquidity premium of cash and reflects the benefit of low transaction cost associated with liquid assets (Miller, 1986). Thus, there is an opportunity cost entailed to holding cash and liquid assets.

On the other hand, the financing hierarchy theory suggests that there is no optimal amount of cash but that firms rather choose the means of financing that are associated with the lowest cost of information asymmetry. Firms prefer to finance their investments with internal funds, and will only raise external capital if such funds are insufficient. Given this, the amount of cash held in a firm is solely the outcome of its profitability, payout policy, and investment outlays, (Myers and Majluf, 1984).

The determinants of cash holding have been an area of debate in the academic literature in recent years. Chireka and Fakoya (2017) posit that South African companies tend to hold excess cash for reasons that are external to the firm. These reasons include political instability, planned offshore investments, and labour unrests in some sectors, such as the mining sector. Other reasons include anticipated peak selling season, lower interest rates at local banks, and increased capital needed to fund expansion plans into the rest of Africa.

Subsequently, the total cash held by non-financial companies grew by 17.4 percent between 2007 and 2017, with the largest increase occurring within the last five years. In 2017, the top 100 non-financial firms held R765 billion worth of cash, up from R154 billion 10 years

earlier (Tambo and Theobald, 2017). Besides, cash holding as a percentage of total assets varied between 6.4 percent and 10.2 percent. These high levels of cash holding have, therefore, spurred the debate on whether South African firms are hoarding levels of cash that can be used for investment.

The rising trend in the number of accumulated cash levels has necessitated the research question for the essay: What are the determinants of cash holding amongst South African firms. The analysis essentially covers the determinants of corporate saving in the form of changes in cash holdings for 80 non-financial firms listed on the JSE for the period 2007-2017.

3.1.2 Objectives

The specific objectives of this essay are:

- To provide stylised facts on cash holding (corporate saving) in South Africa,
- Investigate the determinants of cash holding among South African firms.

3.1.3 Relevance of the study

The South African economy is projected to grow by less than 1 percent, which is below the 5 percent target set in the National Development Plan (NDP) (SARB, 2017). In addition to the low growth rate, South African companies have been said to be on an investment strike by hoarding cash instead of investing to promote economic growth (Tambo and Theobald, 2017). Thus, understanding the determinants of cash holding is imperative to boosting economic growth, through the release of fund by investment.

Chireka and Fakoya in their 2017 analysis of cash holding in South Africa's retail firm used a partial analysis of the adjustment process of cash holding and did not account for endogeneity even though cash holding is correlated over time. This paper extends on their work and accounts endogeneity by applying the generalised method of moments (GMM), IV instruments econometric estimations.

Finally, firm-specific determinants of cash holding have been extensively explored in the litera-

ture (Chireka and Fakoya, 2017). However, macroeconomic and political determinants are yet to be explored, especially in South Africa. Hence, our study contributes to cash holdings literature by focusing on how South Africa's non-financial firms manage cash holding in response to macroeconomic conditions from an emerging market perspective.

Thus, this study extends the literature on the empirical determinants of cash holdings by studying the contemporaneous effect of macro variables on corporate cash holdings and improve Chireka and Fakoya (2017) that only considers firm-specific variables. The study demonstrates that macroeconomic and political variables impact the adjustment speed of cash to target levels. Lastly, the study improves the methodological approach and controls for endogeneity by using Arellano-Bover/Blundell-Bond model.

3.1.4 Structure of the study

Subsection 3.2 presents the trends in cash holding during the period under investigation. Subsection 3.3 outlines the theoretical and empirical literature review. The subsection starts by presenting the theoretical literature, where theories and motives for holding cash are discussed. Further it presents a review of previous empirical findings. Subsection 3.4 presents the research methodology employed in this study together with the data sample and several variables that are predicted to have a determining effect on corporate liquidity. Subsection 3.5 presents the results of the empirical investigation together with an analysis of its theoretical implications.Subsection 3.6 summarises the findings and presents the conclusions of corporate cash holding determinants established in this study.

3.2 Stylised facts on cash holding (corporate saving) in South Africa

3.2.1 Introduction

The primary purpose of any government is to ensure growth and security in the country. The failure to meet this primary purpose results in a negative chain reaction that trickles down to

the rest of the country. One of the major avenues used by the government to boost economic growth is investment. However, the South African government in the recent past has faced difficulties with boosting investment from would-be investors. In areas where there has been success in investment, such as the motor industry, the government has had to subsidise the industry.

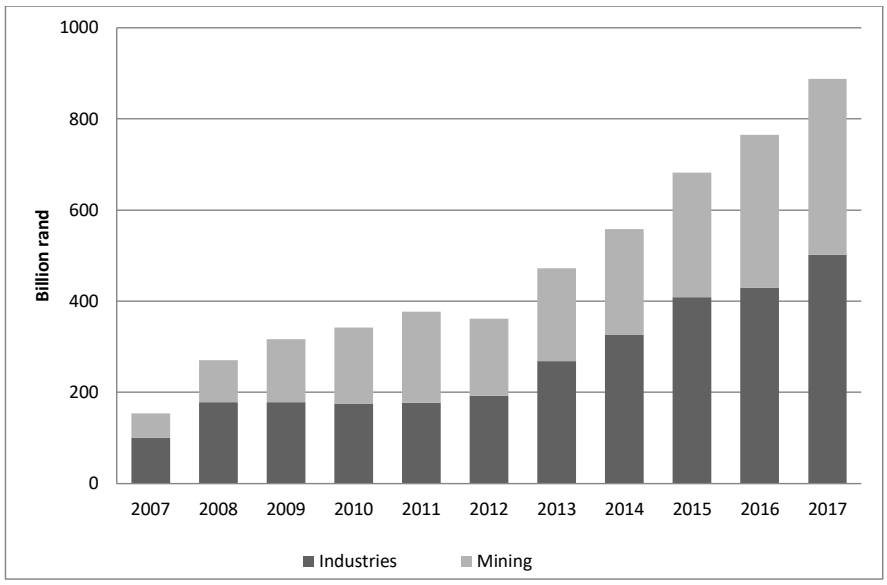
South African companies are accumulating reserves and not investing in the economy while acquisition-led growth has increased concentration and led to anti-competitive behaviour (Centre for Competition, Regulation and Economic Development, 2017). There is an increasing debate about introducing structural change in ownership and control of South Africa's economy. The department's Black Industrialists Programme seeks to involve black people more substantially in the operation and ownership of industrial enterprises as currently the large proportion of ownership in the economy is skewed towards the white population. The research further revealed that large established firms with market power pose as barriers to entry in the economy. There were further indications that the concentration worsened with investment largely in the form of mergers and acquisitions instead of new productions.

3.2.2 Trends in Cash Holding in South Africa

Below are some trends in cash holding relative to total asset, real GDP growth and capital expenditure. Cash holding is measured as the ratio of cash plus the equivalent asset to total assets. Nyamgero (2015) and Flipse (2012) emphasize the use of this ratio in their studies of trends in cash holdings. The ratio recognizes that cash should grow in line with all the other assets of the company.

Figure 3.1 shows a rising trend between 2013 and 2016. After the 2008 financial crisis, cashing holding continued to increase until the price boom of 2010/2011. With the price, mining companies made more money and increased spending and borrowing causing the market to crash. In 2012 commodity price drastically fell causing mining companies to sell assets and cut cost to stay afloat, hence the fall in 2012. After a steady period of recovery, mining companies have seen a resurgence in commodity prices as is reflected in the high levels of cash holding.

Figure 3.1: Nominal cash holding by sector



Source: Author's estimations using SHARENET data

However, companies are cautious about their spending due to the 2012 slam. The holding in industry has been stable, starting to rising in 2014. This rise is attributed to the notion that retailers, food producers and manufacturers are holding healthy cash balances, with little or no debt, yet are not investing in the economy.

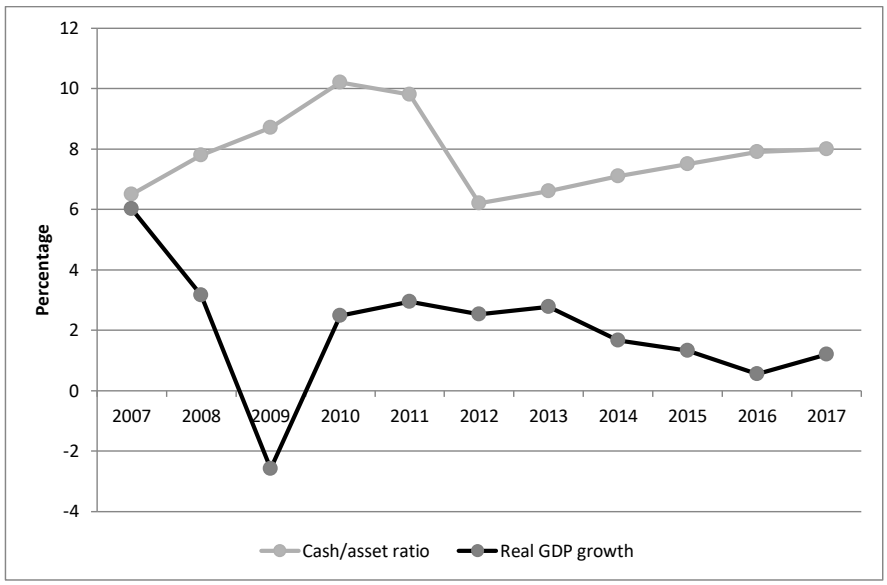
Cash holding and real GDP

Figure 3.2 shows the ratio of cash holding to total asset, and it revealed that the ratio has ranged between 6 and 10.2 percent for the period under investigation. There was an overall increase of 1.6 percentage points between 2007 and 2017. This shows that much of the growth in company cash holdings have been due to the general growth of company balance sheets. The relative level of cash as a proportion of companies' assets has not varied much over the decade.

Figure 3.2 also shows that cash holding varies inversely to economic growth. Cash holdings as a proportion of assets reached its lowest during in 2012. The highest levels of cash were held during the financial crisis in 2008 and subsequently in 2009. This indicated that companies were increasing cash holdings to prepare for bad economic conditions.

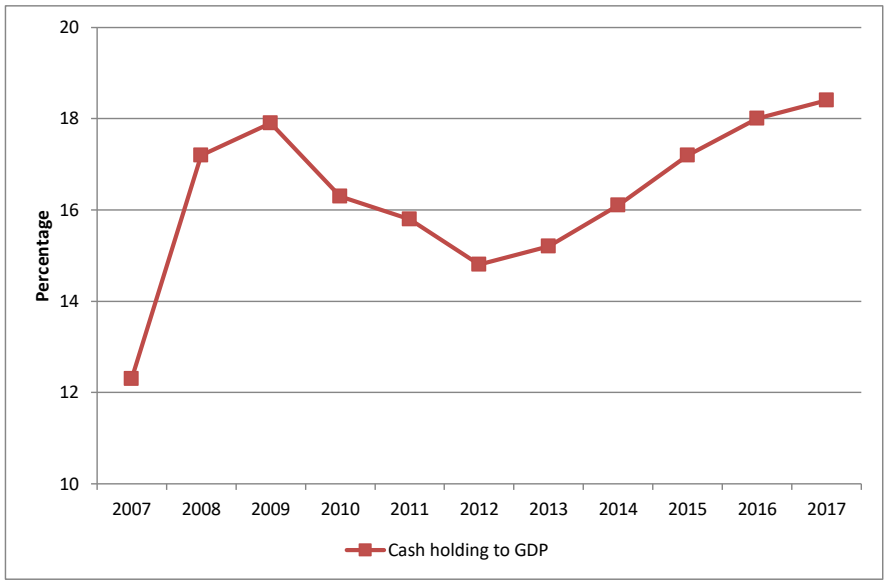
Cash holding as a percentage of GDP, in Figure 3.3, shows a similar trend to that of cash/total assets. The ratio has ranged between 12.3 percent and 18 percent. This again shows that

Figure 3.2: cash/total asset ratio and real GDP growth



Source: Author's estimations using SHARENET data

Figure 3.3: Cash holding as a percentage of real GDP



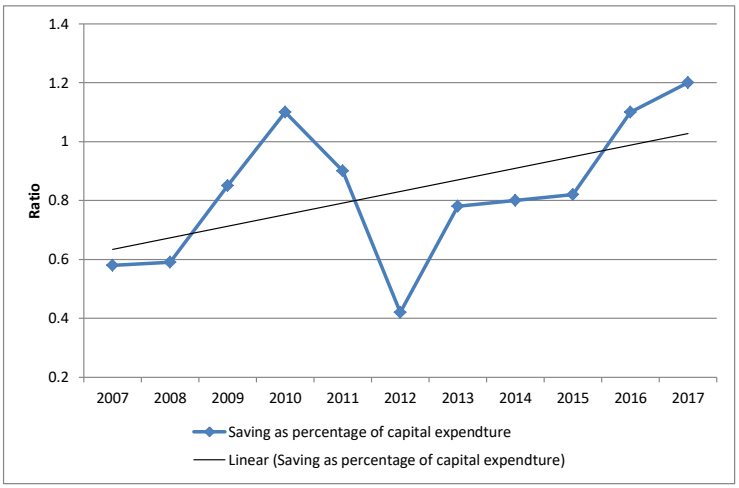
Source: Author's estimations using SHARENET data

companies' cash levels have not varied much when seen in the context of the size of the overall economy.

Cash holding and capital expenditure

Capital expenditure is investment undertaken by firms, therefore increased levels of cash holding also increase the relative amount available for expenditure. The ratio of cash saving to capital expenditure reveals the state of investment. A ratio of above one implies that cash savings were higher than capital expenditures whereas a ratio of less than one occurs when capital expenditure exceeds cash savings. If capital expenditure equals cash savings, the ratio will be one.

Figure 3.4: Cash holding to capital expenditure



Source: Author's estimations using SHARENET data

Figure 3.4 shows that on average the ratio for South African companies has been largely below one, implying that companies have been spending more than what they were saving. This graph shows that companies slowed capital expenditure relative to cash levels after the 2008/2009 recession, and have slowed again along with the decline in economic growth over the past four years. However, only in two years, 2010 and 2016, was the ratio greater than one, indicating that in eight of the last 10 years, companies spent more on investment than they held in savings.

3.2.3 Conclusion

This section has highlighted some of the key factors that affect the South African corporate world. There is a lack of investor confidence in economic performance and therefore firms hold cash. This cash holding has a detrimental impact on investment and the economic growth at large.

The trends in cash holding have revealed that the mining sectors hold more nominal cash than other industries. In addition, firms hold cash during a financial crisis or in anticipation of bad economic times. Lastly, the section also revealed that there has been more spending than saving by firms in South Africa.

3.3 Literature review

Corporate saving in corporate finance can be defined as retained earnings or cash holdings. Three models have been identified in corporate finance to explain corporate saving, namely the trade-off theory, financial hierarchy theory and free cash flow theory. This section discusses the motives for holding cash as well as the models for the determination of a firm's optimal cash holding. Lastly this section presents the empirical literature review before concluding the section.

3.3.1 Theoretical literature

Theories of cash holding

There are three predominant theories on cash holding, namely the tradeoff theory, the pecking order theory, and the agency cost theory.

The trade-off theory is one of the earliest theories espoused by Tobin (1956), and Miller and Orr (1966). The theory states that firms set their optimal cash levels by comparing marginal benefits against the marginal costs of holding cash. As such, cash holding decisions are made with the view of maximising benefits. The model asserts that the major advantage of holding cash for firms is that it serves as a safety cushion against rising costs of external funds (or the cost of liquidating existing assets) to finance their growth opportunities.

In 1961, Donaldson developed the financial hierarchy (or pecking order) model, which was then extended by Myers and Majluf (1984). The theory asserts that a firm's investment decision should aim to minimise cost. Thus, the financial hierarchy theory states that firms should finance investment first with retained earnings, then with safe debt and risky debt, and finally, with equity (Myers and Majluf, 1984). In essence, the theory explains that firms do not aim to accumulate cash, but cash is used as a buffer between retained earnings and investment needs. Therefore, the motive for holding cash is to avoid external financing costs. The financial hierarchy model differs from the Trade-off theory in that the latter focuses on maximising benefits as opposed to minimising costs.

Besides, Stulz (2002), espoused that the conflicts of interest between shareholders and managers could also relate to a firm's cash holdings. One reason for managers to hold excess cash is that they are risk-averse. Managers are not fully diversified because they cannot divide their human capital, and therefore more entrenched managers hold excess cash to avoid market discipline. Jensen (1986) argued that in the presence of managerial discretion, managers have incentives to hold large amounts of cash so that they can have more flexibility to pursue their objectives. Cash allows management to make investments that the capital market would not be willing to finance. Since excess cash holdings allow self-serving managers to avoid the discipline of the capital markets, investing in cash increases the costs of outside financing and can have detrimental effects on the firm's value.

Jensen and Meckling (1976) suggest that managerial ownership reduces the incentives for value-destroying actions, implying a negative relationship between managerial shareholdings and the number of cash reserves. At the same time, however, managers are risk-averse and less than fully diversified, and they protect themselves from outside pressure by holding excess cash.

Motives of holding cash

In addition to the theories, cash holding can be explained by the motives for holding cash. Keynes (1936) identified three motives for holding cash, namely; the cash buffer for precaution, the reduction of transaction costs and the cash allowance for speculation. Recently, tax implication has also emerged for firms as a motive for holding cash. These four motives are discussed below.

The transaction motive: The transaction motive emphasises that the main advantage of holding cash is that the firm can lower its transaction costs by using its cash to make payments rather than liquidating assets (Miller and Orr, 1966). Consequently, firms will hold more cash when they are likely to incur higher transactions costs to convert non-cash assets to cash. On the other hand, firms will tend to hold a lower amount of cash when the opportunity costs of cash retention are greater (Baumol, 1952).

Precautionary Motive: Keynes (1936) explained that firms hold cash as a shield against

future cash shortfalls and to finance their positive Net Present Value (NPV) investments. Along the same line of thought, Kim, Mauer and Sherman, (1998) modelled the optimal level of cash holding using a trade-off between the low return on liquid assets and the benefits of minimising the firm's reliance on costly external financing. Similarly, Almeida, Campello and Weisbach, (2004) posit that a precautionary motive holds mainly for financially constrained firms but not their unconstrained counterparts. Also, Bates, Kahle and Stulz, (2009) opined that the precautionary motive for cash holdings explains much of the rise in cash holdings observed over the last three decades.

Speculative Motive: The speculative motive of holding money designates that firms may keep cash in order not to have a deficit of cash when alternative investment opportunities arise. Jones and Ostroy (1984) argued that money offers flexibility to its holder that other assets cannot provide. Under the presence of liquidation (transaction) costs on other assets, money is held to enable the option of waiting for tomorrow to resolve uncertainty rather than investing today under uncertainty. Thus, the firms with higher business opportunities or capital investments hold cash based on the speculation motive as an enabler of options (Ozaki and Nashimura, 2003).

Tax Motive: Tax motive is an additional motive that applies to multinationals or companies with foreign earnings. Daher (2010) discussed that multinationals might face negative tax consequences associated with the repatriation of foreign earnings. Repatriation of earnings from affiliates operating in lower-tax countries means relatively higher tax expenses, and as a result such affiliates hold higher cash balances than other affiliates (Foley, Hartzell, Titman and Twite, 2007).

According to Daher (2012), firms may also worry about the double taxation of dividends. When money is transferred from the company to shareholders in the form of dividends, earnings are typically taxed twice, first at year-end on payment of corporate tax, and second when after-tax earnings are distributed to shareholders, the latter having to pay income tax on dividends. To avoid additional dividend taxation, firms may prefer to hold cash rather than to pay it out to shareholders.

Models on the optimal level of cash holding

Several models have been developed to determine the optimal level of cash holdings. According to these models, the optimum cash levels predominantly depend on factors like cash needs, transaction costs and interest rates. These models are essential as they have shed light on the determinants of cash holdings.

Baumol-Tobin model: The Baumol-Tobin was developed by William Baumol (1952) and James Tobin (1956). The model asserts that there is a trade-off between the opportunity cost of holding cash and the trading cost associated with the buying and selling of securities. The opportunity cost of holding liquid assets is the foregone interest rate that could have been earned in securities. As such, there is an inverse relationship between the interest rate and the optimal level of cash holding. The interest rate makes cash holding less attractive in the presence of more profitable investments.

Moreover, the model predicts that trading costs have a positive effect on the level of cash holding. Transaction costs are the costs incurred during the selling of securities and every time a firm runs out of cash; it has to sell securities to replenish the cash levels. Therefore higher transaction costs encourage firms to hold higher cash balances.

The model posits the importance of the total amount of cash required, i.e. to know how much liquid assets you should hold to pay your bills; you first need to know what the total billings are. Therefore the higher the cash needed the more cash a firm will hold since there is a transaction cost attached to replenishment.

Miller-Orr model: The Miller-Orr model for determining the optimal cash holding is not far from the Baumol-Tobin model. The Miller-Orr (1966) model assumes that cash balances fluctuate unevenly over time in so much as that the average cash balance, the optimal cash balance and replenishment may not occur on set dates. This is because revisions of the cash balance are done according to certain upper or lower bounds, for example, when cash holdings are excessive or very small.

The model explains that cash holding increase with transaction costs and fall with interest rates.

The point of departure from the Baumol-Tobin model is that the Miller-Orr model allows for cash balances to increase with their variance. When the variance is large, higher balances are needed to prevent the cash balance from hitting the financial boundaries too often.

Orgler model: The Orgler model (1969) asserts that optimal cash management can be determined using multiple linear programming. The construction of the model comprises three sections: (1) selection of the appropriate planning horizon, (2) selection of the appropriate decision variables and (3) formulation of the cash management strategy itself.

The advantage of the model's linear programming is that it enables the coordination the optimal cash management with other operations of the firm such as production. It also has minimal restriction on capital balances.

The model uses a yearly planning horizon with twelve-monthly periods. The Orgler model also analyses four sets of decision variables namely; payment schedule, short-term financing, purchase and sale of marketable securities and cash balance itself. The formulation of the model requires an objective function to be specified followed by a set of constraints.

Orgler's (1969) objective function is to minimise the horizon value of the net revenues from the cash budget over the entire planning period. Using the assumption that all revenues generated are immediately re-invested and that any cost is immediately financed, the objective function represents the value of the net income from the cash budget at the horizon by adding the net returns over the planning period. Thus, the objective function recognises each of the operations of the firm that generates cash inflows or cash outflows as adding or subtracting profit opportunities from the firm from its cash management operations.

3.3.2 Empirical Literature

A firms' cash holding decision depends on both micro and macrol factors. Thus, this subsection will first discuss microl factors that have been extensively invested in literature all over the world. After which, the subsection will discuss the impact of macro factors on a firms cash holding.

Ogundipe, Ogundipe and Ajao (2012) investigated the determinants of cash holding in Nigeria using the GMM technique. The authors showed a significant negative relationship between cash holdings and firm size, net working capital, return on asset and bank relationship. In contrast, Al-Najjar (2012) found profitability and firm size to have a positive influence on cash holding for developing countries. The difference is reflected in the sample size. Whereas Ogundipe et al. (2012) focus on Nigeria, Al-Najjar (2012) pooled a group of four emerging economies (Brazil, Russia, India, and China).

More so, Ogundipe et al. (2012) also found a significant positive relationship between growth opportunities, leverage, account receivables, inventories and financial distress. Surprisingly, the authors found no significant relationship between cash flow and cash holding contrary to the trade-off and pecking order theories. The insignificance might be a result of measurement since cash flow was proxied using the ratio of total net Asset (Total Asset less cash and cash equivalent). The authors also found that firms could not instantaneously adjust to targeted cash levels due to high costs. However, Al-Najjar (2012) identified leverage, debt payment, dividend payment, and liquidity to be inversely related to cash holding. The Al-Najjar (2012) study spans a short period of seven years only and may provide a weak Sargan test in the analysis as the N of 1992 is too large in comparison to the T of seven years.

Although Zimbabwe is not on the same level of economic development as South Africa, research on Zimbabwe is informative because of its geographical location. One such study was investigated by Mugumisi and Mawanza (2014). The authors investigated the determinants of cash holding in 29 non-financial corporate firms in Zimbabwe from 2009 to 2012. Using the random effect panel method, Mugumisi and Mawanza (2014) found the existence of a positive relationship between dividends and cash holding. This result is consistent with the study of Ozkan and Ozkhan (2004) of UK firms. It implies that firms hold higher cash levels to avoid the position of the dividend not paid. Also Ozkan and Ozkan (2004) using GMM found a significant monotonic relationship between managerial ownership and cash holding.

Additionally, Zimbabwean firms' cash holdings are positively influenced by the return on assets, the ratio of cash flow to assets ratio and firm cash holding. Besides sales growth, debt maturity

structure, capital expenditure and net working capital had a significant negative impact on firm corporate cash holding. Thus, in Zimbabwe, firms substitute cash with other liquid assets. Companies with assets that can easily and cost-efficiently be converted into cash tend to hold less cash. Kariuki, Namusonge and Orwa (2015) echoed these results for Kenyan manufacturing firms, except they found a positive relationship between cash flow variability and cash holding.

South Africa is part of a group of countries referred to as BRICS (Brazil, Russia, India, China and South Africa). It is, therefore, significant to this study to include studies from these countries. Bhole and Mahakud (2005) studied the trends and determinants of private corporate savings in India. The authors employed the GMM technique for the estimation. They also found that the retention ratio of the companies was positively related to profit after tax ratio and high growth firms. Megginson and Wei (2010) also found profit to be positively related to cash holding in Chinese share-issue privatised firms. It shows that the more profitable a firm is, the more cash will be held. Other variables to positively impact include level of investment, cost of borrowing, and the growth rate of the firm.

Furthermore, cash holding in China firms is negatively influenced by debt and net working capital, while cash holdings declined as state ownership increased Megginson and Wei (2010. However, the OLS estimation technique has been heavily criticized in providing non-robust results. On the other hand, Bhole and Mahakud (2005) identified cash holding to be negatively related to external sources of funds, corporate tax rate, and cost of equity. This paper provided a comprehensive view of the cash holding determinants in India; however, the inclusion of the whole period, in addition to the three periods would have provided a more holistic view.

In a study of South African companies, Aron and Muellbauer (2000) used qualitative research techniques to examine the determinants of annual net corporate savings relative to national income for the period 1966-1997, by disaggregating this ratio into two components, and investigated the determinants separately for net corporate savings with respect to net corporate income and for gross corporate profits relative to national income. The major findings from the profit equation were that the share of profits in national income increased with the ratio of wholesale prices to unit labour costs, the terms of trade, the difference between the highest

tax rate on individuals and the rate of corporation tax and capacity utilisation, but declined with the ratio of company taxes to profits and with import tariffs. From the corporate savings equation, the authors found that the rise in the inflation rate between the late 1960s and late 1980s was an important factor in explaining the rise in the share of corporate savings in net profits; while with the decline of inflation in the 1990s, the corporate savings rate has been bolstered by high real interest rates and financial liberalisation in consumer credit markets. It was also concluded in the study that changes in personal tax rates on dividends played no role in explaining the rise in the corporate savings rate out of net profits.

Still in South Africa, Chireka and Fakoya (2017) investigated factors affectingf cash holding providing evidence from selected retail firms. The authors used a three-panel data regression (pooled regression, random effect and fixed model) to provide the results. The data of 17 retail firms listed on the JSE collected from the INET BFA database from 2000 to 2015 was used. The authors found that that dividend payments and cash flow volatility positively influenced retail cash holdings, whereas liquid asset substitutes and capital expenditure exerted a negative influence, whereas firm size, leverage, investment opportunities and cash flows were all found to have an insignificant impact on the cash holdings of retail companies. Among the three panel regressions used, the fixed effects method was found to be the most robust of the study. The study only focused on a sample of South African retail firms and, as such, the findings cannot be generalized to the entirety of the companies listed on the JSE. Also, it excluded retail companies with missing years from the study sample. While this provides a balanced panel, leaving out companies with missing observations gives rise to survivorship bias.

Literature review reveals very few studies connecting macro factors to corporate liquidity. Baum, Caglayan and Ozkan (2003) used an aggregate value of the conditional variance of macroeconomic factors and find that macroeconomic uncertainty is negative or positive to cash depending upon the data or period (Baum et al., 2003). Thus industry uncertainty leads to an increase in cash holdings. Chen and Mahajan (2010) go a step further to account for individual macroeconomic variables for the case of Taiwan. They identify interest rate and inflation, GDP growth, budget deficit, credit spread, money market rate and Corporate tax impact cash holdings of firms (Chen and Mahajan, 2010).

With rapid globalisation, there is an increase in the number of firms that operate internationally in India, and thus, Anand, Thenmozhi, Varaiya and Bhadhuri, (2018) exchange rate and oil price to be positively related to cash holding. Moreover, the GDP growth rate is found to be positively related to cash holding by Anand et al. (2018) and Abushammala and Sulaiman (2014), implying that the income effect

While Abushammala and Sulaiman (2014) and Anand et al. (2018), use the Arellano-Bover/Blundell-Bond panel data model to address the problem of endogeneity in the analysis, Chen and Mahajan (2010) use only fixed-effects model. Thus, there is lack of studies, which explore the effect of individual macroeconomic factors on cash holding, controlling for the problem of endogeneity. Moreover, no attempt has been made to investigate whether business confidence and political stability affect cash levels in firms.

3.3.3 Conclusion

Mugumisi and Mawanza (2014) highlighted the importance of cash holding research among African and developing countries all over the world. The literature shows a wide array of cash holding research in developed countries and very little work done among developing countries revealing a research gap. On the African continent only a handful of countries have been investigated, i.e. South Africa, Nigeria and Kenya. This research focuses on South African non-financial firms listed on the JSE thereby analysing factors that are peculiar to the country. Non-financial firms have been selected, as the literature review pointed out, because financial and insurance firms are required by regulation to have a specified amount of money available for clients.

The study by Chireka and Fakoya (2017) on the partial adjustment process of cash ignored the endogeneity issue and the fact that cash holdings are correlated over time. However, this study will apply the GMM, IV instruments econometric estimations. While there is evidence of firm factors influencing the adjustment speed of cash holdings in firms, the fact that macroeconomic variables can also impact adjustment speed of cash levels in firms has not been explored yet in South Africa. Hence, our study contributes to cash holdings literature by focusing on how

South African firms manage cash in response to macroeconomic and political conditions from an emerging market perspective. Thus the study fills in the gap in literature on the empirical determinants of cash holdings of firms in terms of the following:

First, the study account for the contemporaneous effect of macro variables on corporate cash holdings and empirically applies it to South Africa. The study considers economic indicators, namely, economic growth, inflation, business confidence and political stability variable, for the first time.

Secondly, The study improves the methodological approach to cash holding in South Africa and controls for endogeneity by using the Arellano-Bover/Blundell-Bond model.

3.4 Methodology

Having reviewed the literature in the previous chapter, the current chapter offers a detailed discussion of the research methodology which is used to determine factors influencing corporate cash holding in South Africa.

The determinant of cash holding was assessed using a dynamic panel method of Generalized Method of Moment (GMM) empirically. The application of this approach to determinants of cash holding is the first to be done for South Africa. The essay also provides descriptive statistics in terms of location and variations, as well as the correlation matrix of the dependent variable (cash holding) and the key independent variables.

3.4.1 Theoretical Framework

Baumol-Tobin model: The Baumol-Tobin model: The Baumol-Tobin model was developed by William Baumol (1952) and James Tobin (1956). The model asserts that there is a trade-off between the opportunity cost of holding cash and the trading cost associated with buying and selling of securities. The opportunity cost of holding liquid assets is the foregone interest rate that could have been earned in securities. As such there is an inverse relationship between the interest rate and optimal level of cash holding. This is because the interest rate makes cash holding less attractive, in the presence of more profitable investments.

In addition, the model predicts that transaction costs have a positive effect on the level of cash holding. Transaction costs are the costs incurred during the sell of securities. Every time a firm runs out of cash it has to sell securities to replenish the cash levels. Therefore higher transaction costs encourage firms to hold higher cash balances.

The model furthers posits the importance of the total amount of cash required, for example, in order to ascertain how much in liquid assets should be held in order to pay the bills, the total amount of billings should be known. Therefore the more cash needed the more cash that a firm will hold since there is a transaction cost attached to replenishment.

Lastly, a firm's cash holding is also affected by the size of the period of cash withdrawals

(denoted by C). A new replenishment takes place when all cash is depleted. It is assumed that the cash level is equal to C immediately after replenishment. Just before replenishment, the cash level equals zero. Therefore, $\frac{C}{2}$ is the average level of outstanding cash balance.

The total number of cash withdraws needed could be calculated as total funds needed (T) divided by the size of one withdrawal (C): $\frac{T}{C}$

The total cost that meets the cash needs can now be calculated as follows:

$$CH = \frac{bT}{C} + \frac{iC}{2} \tag{3.1}$$

Where: b = Transaction cost

T = Total amount of funds needed

C = Size of cash withdrawal for the period (Total cash required for the specified time period)

i = Interest rate

In order to minimize these costs, take the derivative with respect to C and set it equal to Zero. The we get the following result:

$$C = \sqrt{\frac{2bT}{i}} \tag{3.2}$$

Since C is spent evenly over the period and it then replenished, the average level of transactions balances is $\frac{C}{2}$. The average cash (money) holding M is:

$$M = \frac{C}{2} = \frac{1}{2}x\sqrt{\frac{2bT}{i}} = \sqrt{\frac{bT}{2i}} \tag{3.3}$$

Hence, cash holding increases with the amount funded and with the transaction cost but decreases with the interest rate. Equation 3.3 can be augumented by adding more variables in accordance with the literature review.

3.4.2 Model Specification

Using the Baumol-Tobin model, determinants of cash holding were identified as the transaction cost, total amount of funds needed and the interest. The model is specified as follows:

$$CH_{i,t} = \beta_1+\beta_2 growth+\beta_3 size+\beta_4 cashflow+\beta_5 leverage+\beta_6 dividend+\beta_6 debt+\beta_7 BCI+\beta_8 EC+\beta_9 INF+\beta \quad (3.4)$$

Where;

CH = cash holding.

Growth = firms growth opportunities.

Size = firm Size.

Cashflow = firms available cash flow.

leverage = firms ability to issue debt.

Dividends = dividend payout.

Debt = debt maturity structure.

BCI = business confidence index.

EC = economic growth.

INF =inflation rate.

PS = political stability.

Fincris = 2008 global financial crisis dummy.

3.4.3 Estimation techniques

This section provides the estimation procedure and technique for this essay. It starts by providing an overview of the GMM estimation method, before elaborating on the specific equations.

Generalised Method of Moments model

Panel data are repeated observations on the same cross section, typically of individual firms, observed for several time periods (Cameron and Trivedi, 2005). As such they contain both time series and cross sectional effects and consequently the data sets are typically larger than pure cross sectional or time series data.

Because of the larger sample size and the fact that explanatory variables vary over two dimensions (firms and years) the estimators based on panel data are generally more accurate than for other sources (Hsiao, 2003). Data used is for the period 2007 to 2017 of the non-financial firms listed on the JSE.

A dynamic panel data model was chosen to control for individual heterogeneity (Arellano, 2003). A panel data model recognises that individual firms are heterogeneous; such heterogeneity, if ignored, will factor into the error term and create heterogeneity bias in methods like the OLS.

In spite of the benefit of the dynamic panel model, there are some problems that arise in estimation (Arellano, 2003). Firstly there is the aspect of correlation between the variable. For example even when unobservable a firm's specific effects are not correlated with the regressors it is still necessary to control them in the dynamic framework. This is because the dependent variable will be correlated with the error term that does not vary with time and the first-difference transformation to eliminate fixed effects introduces correlation between the lagged dependent variable and differenced errors. Secondly firm specific variables are usually not exogenous, which means that shocks affecting the dependent variable are also likely to affect some of the independent variables in the model.

Hsiao (2003) explained that in panel estimation, neither the Generalized Least Squares GLS) estimator nor the Fixed Effect (FE) estimator produce consistent estimates in the presence

of dynamics and endogenous regressors. The dependent variable has lagged endogenous regressors as well as unobserved firm fixed effects which are correlated with the regressor as the orthogonality condition is not likely to be met for a GLS or FE estimator to produce consistent estimates therefore the Generalised Method of Moment approach was used.

With the use of the GMM the assumption is made that the error term is independently distributed across firms with zero means, but there are no restrictions on heteroscedasticity across firms and time. Secondly, we assumed that firm specific effects are unobservable but have a significant impact on cash holdings (Hsiao, 2003). This implies that firm specific effects are different across firms, however, are fixed for a given firm through time. Conversely, time−effects vary through time and are the same for firms in a given year, capturing economy−wide factors that are exogenous to the firms' control. It is vital to allow for unobserved firm−specific effects as different firms may differ in cash holdings due to several unobserved factors related to preferences, management idea, firm conditions, competition from other firms, etc. Omitting unobserved factors may result in biased parameter estimators as these factors could be correlated to the explanatory variables (Wooldridge, 2002a).

There are three methods of panel dynamic estimation namely, Blundell and Bond (1988) System of GMM, Arellano and Bond (1991) difference GMM model and the Arellano and Bover (1995) deviation GMM. This essay uses the Blundell and Bond (1988) System of estimation because this method accounts for endogeniety in the dependent variable and can also used in for a panel dataset with a short time dimension (T=10) and a larger cross sectional dimension (N = 80). Furthermore, the model also assumes that independent variables are not strictly exogenous, which implies correlation with and possibly current realizations of errors, fixed effects and heteroskedasticity and autocorrelation within individuals.

Blundell and Bond GMM Specification

The following model examines the impact of firm variables on cash holding in a panel dataset of 80 firms for a period of 10 years (2007 to 2017):

$$CH_{i,t} = \alpha + \beta_1 CH_{i,t-1} + \beta_2 Firmspecificvariables + \beta_3 Macroeconomicvariables + u_{i,t} \quad (3.5)$$

Where;

$CH_{i,t}$ = Ratio of cash to total assets (Cash holding)

$CH_{i,t-1}$ = The lagged value of cash holding

α = the constant

β_1, β_1,β_1 = regression cofficients.

Below are some econometric problems that may arise from that Equation 3.5, and some solutions are also presented.

Firstly dividends and leverage can be assumed to be endogenous because cash management decisions are heavily hinged on dividend payout, leverage and cash holding. The assumption is that a managerial decision on the level of cash holding inherently determines the dividend payout as well as the leverage ratio. Therefore these two variables are assumed to be endogenous. This then implies correlation of these regressors with the error term.

To deal with the problem of endogeneity, the Arellano-Bond (1991) difference GMM estimator first proposed by Holtz-Eakin, Newey and Rosen (1988) is used. The model will include lagged levels of the endogenous regressors in $K_{i,t}$ (dividend payout and leverage). This makes the endogenous variables pre-determined and therefore not correlated to the error term in equation 3.5. The Blundel-Bond system GMM estimates the two equations being distinctly instrumented.

Secondly, the time-variant firm characteristics (fixed effects), such demographics and managerial characteristics, may be correlated with the explanatory variables. The fixed effects are then contained in the error term in equation 3.5, which consists of the unobserved firm-specific effects, v_i and the observation specific errors, e_{it}.

The third problem is that the presence of the lagged dependent variable $CH_{i,t-1}$ will give rise to autocorrelation. However, the the first-difference lagged dependent variable is also instrumented with its past levels which eliminates the autocorrelation problem.

Finally the Blundel-Bondis designed fits a small-T and large-N panels. In large-T samples a shock to the firm's fixed effect which shows in the error term, will decline with time. Similarly, the correlation of the lagged dependent variable with error term will be insignificant (Roodman, 2006).

3.4.4 Diagnostic tests

Unit Root Test: TThe panel data contains an aspect of time series as it is prudent to test for Unit Roots to determine the stationarity of the series to avoid spurious results. The essay presents, the results of the Im, Pesaran and Shin (IPS) unit root test which is based on the well-known Dickey-Fuller procedure. A series that exhibits a stochastic trend will not be stationary and cannot be forecast far in the future. A stationary series will constantly return to a given value and no matter the starting point, in the long-run, it is expected to attain that value (Sargan, 1958).

Im, Pesaran and Shin (1997) proposed a test for the presence of unit roots in panels that combine information from the time series dimension with that from the cross-section dimension so that fewer time observations are required for the test to have power (Hurlin and Mignon, 2007). Since the IPS test has been found to have superior test power by researchers in economics to analyse long-run relationships in panel data this procedure will also be employed in this study.

Descriptive Statistics: Descriptive statistics are a collection measurement of location and variability. The location explains the central values of the variable through the mean, median and mode. Variability, however, refers to the spread of the data from the centre, given by, variance, standard deviation and skewness. These statistics illustrate the spread of the panel data and indicate the spread and stability. The descriptive statistics have also been provided and interpreted.

Correlation Matrix: Correlation analysis aids in determining the degree of association be-

tween two or more variables (Jahangir and Begum, 2008). The primary objective is to measure the strength or degree of linear association between two variables. It ranges from -1 to 1. The Pearson correlation coefficient was used to assess the strength of direction of the association between the variables.

Sargan/Hansen test:A crucial assumption for the validity of the GMM is that the instruments are exogenous. If the model is exactly identified, the detection of invalid instruments is impossible since the estimator will choose exact coefficients. However, if the model is over identified, a test statistic for joint validity of the moment conditions falls naturally out of the GMM framework.

The Sargan/Hansen statistic is used to test the validity of the subsets of the instrument via the difference-in-Sargan test. If an estimation with and without a subset of suspect instruments is performed under the null hypothesis of joint validity of the full instrument set, the difference in the two reported Sargan/Hansen test statistics is itself asymptotic with degrees of freedom equal to the number of suspect instruments. The regression without the suspect instruments is referred to as unrestricted regression since it imposes fewer moment conditions. The difference-in-Sargan test is only feasible if it is an unrestricted regression with enough instruments to be identified.

The Sargen test under the null hypothesis of "the instruments as a group are exogenous" is tested and reported.

Arellano-Bond test for autocorrelation: In order to test for autocorrelation, the test is applied to residuals in differences since Δe_{it} is mathematically related to $\Delta e_{i,t-1}$, negative first-order serial correlation is expected in differences and evidence of it is uninformative (Roodman, 2006). Hence to check for first-order serial correlation in levels, we look for second-order correlation differences, with the notion that this will detect correlation between the $e_{i,t-1}$ in Δe_{it} and the $e_{i,t-2}$ in $\Delta e_{i,t-2}$. Generally, the test is for serial correlation of order l in levels by looking for correlation of order $l+1$ in differences.

The Arellano-Bond test for autocorrelation in the model with a null hypothesis of "no au-

tocorrelation" is tested and reported. It is expected that the test for AR(1) process in first differences rejects the null hypothesis. The more significant test is the test for AR(2) in the first difference because it detects autocorrelation in levels. Both tests are reported.

3.4.5 Data, sources and description

The panel data used for analysis was sourced from the Sharenet website. Sharenet is an investment firm that allows for individuals as well as firms to invest in the stock market on the JSE. With this aim, it records firms' balance sheet publications annually for firms that must be listed on the JSE. From the firms' balance sheets data on the variables was accessed and collected for 80 non-financial firms listed on the JSE. The data collected was from 2007 to 2017 for non-financial firms. Financial and insurance firms were excluded because of the cash reserve required by law as well as the regulations and deposits from non-corporate entities. Financial firms are required to have a specific amount of cash for their customers. Including them in the sample would result in a skewed result being obtained.

Therefore, the data consisted of randomly selected non-financial firms listed on the JSE. These firms included 10 firms from general retail and industry, 5 food producers and drug retailer firms, 5 construction and electronics firms, 10 Chemical, health care equipment and leisure goods firms, 10 media and telecommunication firms, 10 mining and oil producer firms, 10 pharmaceutical firms and software computer firms, 10 support service, technology hardware and tobacco firms, and lastly 10 travel and leisure and Altx firms. For a full list of the included firms, see Appendix A. Selection was done based on a firm having data for the entire period under consideration. Therefore, firms that were list after 2007 or firms that were unlisted before 2017 were not included. The author considered only South African firms listed on the JSE.

The growth variable represents the firms' growth opportunities proxied by the yearly growth rates of sales. Both the trade-off theory and pecking order theory predict a positive relationship between growth opportunities and cash holding. Due to the fact that costly external financing raises the probability of a firm passing on valuable investment opportunities, firms hold sufficient liquid assets, (e.g. in the form of cash) in order to be able to take advantage of most of

the profitable investment opportunities that may present themselves at a certain point in the future, at the lowest costs. Mugumisi and Mawanza (2014) explained that growth opportunities influence future investments and future capital requirements. Higher growth will result in higher saving and improve future investment opportunities.

Firm size is proxied using the natural log of total assets. The data on total assets was obtained from Sharenet and transformed into the log in STATA. According to trade-off theory, cash holdings and firm size have an inverse relationship because larger firms are able to earn profit from the economies of scale, have more diversification, greater constant cash flows and a lower possibility of financial distress (Titman and Wessels, 1988), obtain easy access to capital markets (Ferri and Jones, 1979), and also decrease the borrowing cost and are less likely to become bankrupt (Ferreira and Vilela, 2004; Opler et al., 1999). Also, the Miller and Orr (1966) model hold that smaller firms may be encouraged to hold more money than larger firms because of the raising of funds for investment is relatively expensive.

On the other hand, the pecking order theory predicts a positive relationship between the firm size and corporate cash holding because large companies usually do better compared to small companies and for that reason must have extra cash (Opler et al., 1999). However, Ferreira and Vilela (2004) showed the contradictory results where small companies facing more growth opportunities and higher business risks tend to hold extra cash because the cost of borrowing is very high for small firms.

Some studies have also found no relation between firm size and cash holding. Moreover, companies operating in large competitive industries hold larger cash reserves as compared to other industries and the companies having greater access to capital markets raise funds from external investors. In the analysis either the positive or negative effect of firm size on cash holding is expected.

Cashflow is represented by the firms' available cash flow. It is proxied by taking the ratio of sum of cash and marketable securities to sales. The pecking order theory suggests that firms prefer internal to external financing. Therefore the higher the cash flow, the higher the retained amount of cash for internal financing. In contrast, the trade-off theory asserts that cash flow

can be seen as a source of liquidity and acts as a substitute for cash holding and this, therefore, predicts a negative relation to cash holding. Ferreira and Vilela (2004) found the positive relationship between cash flows and cash holdings. On the other hand, Ogundipe et al. (2012) could not find a significant association between cash flows and cash holding of a firm. Thus, a positive association between cash flows and cash holdings for South Africa is expected.

Leverage is a firms ability to issue debt. According to the trade-off perspective the variable leverage has somewhat an ambiguous relationship to cash holding due to competing assumptions. On the one hand it is assumed that firms with a higher leverage also have a higher risk of bankruptcy because of the rigid nature amortization plays to creditors. In a bid to avoid this kind of risk, highly levered firms are expected to hold larger amounts of cash. On the other hand, the extent to which a firm is financed by debt gives an indication of a firm's ability to raise debt. Thus, firms with high leverage ratios are also expected to have better access to debt capital and hence accordingly would hold less cash. This variable is therefore proxied by ratio of total liabilities to total asserts.

Dividends represent the firms ability to pay dividend. Ozkhan and Ozkhan (2004) explained that dividends can be viewed as negative equity to the extent that a firm can raise funds by cutting dividends. The companies paying dividends are observed to be less risky and have greater access to the capital market therefore the precautionary motive of cash holding is weak for dividend paying companies compared to non-dividend paying companies (Afza and Adnan, 2007; Opler et al., 1999). Therefore it is expected that dividend payments have a negative influence on cash holdings. Dividend variable is taken as a dummy for every year dividends were payout.

Debt shows the firms debt maturity structure, proxied by the ratio of current liabilities to total liabilities. Debt maturity also influences the level of cash holdings because the use of more short-term debt forces the company to renew it on a periodic basis and thus it puts pressure on the companies to hold a higher amount of cash in case of repayment or insolvency (Guney, Ozkan and Ozkan 2007). Ferreira and Vilela (2004) also found that companies operating in better investor protection hold a lower level of cash. Therefore, the negative effect of debt

maturity on cash holdings of the firms can be predicted.

With regards to macroeconomic variables, the inflation rate is proxied by the yearly percentage change in consumer price index in local currency. Inflation erodes economic agents of their purchasing power. As such, during inflationary periods, firms require more money to purchase the same amount of raw materials. So firms use more of their working capital while they generate less money. Therefore, the expectation is that when inflation rate increases, firms have to hinge against increasing costs by exchanging their liquidity with real estate and gold, which values will increase as inflation rate increases. This in turn, leads to a decrease in firms cash holding (Friedman, 1977). On the other hand, a continuous increase in the inflation rate leads the government to regulate macroeconomics through monetary policies, including an increase in interest rate. An improvement in interest rate, as well as the control of credit scale in commercial banks, will encourage lending where banks will implement external financing constraints (Chen and Mahajan, 2010). In response, the firms will convert their assets into cash, thus increasing cash holding.

Economic growth is measured by the yearly percentage change of gross domestic product (GDP). Economic growth is hypothesised to be inversely related to cash holding. In other word a companies' cash holdings will decrease when the economy grows (Tambo, and Theobald, 2017). This is because firms will invest during periods of economic growth. However, during a recession, companies turn their assets into cash to absorb any negative earnings shocks.

Political stability reflects the political status of a country for a given year. The data is sourced from the World Governance Index (WGI) compiled by the World Bank. The WGI compiles data for five categories, namely: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption. The political stability and violence index measures the perception of the likelihood of political instability and/or politically motivated violence including terrorism. The index ranges between -2.5 and +2.5 points. When the score of a country on the related index is close to -2.5 it shows that it fails (i.e. political instability) whereas a more politically stable country will score to + 2.5.

Business Confidence Index (BCI) shows the confidence investor (firms) have in the profitability of their investment in the countrys' economy. Data on BCI in South Africa can be obtained from the Bureau of Economic Research (BER) and the department of the South African Chamber of Commerce and Industry (SACCI).

The SACCI BCI is a composite monthly index of thirteen quantitative sub-indices thought to have the greatest bearing on the prevailing 'mood' of South African business. These include the exchange rate, inflation, the prime rate, retail sales volumes, credit extension, commodity prices, import and export volumes, new vehicle sales, utility services, manufacturing production, building plans passed, and the stock market index. Therefore, the SACCI BCI is an ex post measure of actual activity, based on the assumption that recent business activity is indicative of the extent of business confidence.

On the other hand, BER BCI is a composite of business respondents in the retail, wholesale, motor trade, manufacturing, building and construction sectors, asked to rate current business conditions as "satisfactory" or "unsatisfactory". The business confidence index is derived as the gross percentage of the respondents responding "satisfactory". The business confidence index varies between 0 and 100 where a value of 50 is indicative of neutrality, 100 indicates extreme confidence and 0 indicates extreme lack of confidence. Thus, it is the unweighted average of indices from these five sectors

The BER BCI reveals what the respondents are saying while the SACCI BER reflects what the respondents doing and experiencing. The SACCI BCI is therefore a composite weighted compilation of thirteen sub-indices that reflect various economic and market indicators, while the BER BCI reflects the optimism of investors. This section will use the BER BCI as this is a much better reflection of the feelings of investors. Since the data is published every quarter, the data has been transformed to yearly, by obtaining the average across the four quarters.

Financial crisis was added to the model to account for the 2008 global financial crisis, a dummy variable is included in the model. The time frame spans 2007 to 2017, and since there is only one year before the financial crisis of 2008, it is impossible to divide the time into the pre and post crisis times. Therefore, a dummy variable is included to account for the financial crisis

shock.

3.5 Conclusion

This chapter addressed the methodology that was used to investigate the determinants of cash holding in South Africa. The Arellano-Bond difference GMM estimation technique was applied to the panel data to identify the determinants. This chapter started by first providing the theoretical model for this essay. After which the data source was identified and tests to ensure that this data was used.

3.6 Empirical Results

3.6.1 Panel data tests

Unit root test

Table 3.1: Result of Panel Unit Root Test – Im, Pesaran and Shin (IPS)

Variable	IPS test	P value	Order of intergration
cashholding	14.56	0.01	I(1)
growth	4.3	0.00	I(1)
dividend	5.02	0.02	I(1)
cashflow	4.3	0.00	I(1)
leverage	1.7	0.01	I(0)
debtmaturity	1.95	0.04	I(1)
lsize	0.82	0.00	I(1)
bci	0.76	0.01	I(1)
EC	0.67	0.03	I(1)
INF	0.05	0.01	I(1)
PS	1.72	0.00	I(1)
fincris	3.76	0.00	I(1)

Source: Own computation

Table 3.1 shows the results of the Im, Pesaran and Shin (IPS) . The IPS tests the Null hypothesis that all the series included have unit root or are non-stationary, while the alternative hypothesis is that the series is stationary. The Table 3.1 indicates that nearly all the variables are stationary after difference except leverage that integrated of order I(0). Since all the variables are integrated at either level or after first difference, we proceed.

Descriptive Statistics

The study findings indicate that the mean growth opportunities rate for the 100 firms was 79.02 percent. It is important to note that the variable of growth was derived from the growth in yearly sales, and as such the standard deviation and the range are quite large, as firms' sales fluctuate from year to year due to varying economic conditions. The mean leverage ratio was 2.2 percent and the mean likelihood of size was 5.5percent with a standard deviation of 0.9. The mean cash flow was 3.3percent with a standard deviation of 0.85. The statistics also indicate that on average, nonfinancial firms hold 2.17 percent of their assets as cash. This indicates that

South African nonfinancial firms on average hold almost half the amount of cash held by listed firms in Zimbabwe (4.27percent) according to findings of a study conducted by Mugumisi and Mawanza (2014).

Table 3.2: Descriptive Statistics Results

Variable	Mean	Median	Max	Min	Standard Dev
CashHolding	2.17	0.06	41.70	0	1.63
Growth	79.02	9.14	150.20	-99.987	2026
Ddividends	0.67	1.00	1	0	0.4715
cashflow	3.38	0.13	6.50	0.04	0.85
leverage	2.20	0.47	1.1	0	43.80
debtmaturity	0.683	0.75	1.52	0.00279	0.234
lsize	5.50	5.80	6.487	0	0.979
bci	43.5	42.5	74.8	26	11.47
EC	2.09		5.36	-1.53	1.68
INF	6.24		11.54	4.26	1.89
PS	-0.06		-0.26	0.21	0.12

Source: Own computation: The table is in percentages

It is important to note that the variable of growth is derived from the growth in yearly sales, as such the standard deviation and the range is quite high, as firms' sales fluctuate from year to year due to varying economic conditions. The mean leverage ratio is 22 percent shows that firms do not rely on debt for financing. Chireka and Fakoya (2017) showed the mean leverage ratio for South Africa retail firms to be 28 percent.

The South African political sphere is predominantly recorded as unstable with a mean index of -0.06. The index is a reflection of the turbulent political uncertainty in South Africa. A host of problems ranging from the Xenophobic attacks, the resignation of President Jacob Zuma, the allegation of corruption and state capture inquire has further dimmed the light on a previously stable country. Business confidence has followed suit with investors losing confidence in the economic climate. The average business confidence scored is 43.5 percent which is below the neutral stance of 50 percent. The dwindling business confidence is compounded by the low ratings from rating agencies that put South Africa one notch above junk status.

Correlation Matrix

Table 3.3 shows the association between the key variables. In the table, the correlation be-

tween most of the explanatory variables is less than 0.50 implying there is no problem of multicollinearity. The highest correlation is between the financial crisis and business confidence at 55 percent, suggesting that investors have more confidence in the returns of their investment in good financial times. Also, the financial crisis is correlated to economic growth and is significant at 10 percent.

Table 3.3: Correlation matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 CH	1											
2 DVD	-0.05	1.00										
3 GWT	0.00	-0.05	1.00									
4 LVG	-0.09***	-0.05	-0.00	1.00								
5 Cf	-0.02	-0.06	-0.00	0.02	1.00							
6 DM	0.11**	0.02	-0.00	-0.45**	0.04	1.00						
7 lsize	0.037	0.07	-0.06	0.04	0.00	-0.09	1.00					
8 bci	0.12*	-0.06	0.02	0.11*	-0.01	0.04	0.04	1.00				
9 EC	0.08*	0.04	-0.8	0.06	0.03	0.62	0.84	-0.57	1.00			
10 INF	0.01	0.02	0.01	0.02	0.11	0.76	0.02	0.11	0.24	1.00		
11 PS	0.08	0.03	-0.01	0.08	0.21	0.04	0.4	0.73	0.75	0.39	1.00	
12 fincris	0.09*	-0.02	0.03	0.08*	0.08*	0.05	0.05	0.55*	0.05*	0.54	0.34	1.00

Note: Sig. level *** 1percent, **5percent and *10 percent

3.6.2 GMM Estimation results and discussion

Table 3.4 shows estimation results for the Arellano-Bover/Blundell-Bond GMM Model for determinants of cash holding of non-financial firms listed on the JSE in South Africa. The coefficient of the lagged dependent variable (cashholding) is positive and statistically significant. It implies that higher cash reserves from the previous year have a positive impact on the current cash levels. Ogundipe et al. (2012) also found similar results for Nigerian firms. The adjustment coefficient is about 0.972 (1- 0.028), which shows that the dynamic model is reasonable and that firms cannot instantly adjust to the target cash level following changes in firm-specific characteristics or random shocks. One possible explanation is that the adjustment process is expensive due to the existence of transaction and other adjustment costs.

The coefficient for leverage is negative, which is consistent with the prior expectations. The sign indicates that firms with higher leverage hold less cash. Thus high leverage ratios imply better access to debt and less cash is required. This result is in line with the prediction of the trade-off

Table 3.4: Arellano-Bover/Blundell-Bond GMM results

Variable	Coef.	Std Error	P>|z|
Cashholding [1]	0.02	0.00	0.00
Dividend	-0.004	0.03	0.74
Leverage	-0.17*	0.07	0.06
Growth	-0.01*	0.00	0.08
Cashflow	0.09**	0.00	0.02
Debtmaturity	0.002*	0.03	0.09
Lsize	0.02	0.04	0.67
BCI	-0.06***	0.03	0.00
EC	-0.008**	0.004	0.03
INF	-0.005	0.006	0.16
PS	-0.064*	0.035	0.07
Fincris	0.015	0.025	0.54

Model Statistics

Group variable: Firm	Time variable: Time	Number of Obs= 534	Number of groups= 80
Number of instruments: 38	Wald chi2(12) = 366.919	Prob > chi2 = 0.0000	

Source: Own computation: Note: Sig. level *** 1 percent, **5percent and *10percent

theory. However, Chireka and Fakoya (2017) found leverage to be insignificant in determining cash holding for selected South African retail firms listed on the JSE. This difference in results could be attributed to sectors selected for the study. Whereas Chireka and Fakoya (2017) focus only on retail firms, this paper considers non-financial firms. The coefficient of the dummy variable of dividend is insignificant, but negative pointing to a negative relationship between cash holding and dividend pay-out. Intuitively, firms that declare dividends are most probably very profitable and likely to be in a good state of affairs such that hold lots of cash.

The coefficient of growth opportunities is negative and significant, at 10 percent. This result is in line with agency theory in that firms with abundant investment opportunities face higher costs of holding liquid assets due to forgone opportunities. The results are also similar to Mugumisi and Mawanza (2014) for Zimbabwean listed firms and Kariuki, Namusonge, and Orwa (2015) for Kenyan manufacturing firms. However, these results are in contrast to findings in Ogundipe et al. (2012), and Chireka and Fakoya (2017) who reported growth to be statistically insignificant for retail firms in South Africa.

It can be seen that there is a significant positive relationship between cash flows and cash

holding. The positive coefficient is consistent with the trade-off theory. It shows that firms prefer to use internal financing as a precautionary motive. The results from the literature are mixed. Ogundipe et al. (2012) found no significant relationship between cash flow and cash holdings for Nigeria, while Chireka and Fakoya (2017) also reported a positive relationship for retail firms in South Africa.

The estimate for firm size (lsize) echoes the results in Chireka and Fakoya (2017), that is, negative and insignificant. Therefore the result does not find support for the assumption that small firms should hold more cash. In contrast, Mugumisi and Mawanza (2014) found firm size to have a negative and significant impact for Zimbabwean firms. The debt maturity variable has a positive and significant impact on cash holding. The positive association implies that the debt structure will increase firms cash holding, as firms need to hold cash in cash of repayment or insolvency.

The coefficient of business confidence index is negative and statistically significant at 1 percent. The higher the business confidence, the less cash a firm holds, leading to an increase in investment. As such the business climate of a country has a significant impact on the investment decisions (cash holding) of firms. In their descriptive report on cash holding, Tambo and Theobald (2017) also found business confidence to have negative effect on a firms cash holding. As expected in the apriori expectation economic growth is inversely related to cash holding and is significant. During bad economic times, firms hold more cash to hinge against increasing cost of external financing. Tambo and Theobald (2017) confirmed these results. The dummy variable for the global financial crisis and the inflation rate are statistically insignificant. The insignificant result suggests that the global crisis did not fundamentally change firm's cash holding decisions.

Lastly, the political stability is inversely related to cash holding as expected in the apriori assumptions. The implication is that during political instability firms hold more cash, and a more stable political atmosphere encourages investment. The host of political problems in South Africa which have seen the political stability index dwindle is at the root of the increase in cash holding by firms.

3.6.3 Diagnostics tests

The Sargan statistic of over-identifying restrictions fails to reject the null of hypothesis (over-identifying restrictions are valid). The test is also not weakened by the number of instrument as the number of groups (80) is greater than the number of instruments (33).Furthermore the test for exogeneity also shows that the instrumental variables are exogenous. The null hypothesis of the Sargan test is that "the instruments as a group are exogenous", with a P-value of 0.176 we fail to reject the null hypothesis.

The result of the Arellano-Bover/Blundell-Bond test for autocorrelation with a null hypothesis of no autocorrelation, is applied to the differenced residuals. The results are consistent with theory as the the test for AR(1) process in first differences rejects the null hypothesis.However, the more important test for autocorrelation is the AR(2) process where autocorrelation is tested in levels. The results fails to reject the null hypothesis with a P-value of 0.513, showing no autocorrelation in the model.

Table 3.5: Diagnostics test Results

Test	statistic
Sargan test of overid. restrictions	Prob > chi2 = 0.231
Difference-in-Sargan tests of exogeneity of instrument subsets	Prob > chi2 = 0.176
Arellano-Bond test for AR(1) in first differences	z= -4.78: Pr> z = 0.000
Arellano-Bond test for AR(2) in first differences	z= -0.65: Pr> z= 0.489

Source: Own computation

3.7 Conclusion

Corporate cash holding has been a major topic in economics and finance in recent years and has attracted huge debate amongst academics and policymakers. In spite of the growing debate, very little research has been done on cash holdings behaviour in emerging economies and specifically Africa. This paper fills in the gap by providing empirical evidence of non-financial firms in South Africa. The specific model is estimated using the Arellano-Bond GMM estimation technique. The Arellano-Bond GMM produces efficient estimators in the presence of heteroskedasticity. Data was collected from a sample of 80 JSE listed South African non-financial firms from the year 2007 to 2017. Data was obtained from the SHARENET database.

Results obtained were consistent with the evidence on available corporate cash holding literature. Six internal variables –firm size, leverage, growth opportunities, dividend payments, cash flows, and debt maturity– were studied to ascertain whether they have a significant explanatory impact on the cash holdings levels of the companies. Our findings show that leverage and growth opportunities are inversely related to cash holdings, whereas debt maturity and cash flow exerts a positive influence. Firm size and dividends payments were all found to have an insignificant impact on the cash holdings of companies.

On the other hand, five external factors –business confidence, economic growth, inflation rate, political stability and financial crisis– were also included. The results reveal that business confidence, economic and political stability are inversely related to cash holding while inflation rate and financial crisis were statistically insignificant.

Therefore, based on the findings of our study, an investor can reasonably conclude that a company with high leverage and high cash flow should retain lower cash holdings. If for some reason, a firm with a high leverage ratio and high cash flow also holds large cash holdings, this might be a signal of possible agency conflict.

In terms of policy, the results suggest that cash holding is directly responsive to economic policy. A policy environment that promotes economic growth and provides certainty is more likely to reduce firms' weariness about economic conditions. Ultimately, company investment

decisions are driven by the prospect of good returns, and the current trajectory of declining economic growth, in South Africa, is dimming those prospects.

Chapter 4

THE DETERMINANTS OF BUDGET DEFICIT IN SOUTH AFRICA

4.1 Introduction

4.1.1 Background and Problem Statement

In many developing economies, there is a persistent incidence of budget deficit. Palley (2006) explained that most countries of the world spend more than is collected in revenue through taxation, and therefore the difference between government expenditure and government revenue is often a negative value (described as budget deficit or public deficit or fiscal deficit). Fiscal deficit is usually accompanied by a rise in public debt, which makes the topic of budget deficit crucial to economic growth.

Tujula and Wolwijk (2004) posited that a large budget deficit and the resulting public debt might result in an inefficient allocation of resources to society. The repayment of public debt will thus act as a constraint to production and will generate crowding-out effects. Besides, budget deficit may also be held responsible for an economy's high inflation rate, low growth rate, a current account deficit and private investment and consumption crowding out (Chaudhary and Abe, 1999). In a monetarist framework, deficits tend to be inflationary because when

monetisation takes place, this leads to an increase in money supply and, ceteris paribus, and an increase in the rate of inflation, in the long run (Gupta, 1991). Thus persistent fiscal deficit can hamper the economic growth and development of an economy.

Furthermore, the role of budget deficits has been debated by different schools of thought yielding different conclusions. Keynesian economists such as Keynes (1936) and Kustepeli (2005) advocated for the importance of government intervention to the success of any economy. Other economists, such as Musgrave (1959) emphasised the importance of fiscal policy for the improvement of social welfare. In contrast, economists ranging from classical to those holding public choice view argue against the use of budget deficits to improve economic performance. In particular, Smith (1776), Ricardo (1817) and Pigou (1912) suggested that instabilities in the economy are a result of government interference.

The South African government, following the Keynesian economists, and being the custodian of economic welfare, has aimed at implementing sustainable fiscal policy in the country. Fiscal policy aims to stimulate economic and social development. Economic and social development can be achieved by the adoption of a policy stance that ensures balance between taxation, expenditure and borrowing that is consistent with sustainable growth. Government expenditure has shown an overall increasing trend from 1980 to 2017, with a sharp increase, between 1987 (21.5 percent of GDP) and 1990 with a record of 24 percent of GDP. Another sharp rise was experienced between the years 2003 at 22.3 percent and 2008 reaching 25.5 percent of GDP. This period saw the introduction of the Accelerated and Shared Growth Initiative for South Africa (AsgiSA), embarked on in 2006, with a focus to halve unemployment and poverty rates. On the other hand, tax revenue continued to rely heavily on personal income tax. For the period under investigation individual tax contributed the largest percentage of total tax revenue (National Treasury, 2014).

An overall increase in government expenditure without matching growth in tax revenue has resulted in increases in national debt and the worsening of the fiscal balance. Between 2000 and 2008, a more fiscal discipline stance was implemented by government which resulted in decreased debt, improved fiscal balance to a surplus in 2006 and 2007, increased tax revenue and

lowered government expenditure. This period also experienced economic growth of 3.1 percent. However,this stable economy was disrupted by the financial crisis which led to widening budget deficit. In the last seven years, national debt rose rapidly as a percentage of GDP reaching a high of 53 percent of GDP in 2017. This was accompanied by a worsening fiscal deficit reaching a low of -5.2 percent in 2012. A more expansionary fiscal policy framework characterized by consecutive budget deficits has dominated in South Africa over the years (National Treasury, 2014).

This has necessitated the problem statement for this essay: What are the determinants of budget deficits in South Africa?

4.1.2 Objectives

The specific objectives of this essay are:

- To provide an overview of fiscal policy in South Africa for the period under investigation.
- To investigate the determinants of budget deficit.

4.1.3 Relevance of the study

The investigation into the determinants of budget deficit is relevant for the implementation of fiscal policy. Budget deficit is a result of the difference between government expenditure and government revenue. As such, budget deficit directly affects fiscal policy which in turn influences economic growth. For example, a reduction in budget deficit is hypothesised to indicate better economic conditions and growth (Diokno, 2006). Also, a country experiencing fiscal deficit in its budget has to rely on both domestic and foreign borrowings. High fiscal deficit in most of the countries has led to a debate in economic literature on fiscal consolidations and its impact on macroeconomic variables.

This essay, will thus, contribute to the body of knowledge on fiscal deficit and fiscal policy by providing factors that influence the budget deficit. It is in line with the current South Africa governments' efforts for fiscal consolidation and increasing economic growth through

debt reduction. This study also accounts for the political arena in South Africa by including the political stability variable.

The study also seeks to contribute to the on-going global debate on whether budget deficits are a result of inefficiency and poor governance or are due to the magnitude of the economic problems that the government seeks to alleviate. There is hardly any literature regarding the determinants of budget deficits in South Africa and the developing world, therefore, this study will contribute to the little existing literature.

4.1.4 Structure of the study

This study is structured as follows: Subsection 4.2 will provide an overview of fiscal policy in South Africa, while Subsection 4.3 will provide the literature review. Subsection 4.4 will discuss the methodology while Subsection 4.5 will present the empirical findings. Subsection 4.6, concludes.

4.2 Overview of fiscal policy in South Africa

4.2.1 Introduction

Budget deficits are as a result of the excess of government expenditure over revenue in the country's budget. This section highlights key aspects around the budget ranging from fiscal policy framework to expenditure policies.

The section begins by providing a brief overview of fiscal policy changes in South Africa, then proceeds to briefly discuss expenditure changes, tax reforms and debt financing in South Africa.

4.2.2 Overview of fiscal policy in South Africa

Fiscal policy is defined as government policy on expenditure, revenue(tax) and borrowing. The evolution and trend of these component are discussed below.

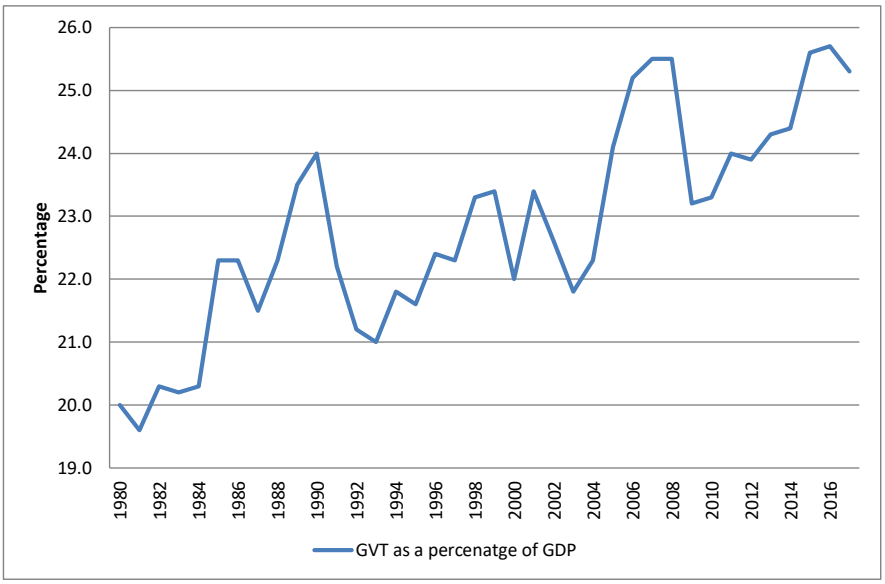
Government Expenditure Trends

In the early 1980s South Africa was a closed economy as a result of economic sanctions imposed by the international community as a result of the apartheid regime. The government increased expenditure by introducing subsidies in a bid to alleviate the effects of the sanctions. The government introduced industrial decentralisation which amounted to direct and indirect subsidies for the establishment of large industries. According to Figure 4.1 below a considerable increase in government expenditure, from 20 percent of GDP to a high of 24 percent of GDP in 1990. As already stated, this period was characterised by sanctions which forced the government to subsidise production and the establishment of industries. From 1990 to 1993 there was a sharp fall in government expenditure, and this was following the establishment of sanctions after the end of the apartheid regime.

Post-1994 after the first democratic election, the South African government embarked on three phases of fiscal reform. From 1994 to 1996 following a period of recession and a rapid rise in government spending, government's Reconstruction and Development Program (RDP) was introduced and a comprehensive re-prioritisation of public expenditure undertaken (Manuel,

2004). The government also introduced three additional reforms namely, the introduction of a three-year medium-term expenditure framework for more transparency and to solidify the link between policy priorities and government long term expenditure plans. Secondly, a statutory budget council and technical committee to manage budgetary and financial cooperation among provincial, local and national governments were established. Between 1994 and 1999 government expenditure increased steadily from 20 percent of GDP to 23 percent of GDP in 1999.

Figure 4.1: Government expenditure as a percentage of GDP



Source: Author's estimations using SARB data

From 1997 to 2000, a period of fiscal consolidation was introduced in the medium-term expenditure planning, and substantial investment in tax reform and revenue administration capacity and efficient coordination of fiscal and monetary policy were introduced. In this same period, the Growth, Employment and Redistribution (GEAR) strategy, was introduced as a macroeconomic measure to achieve sustained annual real gross domestic product (GDP) growth of 6 percent or more by the year 2000. This growth reflected a reduction in government expenditure to a low of 21.8 percent. It was accompanied by a fall in the cost of borrowing as well as a fall in public debt. The reduction in the cost of borrowing left room for government investment in social service and infrastructure.

The period 2001 to 2008 saw the introduction of more prudent fiscal consolidation was adopted.

The Accelerated and Shared Growth Initiative for South Africa (AsgiSA), embarked on in 2006, was a coordinating framework to enable the achievement of new government goals of halving unemployment and poverty between 2004 and 2014. It aimed to accelerate economic growth to an average of at least 4.5 percent between 2005 and 2009 and further to a sustainable 6 percent average annual rate between 2010 and 2014. The period is also associated with a steady increase in government expenditure. However, the more prudent fiscal stance that was adopted and AsgiSA resulted in a decline in fiscal deficit and a budget surplus between 2006 and 2007 of 0.3 and 0.7 percent of GDP. The improved economic outlook also saw a growth in GDP of nearly 3 percent in 2007.

From 2009 to 2017, fiscal consolidation policies continued. However, the period is marked by the global financial crisis and national government elections. This saw the end of the good economic performance era and the downturn forced government to spend more with an increasing number of people on social grant due to increased unemployment. In 2010/11 the government introduced the New Growth Path (NGP) initiative which was aimed at taking the economy out of recession. The main focus of this initiative was to boost employment and to reduce poverty and inequality.

Tax reform changes and Trends

The tax reform measures in South Africa between 1980 and 2017, have been shaped by three main commissions, namely; the Margo Commission of 1987, the Katz Commission of 1994 and the Davis tax Commission of 2013. The Margo Commission was tasked by the government to study the tax structure of the country and produce a comprehensive report. The major recommendation of their report was the introduction of separate income taxes for men and women, secondly the introduction of the same rebate for both married and unmarried persons and the recommendation for a simpler income tax structure with fewer, broader bands and lower marginal rates. A significant tax policy change before the Commission's report was the replacement of sales tax by Value Added Tax in 1991.

The Katz Commission (1994) was tasked to inquire into the appropriateness and efficiency of the tax system and provide recommendations for its improvements taking into account interna-

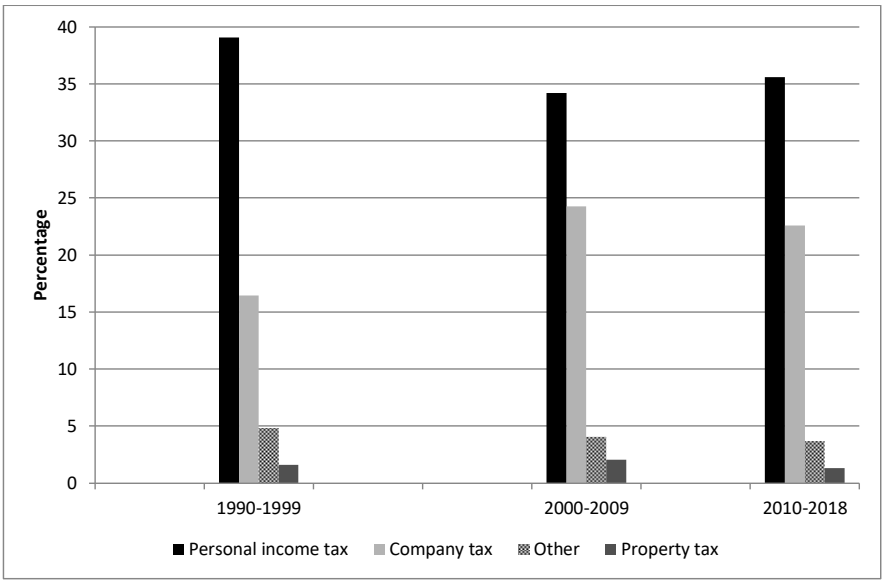
tionally accepted tax principles and practices. This commission produced nine reports. Based on the committee's report, the national government embarked on major fiscal reforms from 1994. These reforms included institutional, rationalisation and harmonisation of tax rates and brackets. The first institutional tax reform was implemented in October 1995, and after the approval from Cabinet the autonomous South African Revenue Service (SARS) was established by restructuring the Inland Revenue and Customs and Excise Directorates in the Department of Finance. According to Jibao (2013) SARS key objective would be the collection of all national taxes, duties and levies, by attracting and retaining competent staff, utilising modern information technology and adopting efficiency-enhancing organisational structures thereby protecting the revenue base.

The Davis Commission of (2013) was instituted to assess the tax policy framework and its role in supporting the role of inclusive growth, employment, development and fiscal sustainability. A total of four reports were released in March of 2018. The key recommendations included the need for alternatives sources of revenue for government other than tax. The committee maintained that the tax system must be considered in a holistic context and that tax revenue alone was not sufficient to address all impediments to economic growth and job creation. Secondly, there was a need to simplify and maintain certainty with regards to tax legislation, to encourage local and foreign direct investment. The third key recommendation was to provide taxpayers with assurance and indicators that their taxes were being spent prudently and invested in their best interests. Lastly the committee elaborated on the extent to which the tax system could influence behavioural changes that promoted economic growth, employment, development and sustainability.

The contributions of different tax sources show that individuals or personal income tax has been the largest contributor to total tax revenue throughout the period under investigation. In the 1990s individual taxes contributed an averaged 39.08 percent to total revenue between 1990 and 1999 while company tax only contributed 16.5 percent in the same period. Between 2000 and 2009 individual tax averaged a contribution of 34.2 lower than the previous decade. This can be attributed to the external shocks to the economy which arose from the 2002/03 East Asian crisis and the rise of the 'dot.com' market as well as the 2008/09 financial crisis.

These led to a slow economic downturn with many individuals losing their source of income. In this decade the average company tax contribution rose slightly to 24.3 percent. Over the last 7 years personal income tax increased slightly, while company tax declined by 2 percent from the previous decade.

Figure 4.2: Average contributions of tax sources to total (1990-2017)



Source: Author's estimations using SARB data

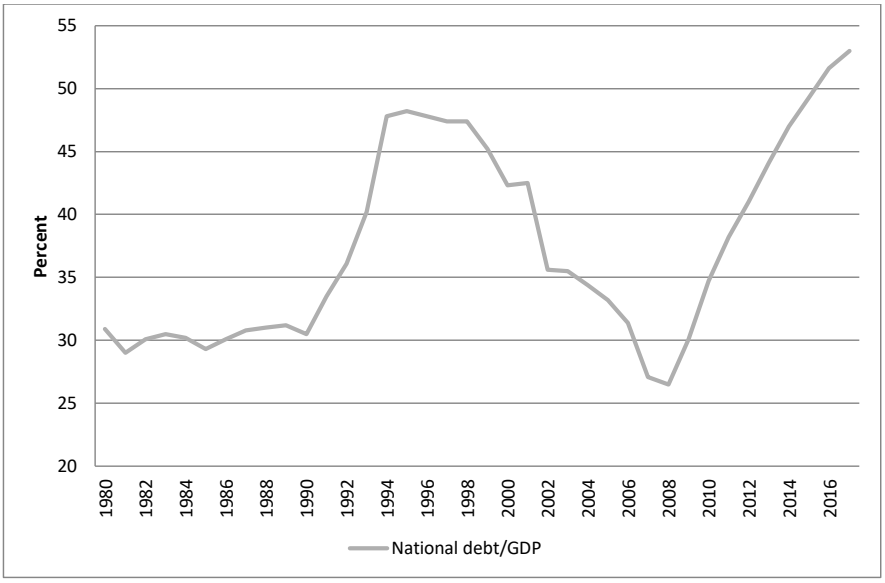
4.2.3 Trends in public debt and fiscal balance

Public debt can be defined as the sum of the domestic debt (marketable and non-marketable) and foreign debt owed by the national government. Figure 4.3 below indicates that between 1980 and 1990 the ratio of public debt to GDP remained below 30 percent before sharply rising between 1990 and 1994 reaching 40 percent. The sharp rise can be attributed to the lifting of sanctions, which enabled South Africa to borrow from the international market, and coupled with preparation for the first democratic election this meant that the government could not introduce expenditure cuts during this period. This was reflected in the accumulation of a larger deficit see Figure 4.3 falling to a deficit of 0.7 of GDP and dropping to a low of -6.6 percent in 1993.

Between 1995 and 2008, the national debt, as a percent of GDP, gradually declined from a high of 42.8 percent in 1995 to a low of 26.5 percent. This stabilization was also reflected in the fiscal deficit as there was an improvement from a low of -4.6 percent to a record surplus in

2006 and 2007 at 0.3 and 0.7 percent respectively. This period coincided with the implemented expenditure and tax reforms that stabilized the economy and saw an economic growth of nearly 3 percent.

Figure 4.3: National government debt as a percentage of GDP



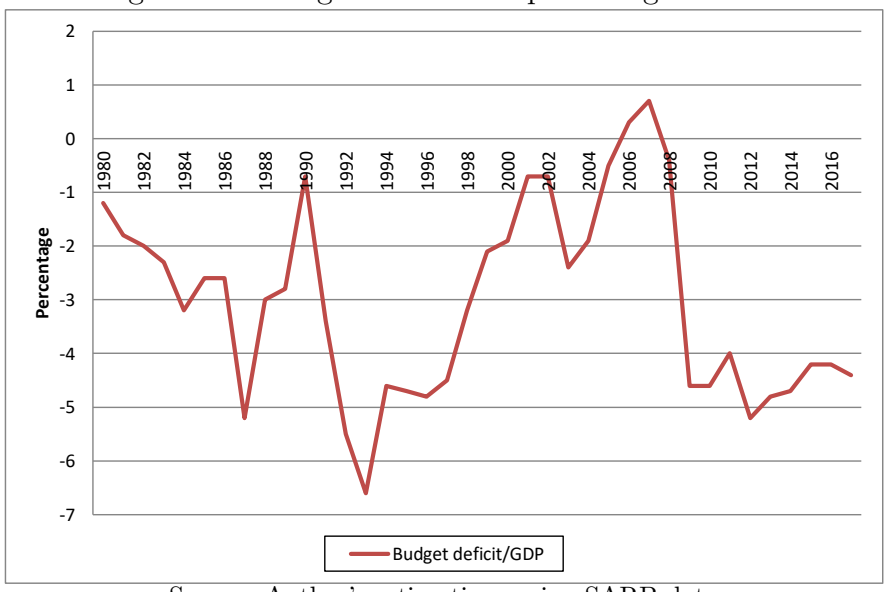
Source: Author's estimations using SARB data

The period post 2008 was succeeded by a sharp increase in national government debt due to the counter cyclical fiscal stimulus to combat the 2008 global financial crisis. Budget deficit followed a similar trend by falling to its lowest of -5.2 percent of GDP in 2012. Furthermore, the recovery period for South Africa was slow and compounded with the high levels of unemployment, and the depreciation of the rand, the budget deficit continued to remain considerably high.

4.2.4 Conclusion

This section set out to provide an overview of fiscal policy and the trends thereof. Government expenditure over the years has taken on different programs and initiatives with a focused on fostering economic growth and employment creation. At the heart of the tax revenue reforms is the aim to have a more sustainable and efficient tax system that is simple to administer. In addition the focus was to increase the tax base through job creation, thus increasing revenue and decreasing fiscal deficit. Lastly, national government debt and fiscal balance have followed similar trends for the period under investigation and have been affected by external shocks to the economy.

Figure 4.4: Budget deficit as a percentage of GDP



Source: Author's estimations using SARB data

4.3 Literature review

This section provides the theoretical and empirical literature review on the determinants of budget deficit.

4.3.1 Theoretical literature

The classical economists view budget deficits to be detrimental to the economy. In particular, Smith (1776) suggested that instabilities in the economy were a result of government interferences. Smith (1776) advocates for overall budget balance because each time a deficit occurs it leads to future deficits which become progressively larger. The larger deficit, will, in turn, lead to tax increases at the detriment of economic agents. The dangers of accumulated long-run debt is that might inevitably lead to national bankruptcy. Says (1803) supported Smith in opposing to debts and deficits.

Says (1803) argues that public consumption is not different from private consumption. In both cases, there is a loss of wealth and value. Thus limitation of public consumption is necessary to provide capital for industry and trade. Government borrowing is unproductive because consumed capital is lost and because of the burden to interest rate. However, a moderate amount of debt is acceptable to encourage investment for the forms of capital that would have

been otherwise spent by individuals. It is thus not surprising that Ricardo (1820) conquered with his predecessors.

David Ricardo, who wrote at the end of the Napoleonic wars and rise of the industrial revolution, referred to debt as one of the most terrible problems to afflict a nation. Thus Ricardo (1820) modified Smith and Say assertion and pointed to the problem of the loss of capital. He posits that the most important burden of national debt is not the interest rate but the loss of original capital. Once a nation had incurred debt, no economic benefit can come of it. Ricardo (1820) adds that long-run debt will lead to increase tases and price of labour; however the real capital of the nation remains unchanged. Furthermore, Ricardo (1820) added that it was only the quantity of government purchases, not whether such purchases were financed through taxation or borrowing, which affected the economy. This implies that economic agents are indifferent about government borrowing now or to a tax increase in the future and has seen been know as the Ricardian equivalence theorem.

In 1848 John Stuart Mill suggested modifications to the classical thinking of deficit and debt. He continued to stress that government borrowing is harmful to the economy and destroys capital which, could have been used to for productive employment. However, He found it paradoxical the years of capital destruction (wars), were the years of prosperity. Mill concluded that loan finance is an effective subtraction from the portion employed in paying workers. Therefore, the classical economist strongly discouraged budget deficit and debt.

In the late 1900s, the neoclassical economist emerged with three key themes, namely; Firstly, consumption of each individual is determined as the solution to an intertemporal optimization problem, where lending and borrowing are allowed an interest rate. Secondly, individuals have infinite lifespans where each individual belongs to a specific generation. Lastly, They assume that the market clears in all periods.

Diamond (1965) pioneered the study of budget deficit in such a model. Diamond asserts that a permanent increase in the domestically held debt to national income depresses the steady state capital-labour ratio. He asserts that rising interest rate stimulates additional saving and reduce investment until capital market equilibrium is reached. Thus persistent government

deficits crowd out private capital accumulation. One weakness of the Diamond model is the sole focus on permanent government deficit. Auerabach and Kotlikoff (1986) studied policy stimulations to account for the immediate impact of a temporary budget deficit. They find temporal deficit to have very little effect on economic variables in the short run.

The traditional Keynesian view differs from the Neoclassical view in two fundamental ways. Firstly, the Keynesian view allows for some economic agents to be unemployed; and secondly it assumes the existence a large number of liquidity constrained agents. Thus total consumption is highly responsive to changes in disposable income.

The traditional Keynesian model asserts that an increase in Budget deficit will lead to an increase in output by the inverse of the marginal propensity to save. This expansion will an increase in the demand for money. Assuming a fixed money supply, interest rate will rise, and private investment will decline. This, in turn, reduces output and offsets the multiplier effect. Thus deficits do not crowd out private investment. On the other hand, increased demand increases the profit on investment. Thus deficits could lead to increased aggregate saving and investment despite the raise interest rate. Lastly, the basic equilibrium model (Tax-smoothing hypothesis) of Barro (1979) which was later extended by Lucas and Stoke (1983) explains that governments aim to minimise distortions that arise from tax through the allocation of taxes over time. The model implies that deficits and surpluses arise when the ratio of government purchases to output is expected to change. The underlying assumption is that the government can issue default-free bonds and this helps to smooth taxes over time. Therefore government should use budget deficits and surplus to smooth tax rates over time.

4.3.2 Empirical Literature

The empirical literature covers studies from all over the world and includes both the political and institutional factors as well as the macroeconomics factors.

Edwards and Tabellin (1994) explained that most of the research on savings has focused primarily on household with the assumption that government saving is exogenous. As such, there has been almost little to no empirical work trying to explain the behaviour of government savings

(deficit) through time or across countries.

Political and institutions factors

Cabinets have the responsibility to design and implement fiscal policy and adjustment strategies. The cabinet consists of politicians of either the same or opposing political party; they have different ideologies and depend on electoral results to be in office. Alesina and Perotti (1995) and Persson and Tabellini (1997) showed that large deficits and debts had been more common in countries with proportional rather than majoritarian and presidential electoral systems. This implies that countries with coalition governments and frequent government turnovers will have a high budget deficit since elections are costly. Thus, Woo (2003) explained that political factors (government fragmentation, political instability and institutions), social polarisation (ethnic division and income inequality), and institutional factors (budgetary procedures and rules, bureaucratic, efficiency, and democracy) have a direct impact on a country's' deficit.

Additionally, Bayar and Smeets (2009) found evidence of inverse relationship between political stability and budget deficit. For example, governments behave opportunistically to the extent that deficits are higher in election-years and lower in the following year. Moreover, Aizeman and Powell (1998) and Agnello and Ricardo (2009) also found support for political stability and government investment.

Persson and Tabellini (1999) found that majoritarian elections led to more redistribution and larger governments and that presidential regime led to less redistribution and smaller governments. Under presidential systems, the government is more transparent and an independent centralised authority (Shugart and Carey, 1992). Also, Acosta and Coppedge (2001) analysed the political determinants of budget deficit in Latin America. Using descriptive statistics they concluded that the number of budget institutions, number of political parties, fiscal discipline and polarisation had a significant impact on budget deficit.

Macroeconomic factors

Easterly and Schmidt-Hebbel (1993) examined the relationship between fiscal deficit and macroeconomic performance for ten developing countries using qualitative research method between

1980 and 1990. The study found strong evidence that over the medium term, money financing of the deficit led to higher inflation, while debt financing led to higher real interest rates or increased repression of financial markets, with the fiscal gains coming at increasingly unfavourable terms.

Chaudhary and Ahmed (1995) examined the relationship between fiscal deficit, money supply and inflation in the case of Pakistan. They found a long run relationship between budget deficit and money supply. The notion that budget deficit through its impact on inflation stimulated economic growth had been tested in the case of Nigeria. The results showed that there a unidirectional causality from budget deficit to inflation existed (Oladipo and Akinbobola, 2011).

Diokno (2006) examined the economic and fiscal policy determinants of public deficit in the Philippines. Using the two-stage least squares method (2SLS), the results showed that inflation capital outlays, and tax effort had a positive impact on budget deficit while, domestic liquidity had a negative relationship with budget deficit. Variables such as economic growth, interest payment as a percent of GDP and intergovernmental grant as a percent of total government expenditures were found to be statistically insignificant.

Agha and Khan (2006) in their empirical analysis of fiscal imbalances and inflation in Pakistan found a short run as well as a long run relationship among money supply, budget deficit and inflation. They concluded that bank borrowing was more inflationary than non-bank borrowing.

Javid, Arif and Arif (2011) used panel regression for selected Asian countries and found that high income, rising inflation and large budget to GDP ratio were associated with budget instability, and external shocks made the budget deficit more volatile, however, countries with high population growth had less volatile budget deficits. The results indicate that a high level of political stability and democracy and improvement in social and economic condition reduces the budget deficit volatility. The results suggest that political and institutional factors had a direct impact on fiscal instability beyond the economic reasons to effect fluctuations.

Anwar and Ahmad (2012) added to these after examining the political determinants of budget deficits in Pakistan. They used the bounds testing approach and co-integration and error-

correction model. The results showed that there was a long run relationship between budget deficit and political variable (democracy and cabinet size). In addition, a positive relationship was found between the size of the government and the size of the budget deficit.

Still in Pakistan, Kalim and Hassan (2013) using a log linear model found that economic growth had an insignificant impact on fiscal deficit in the long run but had significant impact in the short run, whereas, other factors such as international trade, total debt servicing and broad money supply were found to have a significant impact on fiscal deficit in both the short and long run. They also used the Granger Causality test to ascertain the direction of causality between the variables and found a univariate causality from economic growth to fiscal deficit, from total debt servicing to fiscal deficit, and the existence of bivariate causality between money supply and fiscal deficit in the short run. Also, in the long run all the factors Granger cause to fiscal deficit. The study also found the existence of joint causality among fiscal deficit, trade, economic growth, total debt servicing and money supply.

In Europe, Maltritz and Wüste (2015) used panel data regression for 27 European countries from 1991 to 2011 to identify the determinants of budget deficits. The authors reveal that government debt and yield had a positive effect on budget deficit while Real GDP, inflation, unemployment and the year of election had a negative effect. The authors also found a significant influence of fiscal rules and stock-flow-adjustments to budget deficit.

In South Africa, Murwirapachena, Maredza and Choga (2013) investigated the economic determinants of budget deficit for the period 1980 to 2010. They used the VECM to determine the impact of macroeconomic variables on budget deficits in South Africa. They found that unemployment rate, economic growth, government investment, and foreign reserves had a significant positive effect on budget deficits, while, foreign debt had negative impact. The paper did not account for the full impact of debt, as it only focused on foreign debt. Economic theory has shown that government debt is imperative in determining budget balance. The authors also used, the log of GDP as a proxy for economic growth. However, economic growth is yearly change of GDP and as such this variable could provide flawed results. Furthermore, the paper uses the VECM which does not take into account prior information to produce regression

results.However, this study is a pioneer in investigating the determinants of budget deficit in South Africa and Africa at large.

4.3.3 Conclusion

The literature review has shown that very little research has been done on determinants of budget deficit in developing countries, especially sub-Sahara Africa. This research will add to the already existing scanty body of country specific research on budget deficit. The research focuses on South African macroeconomic and politicalfactors that are peculiar to the country. Furthermore, the essay uses yearly data from 1980 to 2017 which provides a considerably large frequency for analysis.

Furthermore, this essay uses a Bayesian Vector Autoregressive (BVAR) model to estimate the relationship between budget deficit and its determinants. The BVAR eliminates the problem of over-parameterisation that is faced with an unrestricted VAR. This is because the BVAR makes use of restrictions based on prior knowledge of the parameters. In addition the BVAR has been shown to produce more accurate results and forecasts in comparison to unrestricted VAR (VECM) as well as improve out-of-sample performance. More so, this study will be the first of its kind to use the BVAR to identify the determinants of budget deficit as no other study has so far used this method.

The review of literature has shown that the factors are; economic growth, government debt, government expenditure, money supply, inflation, government investment and political instability are the major determinants of budget deficit. Some of these variables will be used as determinants of budget deficits in this essay.

4.4 Methodology

This section outlines the methods and estimation technique to answer the research question outlined in section one one. It starts of by presenting the theoretical and empirical model and then goes on to detail the estimation technique.

4.4.1 Theoretical Framework

Government saving can be explained by the tax-smoothing hypothesis espoused Barro (1979). The hypothesis holds that government aims to reduce distortions caused by tax through the allocation of taxes over time. The tax-smoothing hypothesis predicts that deficits and not taxes vary with the level of government expenditure.

The model is based on government's budget equation where the present value of expenditure and initial public debt is equal to the present value of taxes, such that:

$$\sum_{1}^{\infty} \frac{G_t}{(1+r)^t} + \beta_0 = \sum_{1}^{\infty} \frac{\tau_t}{(1+r)^t} \tag{4.1}$$

Where;

G_t =public expenditure net of interest payments on public debt in time period t,

τ_t = real tax revenue obtained in time period t,

r = real (=nominal) interest rate assuming constant prices.

From Equation 4.1, the present value of taxation can determined, since there is exogenous government expenditures and a fixed initial debt level. Barro(1979) explained that the present value in equation 4.1 provides space for the determination of the time pattern of taxes. The model constraints lie with the mechanisms the government uses to finance its expenditure, debt and taxes. It is assumed that government does not use the printing of money as a mode of financing.

The collection of taxes, which are also known as 'excess burden' or 'deadweight losses', carries an associated cost. For the given present value of taxes, the present value of the excess burden is determined by the tax distribution by type and the timing of taxes. The present value of the given tax collection costs is:

$$Z = \sum_{1}^{\infty} \tau_1 f(\frac{\tau_t}{Y_t}/(1+r)^t \tag{4.2}$$

Where:

Z = the total collection cost of taxes, t= 1,2,..., ∞

Y_t =Real income or taxable resources.

In each government has a planned series of expenditure G_1,G_2... which is financed by the anticipated real income values Y_1,Y_2....; real interest rate, and the initial stock of debt β_0

The aim of the government is cost minimization strategy under which costs are optimally selected. The optimization problem is to choose τ_t, t = 1,2,3.... in each time period from Equation 4.2 subject to Equation 4.1. To obtain the first order conditions, the marginal costs for raising taxes are required to be the same in each period. This implies the first testable implication of the hypothesis is that tax follows a random-walk behaviour as changes in tax rates are unpredictable. The government sets the taxation rates to minimize the costs of taxation over time. With the assumption of a balanced budget, minimization of excess burden of taxation will result in a constant tax rate over time. The distortions are evenly spread across time periods hence any changes in tax rates are unpredictable.

Ghosh (1995) extended Baro's (1979) model by focusing on the optimal path of budget surplus. An optimal budget surplus is equal to the present value of the government expenditures which can be compared to the actual budget surplus to access the smooth path of taxes over time. Therefore, the dynamics of taxes are understood indirectly by exploring the relationship between budget deficit or surpluses and the government revenue. Ghosh (1995) develops the notion that tax-smoothing budget surplus or deficit should reflect any changes in the govern-

ment expenditure which are temporary. The optimization problem sets the present value of changes in the government expenditure equal to the budget surplus/deficit. The actual budget surplus (deficit) is given by:

$$SUR_t = \tau_t - g_t - (r - n)d_t \tag{4.3}$$

Where:

τ_t = tax rate in time period t,

g_t = ratio between government expenditure and GDP in time period t,

d_t = debt/GDP ratio in time period t

n = growth of output as a fraction of GDP

r = real interest rate.

And it is compared to the optimal budget surplus/deficit defined as:

$$SUR_t^* = \sum_{j=1}^{\infty} R^j E(\delta g_{t+j} | \Omega_t) \tag{4.4}$$

Where;

$E(\delta g_{t+j}|\Omega_t)$ = expectation of change in the government expenditure as a fraction of GDP conditional on the information set of government in time period t,

$R = \frac{(1+n)}{(1+r)}$

The implication of Equation 4.3 and 4.4 are that budget surplus should lead to subsequent changes in the government expenditure. This depends on the assumption of the future path of government expenditure,in that surplus Granger-cause the change in the government expenditure as long as the government has more information about the in changes expenditure.This

further implies that temporary increases in expenditure are financed by budget deficit or lower surplus, however, an anticipated future increase in expenditures is finance by increase in taxes.

From Equation 4.3 and 4.4, the tax-smoothing predicts that budget surplus or deficit can be determined by tax rate, ratio of government expenditure and GDP, the ratio of debt to GDP, growth of output as fraction of GDP and the real interest rate.

4.4.2 Model Specification

The tax-smoothing hypothesis provided the basis for empirical model of public savings. The model attempts to identify the determinants of budget deficit which is Y_t. The variables identified from theory are economic growth (EC), government debt (DEBT), government expenditure, (GVT), government revenue (RVN), real interest rate (RR)and Money supply (MS) and political instability.

The BVARs estimated can be written in equation form as:

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_\rho Y_{t-\rho} + e_t \tag{4.5}$$

Where,

$$Y_t = \begin{bmatrix} EC_{i,t} \\ GVT_{i,t} \\ RVN_{i,t} \\ DEBT_{i,t} \\ RR_{i,t} \\ MS_{i,t} \\ PS_{i,t} \end{bmatrix}$$

Where:

BD = budget deficit.

EC = real GDP growth.

GVT = government expenditure.

RVN = government revenue.

DEBT= government debt.

RR = real interest rate.

MS = money supply

PS= political instability

4.4.3 Estimation technique

Refer to Chapter 2

4.4.4 Data, sources and description

The time-series data used for analysis was sourced from the South African Reserve Bank (SARB) website and World Bank. This study will make use of yearly data from 1980 to 2017. The data for the variable budget Deficit was sourced from the SARB as 'budget deficit as a percentage of GDP'.

Economic growth data was also sourced from the SARB as GDP at 2010 constant prices. The real GDP growth was calculated by the author using the formula: $(GDP_{current} - GDP_{previous})/GDP_{previous}$. Economic growth is expected to have a negative relationship with budget deficit and have a positive impact on overall fiscal balance (Tujula and Wolwisjk, 2004). This implies that economic expansion will reduce the size of the budget deficit.

Government expenditure was used as a variable obtained from the SARB as national government expenditure as percentage of GDP. Ghosh (1995) hypothesised that there is a positive relationship between budget deficit and government expenditure.

Government revenue downloaded and used national government revenue as percentage of GDP. The higher the revenue, the lower the budget deficit, hence a negative relationship is hypothesised by tax smoothing hypothesis.

Government debt was used as the ratio of national government debt to GDP, obtained from the SARB. Interest payment of debt for a government will reduce the amounts available to invest and address macroeconomic problems. It is expected that increasing total debt servicing increases budget deficit (Diokno, 2006).

The real interest rate was sourced as from the World Bank. It is described as the lending rate adjusted for inflation as measured by the GDP deflator. It is predicted that there is a negative relationship between interest rate and budget deficit. An increase in the real interest rate will reduce private-sector demand for capital thereby reducing the demand for commercial and retail borrowing, thereby decreasing funds for financing deficit hence a negative relationship.

The money supply is shown as the ratio of M2 to GDP downloaded from the SARB. This variable is used as a proxy for financial deepening. It is anticipated that this variable will have a negative relationship with budget deficit. With more money supply consumer, there is more money available for the purchase of goods and services without incurring cost. This will result in increased aggregate expenditure, economic growth and improve the fiscal balance (Diokno, 2006).

Political stability reflects the political status of a country for a given year. The data is sourced from the World Governance Index (WGI) compiled by the World Bank. It is expected that political instability extenuated budget deficit as a result of increased government spending. In periods of high political instability, the government spends more on keeping peace and order, and as such increases the budget deficit (Lavigne, 2006).

4.4.5 Conclusion

Macroeconomic time series data is applied in a BVAR model in order for these determinants to be identified. This section started by first providing the theoretical model for this essay. After which the data source was identified and tests to ensure that this data could be used. The BVAR model is then described as the estimation tool because it is a better tool in comparison to other VAR models and residual diagnostic tests that have also been done. The variable included in the model are economic growth, government expenditure, government revenue,

government debt, real interest rate, money supply and political instability.

4.5 Empirical Results

4.5.1 Introduction

This section empirically investigates the determinants of budget defiicit. Specifically, it answers the question: What are the determinants of budget deficit in South Africa?

4.5.2 Time series data tests

Unit root test

Table 4.1: Result of Unit root test

Variable	ADF		KPSS	
	Level	1st Difference	Level	1st Difference
BD	-2.44 (0.38)	-5.64 (0.0002)	0.095 (0.15)	0.16 (0.15)
EC	-4.14 (0.43)	-7.07 (0.02)	0.14 (0.000)	0.14 (0.62)
GVT	-4.03 (0.02)	-5.6 (0.00)	0.09 (0.000)	0.17 (0.91)
RVN	-1.83 (0.67)	-6.63 (0.000)	0.11 (0.000)	0.15 (0.79)
Debt	-1.82 (0.675)	-3.38 (-0.069)*	-0.08 (0.273)	0.1 (0.033)
RR	-5.27 (0.00)	-8.55 (0.00)	0.16 (0.15)	0.080 (0.91)
MS	-0.57 (0.97)	-3.54 (0.04)	0.2 (0.54)	-0.05 (0.000)
PS (0.73)	-1.03 (0.001)	-4.50 (0.00)	-0.92 (0.22)	0.05

Note:critical values are in parenthesis at 5percent. The appropriate lag was selected using the Akaike Information Criteria (AIC) for ADF test and Schwert criterion and the Bartlett kernel method

Table 4.1 shows the results of the Augmented Dickey-Fuller (ADF) and KPSS tests. The Null hypothesis for ADF is that the series contains a unit root, while the alternative hypothesis is that the series is stationary. For the KPSS, the null hypothesis is that the series is stationary. Rejection of the null hypothesis implies that the series is nonstationary. The table indicates that all the variables are intergrated of order one according to the ADF test. However the

KPSS shows that that three variable (GVT, RVN and RR) are stationary at level. Since most of the variables of the same order are integrated the analysis can be undertaken.

Structural breaks

The results of the multiple break show that the model consists of four structural breaks in the years 1987, 1994, 2003 and 2009.These dates coincide with significant dates in the history of South Africa's political economy. For example, the year 2009 is not only marked as the post 2008 financial crisis, it is also associated with the national election of President Jacob Zuma. During an election year government spends a lot on campaigns as well as on the election through the printing of ballots, payment of election officers and the running of the elections generally. This has an effective shock on the budget balance, increasing budget deficit due to the increase in expenditure.

Furthermore, the year 2003 is marked by the approval of a major programme to treat and tackle HIV/AIDs. The programme was to include the distribution of the costly anti-AIDS medicine and the roll out of drug-distribution centers as well as preventive programmes. This added pressure on the budget because it is was a costly programme hence the shock. The first anti racial election was in 1994 seeing the end of the unfair apartheid laws, and the introduction of the Black Economic Empowerment programme (BEE). Lastly the 1987 break point is as a result of the economic sanctions, riots and political instability that fought the apartheid regime.

Even though the model indicated four structural points, this essay has only accounted for two structural breaks using dummy variables for 2009 and 1994. This was done to safeguard the degrees of freedom since the model is using yearly data. Moreover these two years are the most significant as they show significant change in the political elections as the post financial crisis year, and regime change respectively.

4.5.3 Empirical results

Results are reported using the Impulse Response Function and Variance Decomposition.

Table 4.2: Multiple breakpoint test

Break test	F-statistic	Scaled F-statitstic	Critical Value**
0 vs 1*	1.11	30.32	13.98
1 vs 2*	7.65	22.96	15.72
2 vs 3*	8.86	26.59	16.83
3 vs 4*	7.28	21.85	27.61
4 vs 5	0.00	0.00	18.14

Break dates

Break dates	Sequential	Repartition	
1	2009	1987	
2	1994	1994	
3	1987	2003	
4	2003	2009	

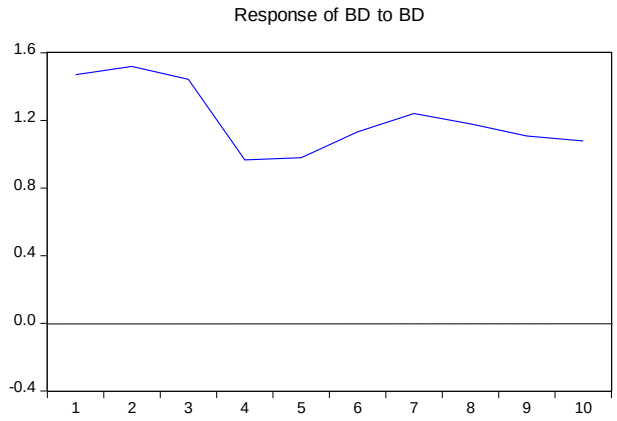
* Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Impulse Response Function

BVAR models can be interpreted with Impulse Response Functions (IRFs). The focus is on determining whether a variable has a relationship with budget deficit and is it positive or negative. The standard 10 periods, which are a little over two years, are taken. In the interpretation of the IRFs, the procedure of reporting responses, using the Cholesky impulse response measure was taken.

Response of BD to BD The results of show that previous amounts of budget deficits have a positive impact on the current levels. This implies, that higher the previous deficit. After nearly three years the response to one standard deviation shock to budget deficit will result in a decrease of in budget deficit. The shock response stays low from the fourth year to the sixth year, before sharply rising in the seventh year.

Response of Budget Deficit to Economic growth: Results from the IRF below shows a generally positive response of budget deficit to a one standard deviation shock in economic growth. It implies a positive relationship between economic growth and budget deficit in South Africa. Just like budget deficit, the response of budget deficit to economic growth is positive and rising in the first three years. After the third year to nearly the sixth year the effect is falling albeit positive before it gradually increases after the sixth year. However, these results



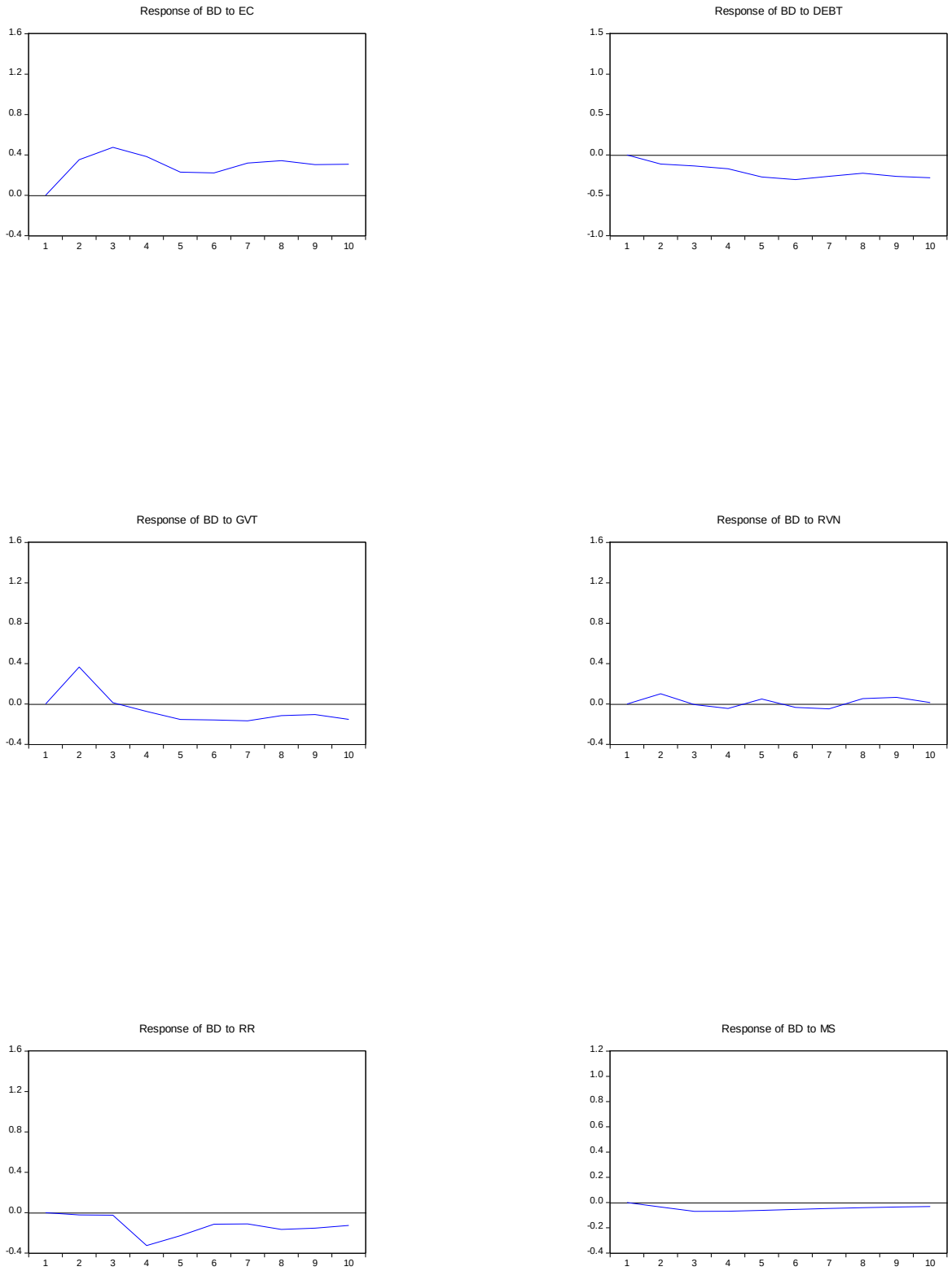
Source: Author's estimations

are not following the apriori expectation in subsection 4.4. However, Murwirapachena, Maredza and Choga (2013) found a similar result for South Africa while Dikono (2006) found economic growth to be statistically insignificant in determining the budget deficit. The positive relationship is hypothesised to be as a result of the repayment of debt and increase expenditure. When there is economic expansion, the government tends to spend more.

Response of Budget Deficit to DEBT: The response of budget deficit to govergnement debt is negative, implying that higher government debt decreases the budget deficit. Intuitively borrowing acts as an additional source of income that does not depend on the revenue collected in the country. It also shows that in the long run debt does not converge to equilibrium. However, the repayment of debt, increases expenditure and might not have the same effect budget deficit. Kalim and Hassan (2013) also found a negative relationship between fiscal deficit and real GDP.

Response of Budget Deficit to Governemt expenditure: The response of budget deficit to one standard deviation shock to government expenditure starts off by being positive until the third year after which expenditure has a negative impact on budget deficit. In the short run, an increase government expenditure will increase budget deficit in accordance with the theoretical expectation. In the long run, the economic benefit of increased government expenditure such as increased consumption, imply a reduction in budget deficit.

Figure 4.5: Impulse-response functions



Source: Author's estimations

Response of Budget Deficit to government revenue: Budget deficit response to government revenue fluctuates around the equilibrium line. In the first year after an increase in revenue, budget deficit responds by a slight increase of nearly 0.1 standard deviation. In the second year, however, a fall in deficit is experienced into a negative.This implies that the deficit is reduced to the increase revenue.The government revenue will converge in the long run, since it i nearly equal to zero in the tenth year. The small response, could be attributed to that method of measurement as government revenue constitute all the revenue to government and not only tax revenue.

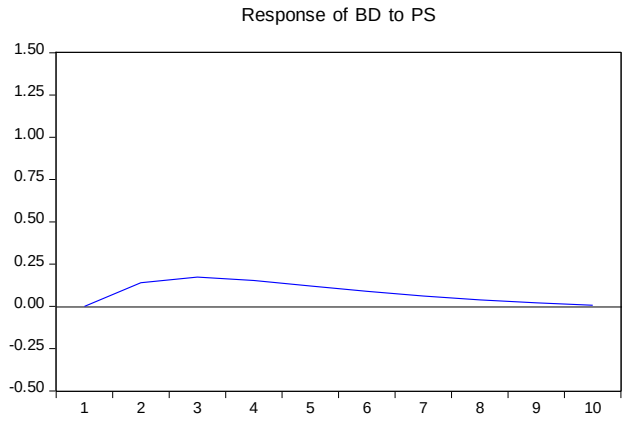
Response of Budget Deficit to Real interest rate: The response of budget deficit to the real interest rate is negative. This implies that the higher the increase rate the lower the budget deficit in accordance to the theoretical expectations. The response of deficit to a shock in the real interest rate, starts reall small and takes a plunge in the third year. This shows that, the real interest may seem to not affect budget deficit in the short run. However in the long run there is a negative effect showing that interest rate can reduce deficit after three years. Diokno(2006) found interest rate to be insignificant.

Response of Budget Deficit to Money Supply: The response of to money supply is negative however, the shock is relatively small. Furthermore, money supply will converge to equilibrium in the long run.

Response of Budget Deficit to Political Stability: The response of budget deficit to political instability is generally positive. This implies that more politically unstable a country is the higher the accumulation of budget deficit. This can be attributed to the fact that the government spends a lot of money to keep the peace. More so the impact of political stability felt most in the first three years, before it declines to equilibrium in the long run.

Variance Decomposition

The forecast of variance decomposition of the seven endogenous variables is shwon in Table 4.3. Variance decomposition shows how much of a change in a variable is due to its own shock and how much of it is due to shocks to other variables. It also indicates the percentage of the



Source: Author's estimations

fluctuation in a time series attributable to other variables at the 10 quarters time horizons. It further indicates the amount of information each variable contributes to the other variables in the BVAR model.

Table 4.3: Variance of decomposition of budget deficit

Period	S.E.	BD	EC	GVT	RVN	DEBT	RR	MS	PS	03DUM	09DUM
1	1.21	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
2	1.29	94.1	2.97	0.09	0.01	0.02	0.001	0.0003	1.17	0.82	0.87
3	1.32	91.4	5.08	0.50	0.01	0.04	0.018	0.03	2.80	0.05	0.01
4	1.34	88.9	6.04	0.78	0.006	0.11	0.018	0.07	4.01	0.02	0.04
5	1.35	87.4	6.48	0.94	0.008	0.21	0.02	0.11	4.72	0.45	0.06
6	1.36	86.67	6.65	1.04	0.01	0.32	0.023	0.16	5.10	0.05	0.16
7	1.37	86.27	6.69	1.09	0.01	0.41	0.026	0.20	5.27	0.43	0.001
8	1.37	86.09	6.68	1.12	0.01	0.47	0.029	0.25	5.32	0.05	0.06
9	1.38	86.01	6.66	1.13	0.01	0.51	0.03	0.29	5.33	0.05	0.46
10	1.38	85.97	6.65	1.14	0.01	0.53	0.03	0.33	5.32	0.365	0.007

Source: Author's estimations

The column of S.E represents the forecast error of the variable for each forecast period. The forecast error stems from the variation in the current and future values of the shocks to each variable in the system. The table shows that own shocks variation are between 85 and 100 percent over the ten year period of forecast. The lowest contribution of budget deficit was recorded after 10years at 85.97 percent. At period 1 BD is 100 percent because the only source of the one period ahead variation is its own shock.

In addition, the results reveal that after budget deficit itself, economic growth is the most significant of the group for the error variance. economic growth was highest in the seventh year

at 6.69 percent in explaining the variance in budget deficit.This shows that economic growth explains budget deficit more in the short run in accordance with the results from the IRF. Another significant contribution is from political stability, which increased from a low of 1.17 per cent in the first year to a highest of 5.33 percent in the ninth year. The contribution of government expenditure increased from a low of 0.09 percent in the second year to a high of 1.14 percent after 10 years. The impact of government expenditure increases with the passing of time implying that, government expenditure impacts budget deficit in the long run. The impact of government revenue is very small and increasing throughout the period 10 in accordance with the IRF results. Lastly, the impact of money supply is also very small, below 1 percent throughout the period, showing that money supply has a low impact in determining budget deficit. The real interst rate impact also lies below one for the all the 10 years.

In summary, the variance decomposition analysis shows that "own shocks" constitute the predominant source of variations in budget deficit in South Africa. The analysis further suggest that the budget deficit can be explained by the disturbances in the macroeconomic and political variables used in this study. Furthermore, the results show that the determinant variable have an impact on budget deficit in the long run. Finally all the variables can be regarded as endogenous to the system,since, Sbeiti and Hadadd (2011) explained that if the shocks do not explain any of the forecast error variance of one macroeconomic variable in all forecast horizons, then this variable is exogenous. At the same time if it happens that shocks can explain all the forecast error variance of the variable at all forecast horizons, this variable is an entirely endogenous variable.

4.5.4 Residual Diagnostics test

The diagnostic tests show the absence of autocorrelation at four lags, while there is no evidence of heteroscedasticity using the white test (no cross term). The Jarque-Bera test suggests that there is a normal distribution. This indicates that the model is fairly well behaved and that all shocks eventually stabilize in the long run.

Table 4.4: Diagonistic Tests

Test	Null Hypothesis	P-value	Conclusion
Lagrange Multiplier (LM)	No serial correlation	0.864	Fail to reject H0
Jarque-Bera (JB)	There is normal distribution	0.473	Fail to reject H0
White test	There is no conditional heteroscedasticity	0.67	Fail to reject H0

Source: Author's estimations

The CUSUM of residual in Appendix B indicates that the model is stable as the test line falls with the bounds of the critical values. The more strict CUSUM of squares also shows there is stability in the model as the test line fall within the bounds of the critical line for the period under consideration. In addition, the AR root graph also indicates that the BVAR model is stable. Since all roots have modulus less than one and lie inside the unit circle.

4.6 Conclusion

This study set out to identify the determinants of budget deficit in South Africa. This analysis was estimated using the BVAR model and result were interpreted using impulse response functions and the variance decomposition.

This essays adds to scanty body of research on the economic and political determinants of budget deficit in South Africa. The literature review section showed there is very little research on budget deficit, not only in South Africa but in developing countries as well. This essay added to the existing literature in South Africa by including theoretically predicted variables such as government expenditure, revenue and the interest rate as well as the inclusion of the political stability variable. These variables were predicted to be fundamental determinants of budget deficit by the tax smoothing hypothesis, however, most of the research did not account for them. In addition, this essay also adds value by accounting for structural breaks identified in South Africa. These structural breaks affect trends in economic activities. Thus accounting for them, provide more robust results.

Furthermore, this essay, used a more superior estimation technique of the BVAR, which uses prior information to provide empirical results. The BVAR eliminates the problem of over-parameterisation that is faced with an unrestricted VAR. This is because BVAR makes use of restrictions based on prior knowledge of the parameters. In addition BVAR have been shown to produce more accurate results and forecasts in comparison to unrestricted VAR as well as improve out-of-sample performance. More so, this study is the first of its kind to use the BVAR to identify the determinants of budget deficit, as no other study has so far used this method.

The results have shown that there is a negative response between budget deficit and government debt, real interest rate, and government expenditure after 3 years. These results are echoed in the literature by Murwirapachena et el. (2013), Kalim and Hassan (2013), Anwar and Ahmad (2012). In addition, economic growth and political instability were found to have a positive impact budget deficit, Murwirapachena, et el. (2013) found similar results for South Africa, albeit, a difference in measurement of economic growth. Kalim and Hassan (2013)

and found economic growth to insignificant. Furthermore, the analysis revealed that there is a fluctuating relationship between fiscal deficit and government revenue. Money supply has a negative influence on deficit in South Africa albeit very small.

From the above finding, government should promote economic growth, in a bid to broaden the tax base and increase revenue. With higher economic growth more people will have income, hence an increase in VAT revenue, and more people will be employed. There will also be more fund for the repayment of debt hence a narrowing the budget deficit. Secondly the government should cut on government spending, for example cut down unnecessary spending within different department. The benefits of reduced government spending will extend to low interest rate and encourage private sector investment. Lastly, the government should implement better policies to control violence, and riots.

Chapter 5

SAVING-INVESTMENT NEXUS IN SOUTH AFRICA

5.1 Introduction

5.1.1 Background and Problem Statement

Domestic saving (saving) and domestic investment (investment) are as essential factors in fostering economic growth and achieving macroeconomic goals of an economy such as maintaining price stability and promoting employment opportunities. Understanding the saving-investment relationship will provide important insights into the process of economic growth. The view is that economic growth critically depends on capital accumulation and capital accumulation which depends on saving from domestic and foreign sources as well as borrowing. Thus, higher saving rates will lead to higher economic growth through increased capital formation. Economic theory has long espoused the significant impact of the link between saving and investment on economic growth.

However, there is no consensus on the direction of causality between saving and investment. On the one hand, the classical economic view posits that an increase in saving leads to higher investment and hence higher economic growth. For example, the Solow (1956) model states

that an economy that allocates a large fraction of its income to saving and investment will have a higher steady-state capital stock and a higher level of income. On the other hand, the Keynesian economic view holds that it is in fact investment that leads to higher saving. The Keynes (1936) model explained that as investment increases, income increases which in turn increases savings.

The relationship between savings and investment is thus important to analyse for an economy such as South Africa because of its significant impact on economic growth. Over the past five years, South Africa has experienced a declining economic growth rate. According to the World Bank (2015), South Africa's economic growth rate has lagged behind other emerging countries (Brazil, Russia, India and China) with an average growth rate of less than three percent between 2012 and 2015. Moreover, to position South Africa on a higher GDP growth trajectory, it will be imperative to ensure there are significantly higher levels of fixed investment. Fixed investment is required to improve a country's overall standard of living.

In spite of the benefits of savings, the South African savings rate has drastically declined since the 1980s and 1990s. Savings as a percentage of GDP has generally declined between 1980 and 2016. The World Bank (2017) reported that savings as a percentage of GDP peaked in 2007 at 26.7 percentage before declining due to the global financial crisis. The lowest recorded proportion was in 2009 at 23.9 percent of GDP. Between 2011 and 2016, savings as a percentage of GDP ranged between 25.2 percent and 24.7 percent of GDP, (World Bank report, 2017).

On the other hand, investment as a percent of GDP has also shown a declining trend over the period under investigation. The lowest investment percentage of GDP was recorded in 1993 at 15 percent, (World Bank, 2017). In the last five years, the rate hovered around 23 percent of GDP. In terms of the annual growth rate of investment, the World Bank (2017) records also show declining trends, in that the lowest growth rate of investment was recorded in 2009 at -9 percent. After the global financial crisis, investment growth gradually increased to 3.3 percent in 2010. In the last five years, growth in investment fell from 4.7 percent in 2011 to 1.8 percent in 2016.

Both savings and investments have followed similar declining trends between 1980 and 2016.

In line with the savings and investment rate, economic growth has also declined. A decline in economic growth had lead to an increase in the unemployment rate, lower levels of industrial production and a decrease in sales (Statistic South Africa, 2018). The increase in the unemployment rate has had a negative trickle down effect reflected in the increasing crime rate and dependency on the government social grants. Stimulating the economy is thus, an important agenda for the South African government. One way to boost the economy is to understand the saving-investment correlation. For example, if causality runs from investment to saving, saving-promoting policies are likely to be unsuccessful and may involve economic inefficiencies. Policy emphasis should focus on removing the impediments to investment.

Therefore, the significance of the saving-investment correlation to economic growth has motivated the research questions for this essay: (1) What is the relationship between domestic savings and domestic investment in South Africa; (2) What is the direction causality between saving and investment in South Africa?

5.1.2 Objectives

The specific objectives of this essay are:

• To provide stylized facts of domestic saving and domestic investment.

• To investigate the relationship between domestic saving and domestic investment for South Africa.

• To identify the direction of causality between domestic saving and domestic investment.

5.1.3 Relevance of the study

It is important to carry out country-specific research in investigating the saving-investment relationship. This is because of the flawed assumption of homogeneity in countries combined in cross country research. Although the countries included in the research may be in the same income brackets, they still possess heterogeneous institutional, economic and political structure. For example, the exchange rate regime, whether fixed or floating, has a significant impact on

capital mobility and hence the saving-investment relationship. This research will contribute to the growing body of country-specific research.

Also, Gil-Alana, André, Gupta, Chang, and Ranjbar (2016) only investigated the Felstein-Horiaka puzzle for South Africa whereas Hungwe and Odhiambo (2019) and provided the trends in saving-investment using descriptive statictistics. This study adds to this body of research in two ways; firstly, the study analyses the saving-investment relationship by controlling for exogenous variables and secondly, the study investigates direction of causality between saving, investment and economic growth. The relationship will enlighten policymakers to identity the point of departure. For example if causality runs from savings to investment, then it will be more effective to implement saving boosting policies to impact investment. However, if causality runs from investment to saving, then policies will be aimed at boosting investment first.

Hungwe and Odhiambo (2019) show that South Africa is heavily dependent on foreign savings, in spite of its well developed financial sector. The reliance on foreign saving makes the South African economy susceptible to international capital shifts and exchange rate fluctuations. Thus the understanding of the saving-investment nexus will encourage the promotion of domestic saving to fuel domestic investments.

Besides, the saving-investment nexus has direct implications for economic growth and raising the level of output in the country. Raising the country's' output is in line with South Africa's National Development Plan, launched in 2012, which is a detailed blueprint for how the country can eliminate poverty and reduce inequality by the year 2030. According to the National Development Plan (NDP), the South African economy needs to grow by 5.4 percent or more to create enough jobs to redress inequality and resolve the country's stubbornly high unemployment rate. To reach and sustain this target, South Africa needs to fund investment that amounts to at least 25 percent of GDP. Investment is, therefore, the best fuel for inclusive, sustainable economic growth, and saving is among the major sources of investment spending. There is, therefore, justification and policy relevance in the study of saving-investment in South Africa owing to its importance in promoting economic growth.

5.1.4 Structure of the study

This study is structured as follows; section 5.2 will provide trends in domestic saving and investment in South Africa, while section 5.3 with summarize previous literature. section 5.4 will discuss the methodology while section 5.5 will present the empirical findings. section 5.6 concludes.

5.2 Overview of domestic saving and domestic investment in South Africa

This section briefly describes the trends of saving and investment between 1980 and 2016. It begins with a brief introduction, in which, saving and investment are defined and then the trends are presented.

5.2.1 Introduction

In the national accounts, investment, also known as fixed capital formation, is defined as acquisition less the disposal of asserts intended for the production of other goods for a long term period (OECD, 2009). Thereby, investment is an asset procured today with the expectation that it will generate income in the form of interest rate and dividends in the future. Investment can be divided into fixed and financial investment. Myles (2003) posits that fixed investment is the acquisition of capital such as machinery, which could be used in the production of other goods. Whereas financial investment is the purchase of securities such stocks and bonds. Gross domestic investment is the summation of public investment (investment by general government) and private investment (investment by corporate and household).

Strydom (2007) defined savings as the income that is not consumed in a particular time period and that isstored away for future consumption. According to Moore (2006), most savings are non-volitional in modern economies, and take the form of a passive accumulation of higher equity values, bank deposits, as well as other liquid financial assets in wealth portfolios. However, Prinsloo (2000) states that gains and losses in capital as well as profits and losses made from revaluing financial or fixed assets are excluded from saving in the national accounts.

5.2.2 Government policy on saving

The effectiveness of monetary policy and fiscal policy is key to encouraging or discouraging a savings culture (Chiroro, 2010). However, the impact of monetary and fiscal policy on savings is unpredictable. Chiroro (2010) advocated for the implementation and re-enforcement of gov-

ernment policy that could do more to encourage financial savings, such as compulsory saving policies as well as tax incentives.

Compulsory savings are savings that individuals and households are compelled to make in the form of pension and provident funds, as per the government rules. This mandatory saving, set out by government, would be successful in increasing household saving. For example, the establishment of a compulsory social security and retirement savings scheme for all citizens would greatly enhance the accumulation of savings in the country. A Sanlam Benchmark Retirement Survey found that most of the active retirement fund members interviewed indicated that they preferred to be forced to save. A significant 73 percent would not opt out of compulsory contributions if given the choice whilst an overwhelming 87 percent would not reduce contributions if they had the option.

The contractual saving (compulsory saving) industry is well-developed in South Africa. The assets of insurance companies alone amounted to well over 80 per cent of annual gross domestic product between 1995 and 1999. If pension funds are included, the ratio of these institutions' total assets to gross domestic product rose substantially and compare favourably with similar ratios in advanced economies (Chiroro, 2010). The well-developed pension system comprises old-age pension and occupational pension schemes. In addition, South Africa has one of the highest levels of insurance premium payments relative to gross domestic product in the world.

The South African first introduced the retirement reforms in 1957 in an effort to increase financial security for all its citizens. The retirement reforms are an ongoing gradual process of improvement and updates in accordance to the development in the financial sector and needs of the citizens, (National Treasury, 2012).

The retirement reforms were presented through five papers with five broad themes ranging from taxes, fees, annuity comparisons, and retirement capital preservation. Some of the themes proposed by National treasury were publicly debated and implement as policy over the years. Since the retirement reforms a perpetual process, changes are still being made. To provide a lot more accurate information, the study will discuss the retirement reforms up to 2017.

The first paper presented by the National Treasury was *Enabling a Better Income in Retirement.* This paper present focused on annuities in South Africa and identified two types of annuities as; living annuities and conventional annuities (National Treasury, 2012a). Three regulatory changes were suggested.Firstly, government was mandated to increase competition among living annuity providers in a bid to reduce fees and the level of financial advice required by retirees. Secondly, it was suggested for the increase of 'automation'. The notion was to create default retirement products, online or otherwise, where retirees with certain balances will be required to enroll. This was envisaged to ease the transition from re-retirement to post retirement. Thirdly, it is was suggested for the increased longevity of protection.

The governance aspect was implement in 2014 where the duties of the trusties have charified to the extent that it is clear what is expected of them. Sanlam Intelligence (2014) explained that legislation has also been introduced which now makes the non-payment of retirement fund contributions by employers a criminal offense. Officers and directors could be fined uo to 10 million or face upto 10 years imprisonment.

The second paper tabled issues around *Preservation, Portability and Governance for Retirement Funds* which aimed at increasing preservation of retirement assets. The legislative proposals were firstly that all pension funds be required to offer preservation of retirement capital as the default option when a fund member changes employers. The second proposal was that all provident funds be aligned with pension and retirement annuities in the form of mandatory amnuitisation. This will reduce the number of people that collect their savings from provident and spend it without realizing the long-term implications. Lastly the paper suggested that trustees should be have financial sector training to ensure that they are in the right position.

Government in a bid to address the low preservation rate, applies a significant tax penalty on employees who withdraw their retirement savings in excess of certain thresholds before actual retirement. From the 1 March, 2016, all retirement funds have be treated the same and *de minimus* was increased from $R75000$ to $R150000$. This implies that if an individual's accumulated retirement capital is less than R150 000, the mandatory annuitisation rule would not apply (National Treasury, 2014b)

The third paper entitled *Incentivising non-retirement savings* aimed at increasing saving in middle to low income households, (National Treasury, 2012c). The aim was to grow the domestic saving rate of South Africa out of the negative ranges and to raise financial security among low to middle income household. This proposal was welcomed by other stakeholders and with minimal amendments it was implemented in 2015. This paper proposed the tax-free saving accounts that would enable citizens to invest in a certain fund and benefit tax free withdrawals and growth, (National Treasury, 2012c).

National Treasury (2012) introduced the Retail Savings Bonds in the 2003 Budget, in a bid to provide a simple and affordable means of saving. In this scheme the tax-free interest income threshold was introduced to provide incentives for non-retirement saving as discussed above. An example of this incentive is the tax-free saving accounts provided by banks, for saving purposes up to a limit of thirty thousand rand. Another example of saving incentive was the Fundisa which was aimed at saving for higher education through a money-market unit trust. However, the existing interest income exemption is not an effective instrument for encouraging savings amongst low to moderate-income taxpayers

National Treasury (2012) also presented the new and proposed incentives to increase savings; namely, interest bearing accounts (Savings account; low denomination top-up retail bonds, money market funds) and equity accounts (Equity, Property assets). Both incentives will be capped at thirty thousand per annum and five hundred thousand for life, with tax free earnings and withdrawals.

The fourth paper presented by National Treasury (2012d) was *Improving Tax Incentives for Retirement Savings* with the aim of simplifying the retirement tax structure. The paper suggested the harmonization of the tax treatment of all retirement funds (pension, provident and retirement annuity) and also to treat all employer contributions to retirement funds as fringe benefits.This implies that all employer contributions made on behalf of the employee are taxable in the hands of the employee. In addition the paper proposed the tax deductions for contribution to a retirement fund should be set according to age. Those who are 45 years and younger should be allowed a maximum of 22.5 percent while those older than 45 years old will

get a maximum cap of 27 percent (National Treasury, 2012d:13). This proposal was welcomed by stakeholders and implemented as policy on the 1 March 2016.

The fifth and final paper entitled *Charges in South African Retirement Funds* focused on reducing the charges of retirement funds that are levied during the accumulation phase of individuals' working career. After an international comparison of retirement fund fees, the National Treasury concluded that South African retirement fund charges were significantly higher.

Trends on contractual and discretionary saving

Estimates of contractual saving were obtained from the South African reserve Bank (SARB) website, under the balance sheet of pensions and long-term insurance by households. The data showed a substantial increase in contractual saving from just over 5 percent of gross household saving in 1995 to a high of 27 per cent in 2005 before declining to 7 per cent of gross household saving, (SARB, 2016).

The table below shows the average growth rate of contractual and discretionary saving by period. It can be seen that in the apartheid era, the growth of contractual saving and discretionary saving were relatively similar at 24 percent and 23.3 percent respectively. However, the immediate post apartheid era before the global financial crisis saw a steep decline to the average growth of discretionary saving to $-$ 34.38 percent. The average growth rate of contractual saving also decreased to 12.1 percent. Post the financial crisis and the recovery period, there was a positive improvement in discretionary saving growth rates to around 3 percent whereas contractual savings only grew by 8.7 percent. The overall average growth rate showed that contractual saving, on average grew by 15 percent while discretionary saving average growth was recorded as -4.6 percent. This implies that between 1980 and 2016 there was no significant growth in discretionary saving rate.

The dissaving by households with discretionary saving institutions is the result not only of decisions which individuals take about saving, but also of the investment decisions that these institutions make (Manyama, 2007). Banks, for instance, have extended increasing amounts in loans to households to finance housing and consumer spending to such an extent that the banks'

Table 5.1: Average growth rate of contractual saving and discretionary saving

Period	contractual saving	discretionary saving
1980 - 1993	24	23.3
1994 - 2007	12.1	−34.4
2008 - 2016	8.7	2.97
1980-2016	15.6	−4.6

*Source: Own calculation using SARB Data, Note: Table is presented in percentages

net lending to households exceeds the increase in households' deposits at banks. To fund these lending operations, banks are relying on funds obtained in the wholesale market. Contractual saving institutions invest mostly in marketable government and private-sector securities and directly allocate only limited funds to private households and individuals.

5.2.3 Government policy on investment

Investment is a crucial element in maintaining sustainable economic growth. Most developing countries have implemented a domestic system to protect investment. This investment protection is done in line with contemporary concepts of the rule of law protection of property right, compensation of expropriation and national treatment of foreigners. South Africa has not been an exception to this investment protection..

The investment policy in South Africa was first adopted in November of 2013 and it was called 'Promotion and Protection of Investment Bill'. This bill saw the termination of bilateral investment treaties (BITs) between South Africa and other countries such as Belgium-Luxembourg, Germany, Switzerland, the Netherlands, Spain, the UK, France, Denmark, Austria, Greece, Italy, Finland and Sweden. However, the bill proved controversial with the case of *Piero Foresti, Laura de Carli and Others vs The Republic of South Africa ICSID case no ARB(AF)/07/1.* The complaint hinged on the South African policy of Black Economic Empowerment (BEE) as foreign investors challenged the South African government in an international arbitration. The termination of the BITs and the backlash that followed led to a revised Bill being introduced on 22 July 2015.

The new policy aims to promote and strengthen South Africa's investment regime by imple-

menting a series of policy measures. The policy maintains and ensures open foreign investment. This implies that all sectors are open to investment and there is no requirement for government approvals. Secondly the government remains committed to investment protection, which will provide adequate security and protection to all investors.The third policy is to preserve the sovereign right to regulate in the public interest. The laws and policies in South Africa are subject to rigorous public consultation, including an expansive public comment period and consultation within the National Economic Development and Labour Council and government before the law is endorsed by the Cabinet. Lastly, the department of trade and industry is committed to implementing investment for sustainable and economic growth.

To implement the investment policy framework, the government introduced an intra-governmental process to explore the establishment of the a national investment act. Secondly South Africa will only enter into BITs on the basis of compelling economic reasons, and the government is in the processes of developing a BIT negotiating template to reduce unpredictable, inconsistent and arbitrary interpretations. The government also established an inter-ministerial committee on investment to oversee the implementation measure of the investment policy.

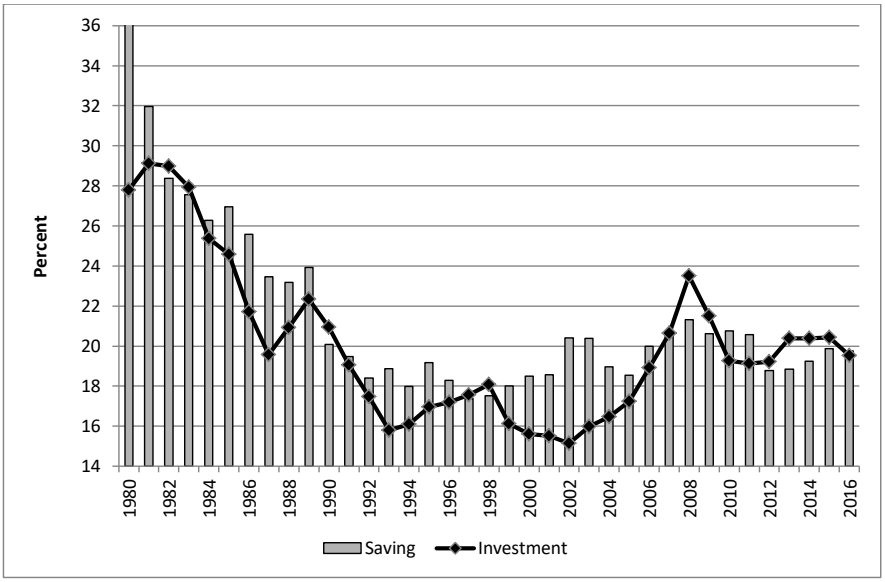
5.2.4 Trends in domestic saving and domestic investment

Saving, Investment and GDP

A downward trend can be observed in both saving and investment throughout the period under observation. Saving as a percentage of GDP declined from a high, of more than 25 percent in the early 1980s, to a low of below 22 percent since the late 1990s and the 2000s. In the last 10 years of the period, it can be seen that saving gradual increased, peaking in 2008 at 21.3 percent of GDP after which it fell drastically due to the global financial crisis of 2008. Beyond 2012 saving has contributed less than 20 percent of GDP.

The investment as a percentage of GDP trend followed a similar trend, experiencing higher investment in the early 1980s, in line with the highest rate of savings. Since the 1980s, the investment rate continued falling before rising for a short period between 2003 and 2008. This gradual growth is attributed to the more stable political period, under President Mbeki's reign,

Figure 5.1: Ratio of saving and investment to GDP in South Africa

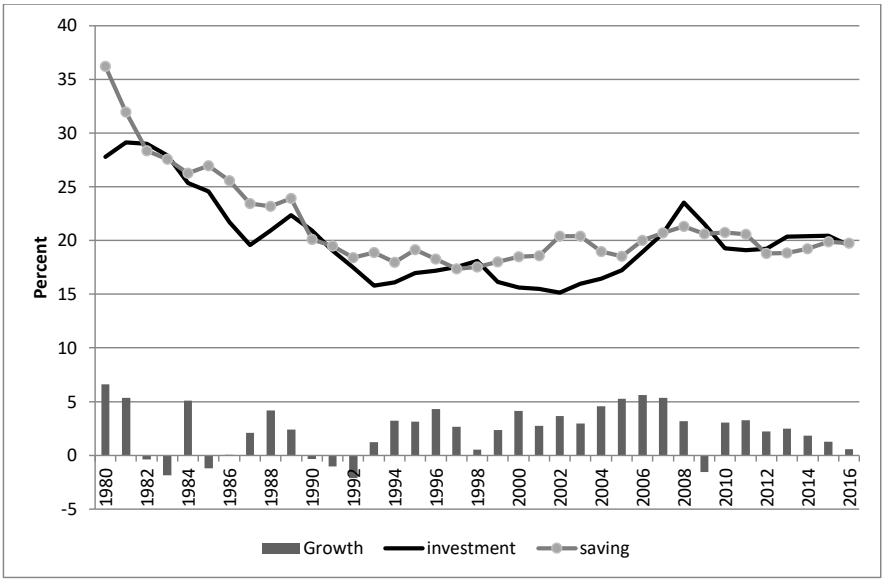


Source: World Bank database

the insurgence of the xenophobic attacks on the public and a considerably stronger exchange rate in favour of the rand. It is interesting to note that between 2006 and 2008 saving was also gradually increasing. After the global financial crisis of 2008 hit the financial market, investment fell drastically to 19.2 percent from a high of 23.5 percent in 2008. This coincided with the withdrawal of external sources of finance due to crisis. Politically, this also coincided with the resignation of President Mbeki and the subsequent election of President Zuma: the unstable political atmosphere was a disincentive to investors. This shows a trend in which investment increases and falls with savings and generally the saving and investment rate follow the same downward trend.

In addition, when the saving and investment trends are compared to economic growth, it could have been that the higher rate of investment and saving coincided with higher economic growth. For example, the period between 2003 and 2008, with a steady increase in investment, is reflect in positive and increasing economic growth peaking at 5.6 percent in 2007. Also 2009 recorded negative economic growth over the last 10 years, which could be attributed to the drastic fall in investment as a result of the global financial crisis and the change in political administration. Since 2013, economic growth has continued to fall from 2.4 percent to 0.5 percent in 2016. Investment and saving levels have also fallen.

Figure 5.2: Ratio of saving and investment to GDP, and Economic growth in South Africa



Source: World Bank database

Saving, Investment and Current Account

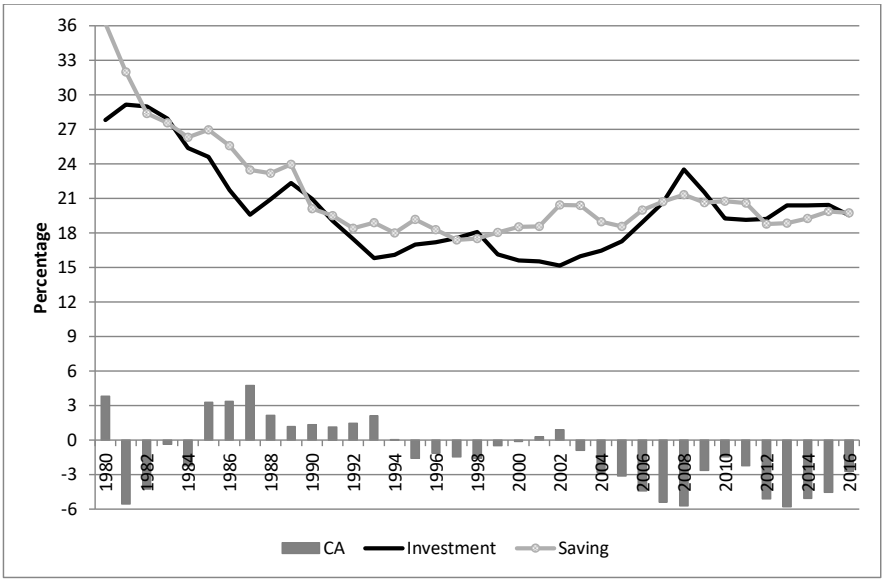
The relationship between saving, investment and the current account balance as a percentage of GDP is shown in Figure 5.3 below. Since 1994 when South Africa became a liberalized economy, a current account deficit has been recorded for most years. This reliance on foreign saving, particularly in the form of capital inflows, has been found to make the country vulnerable, since foreign investors could easily withdraw their funds from the country (World Bank, 2011).

Since 1994, the current account balance has been negative (current account deficit) each year except for the years 2001 and 2002 when a current account surplus was recorded (South African Reserve Bank, 2017). The continuous deficit implies that the country has experience more imports than exports since the early 2000s. This would reflect that investment in South Africa has been financed by capitals inflows which cannot be relied on for an extended period of time.

Investment,FDI to GDP

Figure 5.4 below shows the proportion of FDI to GDP. It can be seen that FDI figures have been fluctuating over the period under consideration. This ascertains the theory that capital flows are volatile and hence are not reliable in fuelling economic growth. Generally FDI have shown an increasing trend from the 1990s. In 1985 South Africa was under sanctions due to

Figure 5.3: Ratio of saving, investment and CA to GDP in South Africa

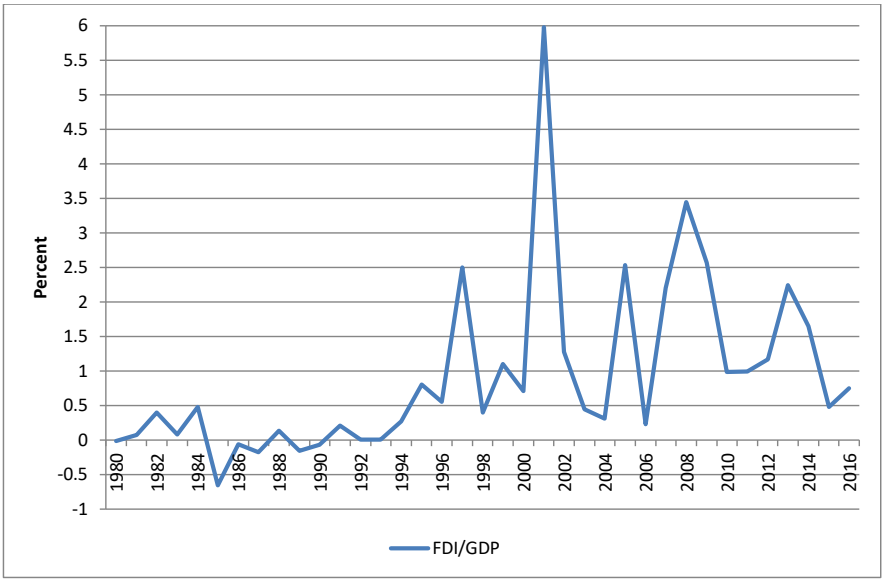


Source: World Bank database

the apartheid regime and did not engage in international trade. At the advent of democracy, in 1994 a gradual increase can be seen in the FDI as a result of democracy and hence openness to the rest of the world. In 1997, there was an increase in FDI up to 2.5 percent of GDP, resulting from the privatisation of Telkom and South African airlines. Furthermore, in 2001, there was a further sharp increase and the FDI reached its peak of 6 percent of GDP which can be attributed to the purchase of De Beer by Anglo American. It is estimated that the total amount of FDI inflows, including accounting transactions associated with the change in ownership of the De Beers mining company, was 3.5 billion.

However, in 2002, FDI decreased to only 1.3 percent, and continued to fall to 0.3 percent in 2004. In 2005, South Africa received a large amount of FDI when Barclays made an acquisition deal with Absa bank. In 2006, the FDI declined drastically to a low of 0.2 percent, but made a recovery in 2007 to reach 2.2 percent of GDP. There was a steady increase until 2008 and 2009. In 2010, the inflows decreased to 0.9 percent, as the world was experiencing a contraction in demand due to the 2008 financial crisis, even though there was an increase in the tourism industry's FDI inflows as a result of the 2010 World Cup, hosted by South Africa.

Figure 5.4: Ratio of FDI to GDP



Source: World Bank database

In 2012, the country faced one of the biggest situations of labour unrest in its history from the mining industry, and as a result, FDI inflows slumped. During this period, South Africa saw disinvestment by major foreign companies, such as the UK pharmaceutical company Glaxo-SmithKline selling 50 per cent of their 12.4 per cent stake in Aspen Pharmacare. FDI stood at 1.2 percent in 2012, and increased to 2.4 percent in 2013. In 2014, FDI decreased again to 0.4 percent and to 0.48 percent in 2015 before a slight increase to 0.7 percent.

5.2.5 Conclusion

Government has policies to help boost both saving and investment in South Africa. Policies to boost saving attempt to influence the consumers ability to save while the investment policy is aimed at creating a conducive atmosphere for investors.

Saving and investment closely follow the same trend in South Africa. Furthermore, it can be seen that investment is heavily reliant on foreign finance as the current account is in deficit for the larger part of the period under investigation. FDI as a proxy for foreign finance shows that external finance is volatile and is easily influenced by political environments.

5.3 Literature review

This section provides the theoretical and empirical literature review on the domestic saving and domestic investment.

5.3.1 Theoretical literature

Theories of Investment

The Keynes theory of investment posits that investments will continue to increase as long as the Net Present Value (NPV) of the expected future revenue, at the margin, is equal to the opportunity cost of capital. In the Keynesian theory, investment is expected to generate a future stream of income. It hypotheses that any investment is expected to generate a stream of future cash flow. Keynes (1936) indicated that investment will be made until there is no longer any class of capital assets of which the marginal efficiency exceeds the current rate of interest. The marginal effieciency of capital is equivalent to the rate of return on investment. Thus if the marginal efficiency of capital is greater than the cost of capital (discount rate), then investment is worthwhile.

Keynes theory of investment, does not regard investment as an adjustment process toward equilibrium, it instead considers investment decision as uncertain because human being are believed to be "animal spirited" and irrational with volatile expectations. The theory assumes that the purchase price of the machine in the base year is equal to the expected future cash flows from the machine and the marginal efficiency of capital (MEC). MEC varies directly with expected future cash flows and inversely with the purchase price. Another assumption of the Keynes theory is that, investment is profitable when the rate of return on a new machine (new investment) exceeds the cost of purchase.

From Keynes investment theory, many theories have emerged such as the accelerator theory, the flexible accelerator theory, and the Tobin q models. These are discussed below

The accelerator theory was proposed by Clark (1917). The model states that the demand for capital does not change due to an increase in the demand for sold goods but instead with the

spurt of that demand. The model explained that, to increase the rate of output of a firm, a proportionate increase in its capital stock is necessary. As a result, the model makes a strict assumption that capital is roughly a constant fraction of output. Thus, a certain amount of capital stock (K) is necessary to sustain a particular level of economic activity at any given period t.

Firms will invest in period t, to obtain a desired level of capital stock and thus any change in output will result in a variation in the level of capital stock. The model was extended to the flexible accelerator model by Goodwin (1948), Chenery (1952) and Lucas (1967). The model improved on the limitation of the simple accelerator model of the adjustment of capital to optimality without time lags as well as the assumption that there is no influence of uncertainty, financial factors, profits and other variables on investment.

The flexible accelerator model thus incorporates lags in the adjustment process between the level of capital stock and the level of output as well as accommodate other factors that might influence investment. The adjustment does not happen instantaneously and any change in the stock of capital will be subjective to different types of lags. These include, financial lags with respect to capital acquisition, administrative lags with respect to the ordering of capital, decision making lags with respect to determining whether to increase the capital or not and delivery lags in respect to the reception of capital.

The model indicates that the wider the gap between the current capital stock and the desired capital stock, the greater rate of investment. Firms therefore strategize to decrease the gap between the optimal capital stock (K*) and the current stock of capital goods left over from the past period K_{t-1}.

Tobin's q (1969) theory states that the level of investment is determined by the ratios of the market value of the current capital to the cost of replacing the capital. Hence marginal q is the ratio of the market value of a marginal unit of capital to its replacement cost and average q is the market value of the average capital to its replacement cost. Tobin's q, indicates that a firm will increase its capital stock if the q is greater than 1 (since spending 1 dollar on capital will result in a greater than 1 dollar return), decrease its stock of capital if q is less than 1 and make

no changes to the stock if q is equal to zero. The marginal q is the more useful in determining the investment but that the average q is most used in most empirical studies for it is easier measure. Thus, average q is often used as a proxy for marginal q. If a firm faces a horizontal demand curve with fixed return to scale in production and installation of assets, marginal q and average q will be the same, which will make the average q a good proxy. However, if the firm is a monopoly then, average q will be greater than marginal q, which will result in difficulties for empirical analysis.

The Neoclassical theory of investment highlights the importance of interest rates and capital prices in determining investment. The model indicates that the rate of interest determines demand schedule of investment and that the optimal level of output can be achieved provided that the price of capital is elastic. Jorgenson (1963) posits that the neoclassical investment model is considered as a firm optimization problem, with the aim of maximizing profit that will yield n optimal capital stock.

The Jorgenson's investment theory is based on a production firm operating in a perfectly competitive market and is guided by the rule of profit maximization. The crucial concept in the neo-classical theory is the rental price of capital which is the thrust of investment.The model assumes that profit-maximising firm equates the cost and benefit of each unit of capital when making decision on how much of capital to lease in by paying a fixed rental per period.The rental price of capital is the periodic repayment that a firm has to make for hiring the machine for a certain period. The firm thus pays a rental of R per period and sells output at a price of P. Therefore the real cost of a unit of capital to the production firm is R/P. The real benefit of a unit of capital to a producing firm is its marginal product. The marginal product of capital (MPK) is the addition made to the total product of the firm by one extra unit of real capital.

So long as the MPK exceeds the rental price of capital, a firm makes extra profit by hiring and using an extra unit of capital. However, as more and more capital is used, MPK falls and a production firm maximises profit by equating MPK with the real rental price. In other words, a profit-maximising firm takes capital on lease rental basis until the MPK falls to equal the real rental price. Three types of costs were identified in the model, namely interest on the loan

(cost of borrowing), capital loss (the fall in the price of capital) and depreciation (capital loss due to wear and tear).

Theories of Saving

The LCH was proposed by Modigliani and Brumberg (1954). The hypothesis assumes that economic agents spend a constant percentage of their expected income on consumption. The aim of the individuals is to smooth the consumption throughout their lifetime. For example, the LCH assumes that individuals save for retirement in their youthful days and consumer in their old age. In addition, Modigliani and Brumberg (1954) noted that a major motive to save is to put money aside for retirement provision. This implies that the youth will save so that they have funds to spend when they are old. The very young have little wealth, middle aged people have more, and peak wealth is reached just before retirement (Browning and Crossley, 2001). Retirees sell off their assets to provide for necessities in retirement. The assets shed by the old are taken up by the young who are still in the accumulation part of the cycle. Therefore, economic agents have a high propensity to save in middle age and a similar propensity to consume in the young and older ages.

The LCH explains social economic aspects of the economy. For example, as the population grows, there are more young than older people, which implies that there are more people that are saving than are dissaving. This means the total dissaving of the old will be less than the total saving of the young, and there will be net positive saving (Deaton, 2005). On the other hand, income growth implies that the young will be saving on a larger scale than the old are dissaving so that economic growth, like population growth, causes positive saving; and the faster the growth, the higher the saving rate.

However, in an economy with no growth, wealth will just be passed around, and no new wealth will be created (Deaton, 2005). The total wealth in the economy depends on the length of retirement, and in simple cases, the ratio of a country's wealth to its income is half of the average length of retirement. Furthermore, the LCH can be modified to explain the impact of taxation on income and therefore savings. Bernheim (1991) explained that savings is given by the difference between total income (including returns on investment) and consumption.

This implies that tax reduces the income available for saving and also takes from the after-tax returns on investment.

Friedman (1957) postulated the permanent income hypothesis, which explains that economic agents will spend on consumption at a level consistent with their expected long term average income. This implies that workers will only save if the present income exceeds the excepted future level of permanent income. This will help safe-guard against future declines in income. More so, changes in consumption behaviour are not predictable and as such, aggregate consumption can only be influenced through the adjustment of individual expectation of fluctuations in future income.

Ozkan(2003) further explains that a defining characteristic of the theory is that an individual's consumption today depends on their permanent income, with their current income having little bearing on this. It can therefore be seen that a person looks towards their future wealth when making consumption decisions. The theory reasons that higher growth, which implies higher future income for individuals, would lead to lower current income. This is due to the fact that individuals will be discouraged from saving and instead consume more as a result of the increase in permanent income. Only changes in permanent income affect consumers consumption patterns.

Mikesell and Zinser (1973) explained the Duesenberry's relative-income hypothesis. The hypothesis relates saving to the ratio of previous and present income. It emphasises that saving behaviour can be understood by considering relative income rather than absolute income. Therefore the ratio of saving to income is dependent on the level of present income relative to previous peak income. Savings in the asset adjustment approach is viewed as a means of assert accumulation, (Mikesell and Zinser 1973). The underlying assumption is that the anticipated level of assets is a positive function of permanent income and that the desired stock of assets is acquired only over a fairly long period of time.

Keynes (1936) developed the absolute income hypothesis. He states that the core determinant of consumption and saving is current income or current disposable income. Current disposable income is a sum of current consumption and current saving. As such any increase in income

increases results in an increase in consumption, however the rise in consumption is smaller than that of income as the other part goes into saving. He relates this to the marginal propensity to consume and as income increases the individuals propensity to save grows, while their propensity to consume drops. The hypothesis maintains that consumption (saving) is determined by the absolute level of income. Thus the short-run saving function represents the relationship between income and saving, (Keynes, 1936).

On the other hand, Keynes (1936) asserts that savings, which is a function of income, is seen as an accumulation of capital for investment in capital goods. Thus in the Keynesian model savings and investment should be equal for the market to clear out in a Keynesian model. The hypothesis was re-enforced by McKinnon's (1973) complementarity hypothesis and the inter-temporal theory of current account.

McKinnon (1973) explained the complementarity hypothesis which postulated that investment is mainly self-financed. Hence, investors accumulated savings prior to investment (Fry, 1978; Moore, 2010). This hypothesis is expected to hold true in a closed economy, since a nation saves out of its income. As such, higher saving levels would imply lower consumption expenditure at a given level of income. Moreover, higher domestic savings would be translated into higher domestic investment. In this case, domestic saving would equal domestic investment (Obstfeld and Rogoff, 1995).

In contrast, the inter-temporal theory of the current account posits that in a small open economy, domestic savings need not be equal to domestic investment, as there may be better returns if invested abroad. This is because domestic savings and domestic investment are determined by different variables. For example, saving is determined by income and wealth while investment is dependent on profitability and risk. In addition, in an open economy with free capital mobility, the savings behaviour of economic agents is influenced by more profitable investment opportunities from the international world (Obstfeld and Rogoff, 1995). Likewise, if national savings fall short of the desired level of domestic investment, a country can borrow the additional funds from abroad.

5.3.2 Empirical Literature

The empirical literature covers studies from all over the world and presents literature on time series methods and panel methods.

Time series data

Feldstein and Horioka (1980) pioneered the study of the saving-investment relationship for various countries. Their study aimed to analyse the savings and investment relation for 16 OECD (Organisation for Economic Cooperation and Development) countries with full international capital mobility over the period 1960-1974. They hypothesised that in a closed economy, a high positive relationship between saving and investment is expected since domestic saving limits domestic investment. In an open economy, however, no correlation is expected as an investment can now be funded by foreign savings, and domestic savings can be invested abroad.

The results contradicted their hypothesis showing a significant relationship between saving and investment in open economies. The study found the coefficients for the estimated regressions all to be close to unity, implying that domestic savings remain in the country of origin. This was a surprising result for countries with a high degree of openness. Thus Feldstein and Horioka (1980) concluded that the 16 OECD countries were not integrated with the global community; they concluded that capital was immobile in these countries.

The following decades have seen several researchers replicating the Feldstein-Horiaka paradox for different countries and with conflicting results. For example, Frankel, Dooley, and Mathieson (1986) found that developed countries tend to have larger saving investment coefficients than the developing economies using the VAR framework. Besides Baxter, and Crucini (1993) using the Benchmark model, confirmed these results and showed a high correlation between saving and investment, implying low capital mobility in OCED. The results also showed saving investment to be more correlated for larger countries and relatively less correlated for smaller countries. Apergis and Tsoulfidis (1997) found that for 14 EU countries, savings and investment are still correlated using the ARDL bound testing approach. The implication is that even after Europe became increasingly integrated, capital mobility was still low between these countries. Kollias,

Mylonidis and Pateologou (2008) also found a significant positive correlation between these two variables in Europe.

Moving on to country-specific test for the Felstein-Horiaka hypothesis, the literature shows no consensus of the saving-investment relationship. For Japan, Yamori (1995) using OLS (Ordinary Least Squares) regression found no evidence of cointegration for Japan, implying perfect capital mobility. In contrast, Narayan (2005) found saving and investment to be cointegrated, thus lending support for the Feldstein-Horiaka hypothesis. In addition, the author also found bidirectional causality between saving and investment. It should be noted that the difference in findings for Japan could be as a result of the estimation technique used. The OLS estimators are not the most suitable to be used on time series data and may produce biased results. Thus estimation technique is an important element in the determination of the results. Besides, De Vita and Abbott (2002) cautioned that the Feldstein–Horioka approach is a partially informative measure of capital mobility.

China's economy, being an emerging economy as part of BRICS, is informative for South Africa. In China, Narayan (2007) using an ARDL framework analysed the saving-investment nexus for two distinct periods, 1952–1994 (fixed exchange rate) and 1952–1998. The results revealed that saving and investment were correlated for both the period of the fixed exchange rate and the entire sample period. With high saving-investment correlation, the results suggest that the Chinese economy conforms with the Feldstein-Horioka hypothesis. Instead of using testing two periods, the authors could have accounted for structural breaks using dummy variables to provide a broader perspective of the Chinese economy.

The next BRICS country to be considered is India. The India economy has seen expansion over the last decade because of its large population that provides cheap labour for European and American firms. Thus an investigation into the saving-investment nexus is critical for the economy. Singh pioneered this investigation in 2008 in which the author used quarterly data from 1950 Q1 to 2001 Q 2. The author elected to estimate the model using the ARDL model and the granger causality test to the direction of causality. The findings showed that saving and investment were cointegrated in India following the Feldstein-Horioka hypothesis. This

result implies that India domestic saving determines domestic investment even though India is an open economy. The test for causality revealed that saving granger causes investment. Still in India, Mishra, Das and Mishra, (2010) and Seth (2011) confirmed the results of Sing (2008) and also found evidence of long-run cointegration and unidirectional causality from saving to investment. Also, Seth (2011) found a long-run equilibrium relationship between corporate savings and corporate investment, indicating corporate sector's dependency on their fund for investment.

The discussion now turns to the African continent, which is where South Africa is located and possess some cultural and economic similarities with regards to financial sector development. Bedia (2007) compared the saving-investment relationship between Ghana and Cote D'Ivoire using the Markov Switching VAR. The author found evidence of more capital mobility in Ghana than in Côte d'Ivoire, implying that foreign capital flowed towards Côte d'Ivoire and not to Ghana during the studied period. Two reasons can be advanced for this result; firstly, Côte d'Ivoire being part of the monetary zone (WAEMU) with a supra-national currency makes this country a more secure place for investors than Ghana which has its currency; secondly, the investment code (law) in Côte d'Ivoire is very favourable to investors, which are allowed to take a large part of earnings out of the country. Moreover, causality ran from saving to investment in Côte d'Ivoire but not in Ghana. However, in Nigeria, Nasiru and Usman (2013) found saving and investment to have a long-run relationship with international capital mobility.

Ogbokor and Misilika (2014) used the ECM and the granger causality test to investigate the saving-investment nexus for Namibia between 1995 and 2011. The authors found no evidence that a long-run relationship existed. The authors also found that saving granger cause investment in Namibia. The authors conclude Namibia relies on foreign sources of finance to fund domestic investment. Lack of co-integration is an indication of high domestic consumption which leads to low domestic savings. Hence, domestic investment has to be funded by international capital inflows. Other the other hand, Nindi and Odhiambo (2014) applied the ARDL-bounds testing approach, and the ECM-based causality test to time series data for Malawi, for the period 1973-2011. The results showed a short-run bidirectional causality between savings and investment.

In South Africa, Afzal (2007) found evidence of a bi-variate causality relationship between domestic savings and private investment using the VAR methods. Thus not only is higher savings required to fund investment, but an increase in investment demand leads to a higher level of savings in South Africa. Gil-Alana et al. (2016) expanded on the cross-country work of Afzal and tested the Felstein-Horiaka hypothesis using fractional cointegration. They use the period from 1946 to 2013 and find evidence of fractional cointegration between saving and investment, indicating some degree of persistence in the gap between the two variables. The authors also find a structural break in saving and investment around 1980, which coincided with the start of a financial deregulation process in South Africa. The FH puzzle is observed before the start of financial deregulation; it subsequently disappears. This suggests that financial deregulation may have weakened the link between saving and investment.

Panel Data analysis

Ozkan, Erden, and Turksen (2009) applied Fuzzy C-Mean (FCM) Clustering Algorithm using panel data from 21 OECD countries covering the period 1970-2003.Their results revealed that saving retention coefficient for smaller countries was greater than the coefficients for larger countries. Moreover, Rao, Tamazian, and Kumar, (2010) used the Blundell-Bond systems GMM method to test the Feldstein-Horioka from the period 1960-2007 for a panel of 13 OECD countries. The authors found evidence for the validity of the Feldstein-Horioka in the pre-Bretton Woods period and found evidence of significant improvement in international capital mobility in the OECD countries.

Kim Kim, and Wang, (2007) applied Generalized Least Square (GSL) estimation for the big three (China, Malaysia, and Korea), ASEAN countries and greater China (Hong Kong, Taiwan, and China) covering the period 1980-2002. The authors concluded that the saving-investment correlation in East Asia steadily decreased over time but was still higher than that of the OECD countries.

Cyrille (2010), studied the long-run relationship between savings and investment for 15 sub-Saharan African countries using panel data. The author found low saving-investment coefficients for developing countries. The author also found that home bias was unrelated to the

correlation between inward and outward capital flows for developing countries.

Esso and Keho (2010) analysed the correlation between saving and investment for the West African Economic and Monetary Union (UEMOA), (namely Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo) using panel estimation methods, bounds test for cointegration and the Granger causality test. The authors showed that domestic saving played an active role in financing investment in only three countries, namely, Benin, Côte d'Ivoire and Niger. For the other four countries, the domestic savings rate and investment rate were not related. In sub-Saharian African, Adeniyi and Egwaikhide (2013) applied Panel Mean Reversion approach, and the results revealed a more outward-oriented economy would move with capital flows and by extension higher investment. Similarly, the significant and positive aid term reflected the importance of this non-market flow in most SSA economies.

5.3.3 Conclusion

Ogbokor and Misilika (2014) emphasised the importance of country-specific research in investigating the saving-investment relationship.This is because of the flawed assumption of homogeneity in countries combined in cross country research. Although the countries included in the research may be in the same income brackets, they still possess heterogeneous institutional, economic and political structure. For example, the exchange rate regime, whether fixed or floating, has a significant impact on capital mobility and hence the saving-investment relationship.This research will contribute to the growing body of country-specific research. In South Africa, particularly, the saving-nvestment nexus has not been empirical investigated expect for the work of Gil-Alana et al. (2016) and Hungwe and Odhiambo (2019). This research will fill in this gap by going beyond the saving-investment correlation, and to test the direction of causality.

Furthermore, this essay uses the Autoregressive distributive lag (ARDL) test to estimate the relationship as well as the direction of causality between domestic saving and domestic investment. This method is adopted because it has better small sample properties than alternative methods, for example, in comparison to the simple VAR model, the ARDL model can have a

large number of variables. Secondly, the order of cointegration does not matter; whether the model is cointegrated of order purely I(0), purely I(1), or mutually cointegrated. Lastly, the bounds test approach allows the examination of short-run dynamics.

5.4 Methodology

Having reviewed the literature in the previous chapter, the current chapter offers a detailed discussion of the research methodology, which is used to examine the relationship between saving and investment in South Africa. The estimation technique applied the Auto-Regressive Distributive lag, (ARDL) model.

The discussion of the research methodology is structured as follows: The theoretical framework is discussed in subsection 5.4.1, followed by subsection 5.4.2, which discusses the model specification. Subsection 5.4.3 discusses the econometric techniques for the estimation.Subsection 5.4.4 discusses the diagnostic test. Subsection 5.4.5 discusses the data, and subsection 5.4.6 concludes the chapter.

5.4.1 Theoretical Framework

The saving investment theory can be solved in a neoclassical inter-temporal model with a representative agent and a representative firm.

Representative agent/ Households

There are two coexistent generations in period 1. Generation 0, solves the problem:

$$maxj^{0}_{(c_1^0)}(C_1^0) \tag{5.1}$$

subject to

$$p_1(C_1^0) \leq [(1-\delta)p_1 + r_1]K_1 \tag{5.2}$$

Where; p_1 = Money price in period 1.

K_1 = Initial capital stock owned by generation 0.

r_1 = Money rental rate of capital in period 1.

δ = Depreciation rate.

(C_1^0) = Consumption of generation 0 in period 1.

There is a unique commodity in each period that may be consumed or accumulated to be used as capital in production in the subsequent period with the above equation.

It is assumed that utility function $j^0(C_1^0)$ is increasing in (C_1^0), the household's decision problem has the trival solution;

$$p_1(C_1^0) = [(1-\delta)p_1 + r_1]K_1, \tag{5.3}$$

which directs the households to consume all of its wealth.

Assume a unit measure of household with preference over current consumption of household members. The representative generation 1 household receives utility from consumption in periods 1 and 2 and solves the problem;

$$max_{(C_1^1, C_2^1, K_2, H_1)} j^1(C_1^1, C_2^1) = g_1 \log(C_1^1) + g_2 \log(C_2^1) \tag{5.4}$$

Where the preference weights g_1 and g_2 sum to 1.

Each household member is endowed with a single unit of time in period 1 and a fractionH_1 of all members search fr a job where;

$$H_1 \leq 1. \tag{5.5}$$

Since leisure does not yield utility, H_1 will be choosen to equal 1. Of the workers that, a fractionL_1 find a job and the remaining U_1 are unemployed, hence,

$$H_1 = L_1 + U_1 = 1 \tag{5.6}$$

The relationship between H_1 and L_1 is given by the expression,

$$L_1 = \overline{q} H_1, \tag{5.7}$$

Where $\overline{q}$ is taken parametrically by the households.

Generation 1's allocation problem is subject to the sequence of budget constraints,

$$p_1(C_1^1) + p_1 K_1 \leq w_1 L_1, \tag{5.8}$$

$$p_1(C_2^1) \leq (r_2 + p_2(1-\delta))K_2 \tag{5.9}$$

Where; w_1 = Money wage in period 1

K_2 = Capital carried into period 2.

r_2 = Money rental rate in period 2

p_2= Money price in period 2.

Households may borrow and lend with each other at money interest rate i and hence the intertemporal budget constraint is,

$$p_1 C_1^1 + \frac{p_2}{1+i} C_2^1 \leq w_1 L_1 \tag{5.10}$$

The solution to this problem is characterized by the consumption allocation decisions,

$$p_1 C_1^1 = g_1 w_1 L_1 \tag{5.11}$$

$$\frac{p_1 C_2^1}{1+i} = g_2 w_1 L_1 \tag{5.12}$$

and the no-arbitrage condition, that defines the money interest rate i at which households have no desire to borrow or lend with each other.

$$1 + i = (\frac{r_2}{p_2} + 1 - \delta)\frac{p_2}{p_1}, \tag{5.13}$$

In period 2, there is a third generation that solves the problem,

$$max_{K_2^\alpha}, C_2^2 j^2(C_2^2) \tag{5.14}$$

subject to

$$p_2(C_2^2) \leq p_2 Y_2 - r_2 K_2 \tag{5.15}$$

Where output Y_2 is produced with the technology

$$Y_2 \leq K_2^\alpha \tag{5.16}$$

The solution to this problem is given by the expression,

$$C_2^2 = Y_2 - \frac{r_2}{p_2} K_2 \tag{5.17}$$

Representative firm/ Firms

The choices made by firms in period 1 are now presented. There is a large number of competitive firms each of which solves the problem,

$$max_(Y_1, K_1, V_1, L_1, X_1 p_1)[Y_1 - w_1 L_1 - r_1 K_1], \tag{5.18}$$

Subject to the constraints

$$Y_1 \leq A K_1^\alpha X_1^{1-\alpha} \tag{5.19}$$

$$L_1 = X_1 + V_1 \tag{5.20}$$

$$L_1 = q V_1 \tag{5.21}$$

The firm must choose a feasible plan Y_1, K_1, V_1, L_1, X_1 to maximise profit taking wage w_1, the rental r_1, the price p_1 and the recruiting efficiency q as given. A firm that V_1 workers to recruiting will hire $qV_1 = L_1$ workers of which X_1 will be allocated to productive activity.

The solution to this problem is characterized by the first-order conditions,

$$(1-\alpha)\frac{Y_1}{L_1} = \frac{w_1}{p_1} \tag{5.22}$$

$$\alpha\frac{Y_1}{K_1} = \frac{r_1}{p_1}, \tag{5.23}$$

and the factor price frontier,

$$p_1 = (\frac{w_1}{[1-\alpha]Q})^{1-\alpha}(\frac{r_1}{\alpha})^{\alpha}, \tag{5.24}$$

Where the aggregate productivity variable is taken as given by the individual firm

$$Q = (1-\frac{1}{q}) \tag{5.25}$$

There is a match technology of the form

$$\overline{L_1} = \overline{H_1}^{\frac{1}{2}}\overline{V_1}^{\frac{1}{2}}, \tag{5.26}$$

Where $\overline{L}$ is employment, equal to the measure of workers that find jobs when, $\overline{H_1}$ unemployment workers search and $\overline{V_1}$ workers are allocated to recruiting by firms. Households choose $\overline{H} = 1$ and hence,

$$\overline{L_1} = \overline{V_1}^{\frac{1}{2}} \tag{5.27}$$

The social planner

How would a benevolent social planner arrange production and consumption in this economy? The question is answered by studying the solution to the following constrained optimization problem.

$$max_{(K_2,L_1,C_1^0,C_1^1,C_2^1)}\lambda_0 j^0 + \lambda_1 j^1(C_1^1, C_2^1) + \lambda_2 j^2(C_2^2) \tag{5.28}$$

$$C_1^0 + C_1^1 + K_2 \leq K_1^{\alpha}L_1^{1-\alpha}(1-L_1)^{1-\alpha} + K_1(1-\delta) \tag{5.29}$$

$$C_2^1 + C_2^2 \leq K_2^{\alpha} + (1-\delta)K_2 \tag{5.30}$$

Where λ_i are welfare weights that sum to 1.

The social planner chooses K_2, the amount of capital to carry into period 2, L_1 employment in period 1, and a way of allocating commodities to individuals, $(C_1^1, C_1^1, C_2^1, C_2^2)$. His problem is characterized as the maximisation of equation (5.28) subject to the feasibility constraints (5.29) and (5.30).

The solution to this problem requires that the two inequalities (5.29) should hold with equality and in addition, the following six first order conditions should be satisfied,

$$-\mu_1 + \mu_2 \alpha K_2^{\alpha-1} \tag{5.31}$$

$$(1-\alpha)K_1^{\alpha} L_1^{1-\alpha}(1-L_1)^{1-\alpha}\left(\frac{1}{L_1} - \frac{1}{1-L_1}\right) = 0 \tag{5.32}$$

$$\lambda_0 j_1^0(C_1^0) = \mu_1 \tag{5.33}$$

$$\lambda_1 j_1^1(C_1^1, C_2^1) = \mu_1 \tag{5.34}$$

$$\lambda_1 j_2^1(C_1^1, C_1^2) = \mu_2 \tag{5.35}$$

$$\lambda_2 j_1^2(C_2^2) = \mu_2 \tag{5.36}$$

The six equations (5.31) to (5,36) and the two constraints (5.29) and (5.30) determine the six variables, $(K_2, L_1, C_1^0, C_1^1, C_2^1$ and the two lagrange multipliers μ_1 and μ_2 associated with the inequality constraints (5.29) and (5.30). Therefore capital K in period 2, is determined by the initial capital stock, k_1, employment of labour in period 1, L_1, consumption of generation 0 in period 1, C_1^0, consumption of generation 1 in period 1, C_1^1, consumption of generation 2 in period 1, C_2^1. In short capital is a function of employed labour, and consumption, since consumptions decisions inherently imply saving decision, we conclude that,

$$K = f(Labour, saving) \tag{5.37}$$

More variables have been added to the theoretical model in accordance with the empirical literature.

5.4.2 Model Specification

The inter temporal investment model above to is used to test for factors influencing investment. The variables included have also been used by Fry (1998), Ghura and Goodwin (2000), Al khatib, Altaleb and Alokor (2012). The model is specified as:

$$GDI_t = \beta_0 + \beta_1 GDS_t + \beta_2 GDP_t + \beta_3 RIR_t + \beta_4 FDI_t + \beta_5 INF_t + u_t \tag{5.38}$$

Where:

GDI = gross domestic investment.

GDS = gross domestic saving.

GDP = real GDP.

RIR = Real Interest Rate.

FDI = foreign direct investment.

INF = Inflation.

A high β_1 (regression coefficient for saving and investment) implies that the large part of domestic saving is retained within the country and transformed into investment suggesting low international capital mobility. On the other hand, a low β_1 would inherently suggest most of domestic saving is spent outside the country, implying high international capital mobility. It also suggest that the country's economy is poor in mobilsing its domestic saving, this could be due to a deepened financial liberalization.

5.4.3 Estimation Technique

The long run relationship between saving and investment is tested using bound test within the autoregressive distributive lag (ARDL) approach developed by Pesaran and Shin (1999) and extended by Pesaran, Shin and Smith (2001). This test is has the advantage that it posses

better small sample properties. Moreover, it can be used irrespective of the order of integration of the regressors. In addition the the order of integration does not matter. i.e., whether a series is integrated of order $I(0)$ or the integrated of order $I(1)$ whether they are mutually integrated does not matter, however, the series would crash under the presence of integration order I(2). Moreover the ARDL can also take a larger number of variable in comparison to the simple VAR model. Thus, unlike the Engel and Granger (1987) two-step co-integration procedure, the bounds test approach does not push short-run dynamics into the error term, so it is also possible to examine short-run dynamics.

ARDL model is estimated using the basic equation:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + ... + \beta_k Y_{t-\rho} + \alpha_1 X_t + \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + ...\alpha_q X_{t-q} + ul_t \qquad (5.39)$$

Where, β is the first difference operator, α is the sum of the X and u is error-term with white noise and spherically distributed. The lag order of the ARDL is determined using information criteria: Akaike Information Criterion (AIC), Schwarz Bayesian Information Criterion (SBIC) and Hannan and Quinn information criterion (HQIC).

The bounds test is mainly based on the joint F-statistic whose asymptotic distribution is nonstandard under the null hypothesis of no co-integration. The ARDL bounds test approach estimated by OLS, which tests for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficient of the lagged level of the variables.

The test is based on Wald-test (F-statistics).The null hypothesis of no co-integration is rejected when the F-value exceeds the upper critical bounds value. We fail to reject the null hypothesis if the F-value is lower than the lower bounds. Finally, the decision about co-integration is inconclusive, if the calculated F-statistic falls between the lower and upper-bound critical values

Causality test

This study uses the Granger causality test to investigate the direction of causality between saving and investment in the bivariate vector autoregressive framework (Granger, 1986). The

Granger causality test facilitates identifying the direction of causality between the variables if a long run relationship exists. The Granger causality test involves the following equations for saving (S) and investment (I) with the right hand side always consisting of lagged values of the dependent variables. The equations to be estimated are:

$$S_t = \sum_{i=1}^{\rho} \alpha_1 I_{t-1} + \sum_{j=1}^{q} \beta_1 S_{t-j} + u_{1t} \tag{5.40}$$

And

$$I_t = \sum_{i=1}^{\rho} \delta_1 I_{t-1} + \sum_{j=1}^{q} \vartheta_1 S_{t-j} + u_{2t} \tag{5.41}$$

The saving equation expresses that saving is determined by investment and past values of itself while the investment equation expresses that investment is dependent on saving and passed values of itself. The Ganger causality tests the null hypothesis 'saving does not granger cause investment' given by $\sum \vartheta_i = 0$; and tests the null hypothesis that 'investment does not granger cause saving' given by $\sum \alpha_i$ =0.

The results could give any of the three following outcomes;

1. *Unidirectional Causality*:

- From Investment to saving is determined if the set of coefficients of investment in equation 14 is statistically significant and not equal to zero ($\sum \alpha_i \neq 0$) and the set of estimated coefficient of the lagged saving in equation 14 are statistically significant and equal to zero ($\sum \vartheta_i = 0$) simultaneously.

- From saving to investment is determined if the set of coefficients of investment in equation are equal to zero ($\sum \alpha_i = 0$) and the set of estimated coefficient of the lagged saving in equation 15 are not equal to zero ($\sum \vartheta_i \neq 0$) simultaneously.

2. *Bidirectional Causality* is suggested when the coefficient of both saving and investment in both equations are statistically significant and not equal to zero.

3. *No-causality or independence* is suggested when the coefficient of saving and investment in both equations are statistically insignificant.

5.4.4 Diagnostics tests

Unit root test: Time series data is prone to non-stationarity and can provide spurious results. Unit root test is done to determine if a variable is stationary or not. There are a number of tools or test that can be used to determine stationarity, namely Elliot, Rothenberg and Stock, 1996; Dickey and Fuller, 1979; Kwatkowski-Philips-Schmidt-Shin, 1992; Ng and Perron, 2001; and, Philips and Perron, 1998). This study uses the ADF and KPSS to test variables for stationarity.

There are two steps used to test for stationarity. First is to the test the variable at level and second is to test the same variable after differencing. If the variable becomes stationary after first differencing then it is concluded that the series are intergrated of order (I). However,in the presence of structural breaks, the above tests may produce misleading results, such that a series may fail to reject the null hypothesis of the presence of unit root. Zivot and Andrews (1992) propose a testing procedure where the time of the break is estimated rather than assumed as an exogenous phenomenon. By endogenously determining the time of structural breaks they argue that the results of unit root hypotheses previously suggested by earlier conventional tests, such as the widely-employed Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979, 1981) test may be reversed. To complement for this limitation the study further employs Zivot and Andrews (1992) unit root tests in the presence of structural break. There are three versions of ZA test for endogenous structural break. The model that allows for break in intercept, the model that allows for break in trend of the series as well as the model which allows for break in the intercept and slope. This test is also carried out in this study.

If structural breaks are found in the model, then dummy variables are created and added to model. The dummy variables created will be equal to the number of structural breaks identified. The dummy variable will take 0 for the pre-shock period and 1 for the post shock period. However, it should be noted that adding dummy variables to the model reduces the

degrees of freedom, as such only significant periods are accounted for by the research.

5.4.5 Data, sources and Description

The time-series data used for analysis was sourced from the South African Reserve Bank (SARB) website. This study will make use of yearly data from 1980 to 2016. The ratios are used because they reduce the variation in the data. The data source is the SARB (GDI, GDS, and GDP) while rest of the variables are sourced from the world bank.

GDI is proxied by the ratio of gross fixed capital formation to GDP as downloaded from the SARB database. It is calculated by aggregating the total value of fixed capital before depreciation and dividing it the GDP of the country.

GDS is represented by the ratio of domestic saving to GDP. It is aggregate of all domestic saving recorded and divided by the GDP of the country.

Real GDP (in millions) at 2010 constant prices is downloaded from the SARB database and transformed into logarithms in eviews.

The real interest rate was sourced as from the World Bank. It is described as the lending rate adjusted for inflation as measured by the GDP deflator.

The variable FDI is proxied as the ratio of foreign direct investment to GDP. Foreign direct investment recorded as the net inflows of investment that acquired a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital, as shown in the balance of payments. The series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP. Weighted average.

Inflation proxied with the percentage change in consumer price index (CPI). CPI shows the changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Data are period averages. The change in CPI then reflects the inflation rate.

5.5 Empirical Results

5.5.1 Introduction

To answer the research objectives of this essay, this section is organised as follows: subsection 5.5.2 looks at the time series data and tests to detect the presence of unit roots and address them. The ADF and KPSS methods are used to detect unit-roots, while the Zivot Andrews test is used to test for unit roots in the presence of structural breaks. Subsection 5.5.3 then provides the results of the ARDL regression including the bound test for co-integration and the short and long-run relationship dynamics. Subsection 5.5.4 briefly illustrates the diagnostic test and subsection 5.5.5 provides the results of the Granger causality test. Subsection 5.5.6 concludes chapter.

5.5.2 Unit root test

Three different unit root tests were conducted, namely, Augmented Dickey-Fuller (ADF), KPSS and the breakpoint unit tests. The breakpoint unit roots test for stationary with the presence of a structural break[1].

The Null hypothesis for ADF and the breakpoint test is that the series contains a unit root, while the alternative hypothesis is that the series is stationary. For the KPSS, the null hypothesis is that the series is stationary. Rejection of the null hypothesis implies that the series is nonstationary. The table below indicates that all the variables of the model are stationary at either level or after the first difference. The real interest rate (RIR) and FDI are stationary at level in the breakpoint test and the ADF test, while the other variables become stationary after first difference if the KPSS test, on inflation is stationary at level. .

[1]Structural break is an exogenous shock to the economy that has an impact on the variable trend. Tests for structural break in the model showed one structural break in 1985. Therefore one dummy variable was added to the model to account for the structural break

Table 5.2: Result of Unit root test

Variable	ADF		KPSS		Breakpoint unit root test	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
LGDS	-0.45 (–3.54)	-7.7 (-3.54)	-0.21 (0.14)	0.08 (0.14)	-5.1 (-5.2)	-7.2 (-5.2)
LGDI	-2.56 (-3.54)	-4.2 (-3.54)	-0.2 (0.14)	0.11 (0.14)	-0.4 (-5.2)	-4.2 (-5.2)
LGDP	-2.19 (-3.54)	-4.1 (-3.54)	-0.18 (0.14)	0.12 (0.14)	-1.7 (-5.2)	-5.3 (-5.2)
LRIR	-5.16 (-3.54)	-8.45 (-3.54)	-0.17 (0.14)	0.06 (0.14)	-6.7 (-5.2)	-9.3 (-5.2)
LFDI	-5.16 (-3.54)	-7.38 (-3.54)	-0.16 (0.14)	0.18 (0.14)	-6.2 (-5.2)	-8.8 (-5.2)
LINF	-1.10 (-3.54)	-4.91 (-3.54)	-0.13 (0.14)	0.30 (0.14)	-4.6 (-5.2)	-8.4 (-5.2)

Note: Critical values are in parenthesis at 5percent . The appropriate lag was selected using the Akaike Information Criteria (AIC) for ADF test and Schwart criterion and the Bartlett kernel method

5.5.3 ARDL model results

The ARDL bound test is performed on the variable stationary of order (0) and (I). The test model used the automatic model selection, in order to select the best model, also the lag length is set to a maximum of 4 lags: this is done in order to reduce the chances of autocorrelation in the model.

Table 5.3: Result of Bound test

F-statistic = 3.601803		
Critical values	Lower Bound	Upper Bound
10 percent	2.08	3
5 percent	2.39	3.38
1 percent	3.06	4.15

Source: Authors Own calculation

Table 5.3 shows the results of the ARDL bounds test.The null hypothesis of 'no long-run relationship exist' is rejected at 5 percent. This shows that investment and the exogenous variables, including saving, are cointegrated in South Africa, which implies that there is low capital mobility following the Feldstein-Horioka hypothesis. These results are is consistent with the findings of Nasiru and Usman (2013) and Gil-Alana (2016) in South Africa, while Ogbokor and Musilika (2014) found no evidence of cointegration for Namibia. Afzal (2007) found no cointegrating relationship for South Africa, among seven other developing countries.

The short-run coefficient using an Error correction model (ECM) are shown in Table 5.4 below. The error correction term (denoted as ECM(-1)) is found to be negative as expected and statistically significant. The term measures the speed at which the endogenous variable adjusts to changes in the explanatory variables before converging to its equilibrium level. A negative and significant error correction term implies that the adjustment process to restore equilibrium is very effective. A relatively high error correction coefficient implies a faster adjustment process. The coefficient is -0.47 and is significant at 1 percent level, which suggests that the model convergence to equilibrium after a shock is relatively great. The estimated coefficient of -0.47 indicates that about 47 percent of the disequilibrium in model is corrected within a quarter.

Table 5.4: Estimated short-run Coefficients Based on ARDL

Variables	coefficient	Standard error	P-value
D(GDI(-3))	0.538*	0.09	0.000
D(LGDS(-1)	-0.79*	0.097	0.000
D(LGDP)	2.83*	0.30	0.000
D(LRIR)	0.04**	0.008	0.02
D(LFDI(-2))	-0.02*	0.002	0.000
D(LINF)	0.06*	0.014	0.004
ECM (-1)	-0.47*	0.069	0.000

Note:*, **, *** shows significance at 1, 5 and 10 percent. Source: Authors own calculation

Furthermore, in the short-run, gross domestic saving has a negative impact on investment such that a one percent increase in savings will result in 42 percent decrease in investment. This is referred to as the paradox of thrift coined by Keynes (1936). He notes that saving can ultimately be detrimental to the economy in that it takes funds out of circulation. For example, if everyone individually cuts spending to increase saving, aggregate saving will eventually fall because one person's spending is someone else's income. However, in the long run, the accumulated saving is available for investment and as such, gross domestic saving is positive and significant in the long the run. A one percent increase in saving will lead to 83 percent increase in domestic investment in the long run.

The coefficient of the log of GDP, which is the income variable, is positive and significant. A one percent increase in GDP will lead to a 2.8 percent in domestic investment. However, in the long run, GDP is statistically insignificant. This in line with the theoretical underpinning in that, increase production will encourage more capital investment.

The log of the real interest rate is significant, with an associated positive coefficient. In this sense, the real interest rate is the rate of return on investment such that a one percent increase leads to 0.04 percent increase in domestic investment. Also, FDI can be considered a substitute for domestic investment since it has a negative coefficient. A one percent increase in FDI leads to 0.02 percent decrease in domestic investment. This shows that FDI and domestic investment are substitutes and not complements in South Africa. Lastly the inflation rate is positive and significant. This is embedded in the fact higher prices lead to higher total revenue, and this provides a firm with the incentive to produce more and thus invest. In the long run, these variables are insignificant.

Residual Diagnostics test

Table 5.5: Diagonistic Tests

Test	Null Hypothesis	P-value	Conclusion
Lagrange Multiplier (LM)	No serial correlation	0.41	Fail to reject H0
Jarque-Bero (JB)	There is normal distribution	0.13	Fail to reject H0
ARCH test	There is no conditional heteroscedasticity	0.84	Fail to reject H0
Ramsey Reset	The model is stable	0.71	Fail to reject

Source: Authors's own calculation

The diagnostic tests show the absence of autocorrelation at four lags, while there is no evidence of heteroscedasticity using the ARCH test. The Jarque-Bero test suggests that there is a normal distribution. This indicates that the model is fairly well behaved and that all shocks eventually stabilise in the long run. The Ramsey RESET test also shows that the model is stable.

5.5.4 Granger causality test

The Wald test was used to test for causality, and it showed that the direction of causality runs from saving to investment, with the rejection of the null hypothesis. This implies that in South Africa, domestic saving plays a key role in boosting domestic investment. This could because of the country's' well developed financial sector that encourages investment through borrowing as such banks require saving for the accumulation of funds, especially in the long run. Afzal

(2007) found a bidirectional causality for South Africa.

Table 5.6: Pairwise Granger causality tests

Null Hypothesis	F-Statistic	Probability	Result
GDS does not Granger Cause GDI	5.36	0.030	Reject
GDI does not Granger Cause GDS	2.70	0.256	Fail to reject

Source: Authors's own calculation

However, The Granger methodology is very sensitive to the lag length, and should, therefore, be interpreted with caution. The lag length used in this model is 2, for two years. The results can then be interpreted such that 'after two years saving granger causes investment in South Africa'.Additionally, the power of unit root and co-integration tests may suffer in small samples.

The essay went a step further to analyse the direction of causality between GDP and domestic investment.

Table 5.7: Pairwise Granger causality tests

Null Hypothesis	F-Statistic	Probability	Result
GDP does not Granger Cause GDI	10.980	0.0039	Reject
GDI does not Granger Cause GDP	1.670	0.430	Fail to reject

Source: Authors's own calculation

The discussion of the impact of domestic saving hovers around the notion that saving induces investment which induces GDP according to Keynes. However, the classical model argues that it is higher income that leads to higher saving and investment. As such this essay goes a step further to analyse the causality between GDP and investment. The results show a unidirectional causality for GDP (income) to investment. Therefore, the classical holds for South Africa.

5.6 Conclusion

This study set out to build a model to analyse the saving-investment relationship while controlling for other influencing variables in South Africa. This analysis was estimated using the ARDL model and result of the long run, and short dynamics reported. The study also used the pairwise Granger causality test to examine the directional of causality between the two variables. The essay focused on country-specific research because the assumption of homogeneity in countries combined in cross country research was flawed.

The estimation method for answering the research question posed in section 1 was answered using the ARDL- ECM model.The ARDL is advantageous as it does not matter the order of stationary between the variables; it either be I(0) or I(1). Furthermore, the ARDL model has better small sample features.

The results found evidence of a long-run relationship between saving and investment. This result is consistent with several earlier studies in the literature (Mngobisa,2014; Nwogbo,2006) that found saving and investment to be cointegrated in the long run. The results also support the Feldstein-Horioka (1980) hypothesis that when there is low international capital mobility since domestic saving and domestic investment are cointegrated. The results also found a positive relationship between investment and GDP, real interest rate, and inflation. While a negative relationship between FDI and domestic investment exists., the implication of these findings suggests that a large proportion of domestic saving remains in South Africa to fund domestic investment in the long run. Also, the study showed a negative and significant error correction term and indicated that 47 percent of the disequilibrium in the model is corrected within a quarter. The study also found a unidirectional causality from domestic saving to domestic Investment in South Africa and unidirectional causality from GDP to Investment.

Therefore, this study recommends that an adequate supply of savings should be maintained as a central policy objective for economic stability. The government should give priority to boost both domestic and foreign saving. In the domestic market, government should reduce income tax to increase the ability to save for households (household saving constitute large proportion

of domestic saving). Besides government should increase indirect tax or consumption tax on luxury goods and non-essential commodities. This would compensate for the reduction in income, as well as raise government revenue, which in turn will encourage government surplus (saving). The added benefit of consumption tax is that it will discourage the consumption of harmful products. In addition government should increase the incentive on tax-free accounts, by increasing the maximum amount, which currently sits at R30 000.

In terms of external sources of finance, the government should aim at maintaining a stable political atmosphere to encourage portfolio flows which act as an additional source of funds for investment. Even though FDI is a substitute for domestic investment, government should aim at maintaining an optimal level of FDI because of its benefits of the transfer of knowledge, skills and technology. With regards to the current account, there is need for the government to develop the import dependent sector of the economy to enable the sector to produce products locally.

Lastly, government should increase saving awareness education through the South African Savings Institute (SASI) and Savings and Credit Corporation (SACCO). This will assist teach individuals the means and benefit of savings and thereby boost the saving culture of South Africa.

Chapter 6

CONCLUSION AND RECOMENDATION

6.0.1 Summary of findings

This thesis set out to investigate domestic saving in South Africa by exploring the determinants of the various components of domestic saving. The components of domestic saving investigate are household saving, corporate saving (cash holding), and budget surplus(deficit). It also set out to investigated the saving-investment nexus in South Africa in a bid ascertain, the impact of saving on economic growth through domestic investment.

The first essay set out to identify the determinants of household saving in South Africa. The aim was to identify factors that influence household saving in a bid to boost saving. This analysis was estimated using the BVAR model, and results have shown that there is a negative and significant correlation between the rate of household savings and real GDP. Furthermore, the analysis revealed that there is a fluctuating relationship between household savings and government budget balance. The results have shown that both inflation and financial deepening have a negative influence on the level of household savings. The interest rate has a positive influence on household savings in South Africa albeit insignificant. Our model passed all the residual diagnostic and stability tests, making our conclusions efficient and reliable. We reported

our results using Impulse Response Functions (IRFs) and Variance Decomposition (VD).

The second essay investigated the determinants of corporate cash holdings using the Blundel-Bond GMM estimation technique. This model produces efficient estimators and accounts for endogeneity. Results obtained in this essay were consistent with evidence in available corporate cash holding literature. The findings showed that leverage and cash flow have a negative effect on cash holdings, whereas debt maturity exerts a positive influence, whereas firm size, growth opportunities, dividends payments and financial crisis were all found to have an insignificant impact on the cash holdings of companies.

The third essay added to the scanty body of research on the economic determinants of budget deficit in South Africa. This essay improved on the existing literature in South Africa by including theoretically (tax smoothing hypothesis) predicted variables such as government expenditure, revenue and the interest rate. Using the BVAR estimation technique this essay found a negative and significant relationship between budget deficit and government debt, real interest rate, and government expenditure after four years. Besides, economic growth was found to have a positive impact budget deficit and a fluctuating relationship between fiscal deficit and government revenue. Money supply has a negative influence on deficit in South Africa albeit insignificant.

Lastly, the fourth essay built a model to analyse the saving-investment relationship while controlling for other influencing variables in South Africa. The results found evidence of a long-run cointegrating relationship between saving and investment. The results also support the Feldstein-Horioka (1980) hypothesis that when there is low international capital mobility, then domestic saving and domestic investment are cointegrated. The results also found a positive relationship between investment and GDP, real interest rate, and inflation. While there exists a negative relationship between FDI and domestic investment. The implication of these findings suggests that a large proportion of domestic saving remains in South Africa to fund domestic investment in the long run. The study also found a unidirectional causality from domestic saving to domestic Investment in South Africa and unidirectional causality from GDP to Investment.

6.0.2 Implications and policy recommendations

Firstly, the government should embark on counter-cyclical fiscal policy to avoid the development of excessive current account deficits during periods of more rapid economic growth, rising investment and falling saving. The government should increase its savings through an improvement in the government budget balance to raise overall savings in periods of economic upswings. Secondly, the government should reduce income tax in a way to improve households ability to save through the improvement of disposable income. Furthermore, with the increase of consumption tax in VAT announced at the budget speech of 2018, the government should increase the incentive on a tax-free savings account, from a maximum of R30 000 to R50 000 or more. Contractual saving has also proven to encourage the saving activities of households as such government should create new avenues of contractual savings for individuals as well as households.

In terms of economic policy, it has been determined that cash holdings are directly responsive to economic policy. A policy environment that promotes economic growth and provides certainty is likely to reduce firms' caution about economic conditions. Then provide an incentive to free up cash for investment, while improved policy is likely to improve prospective returns on investments. Ultimately, company investment decisions are driven by the prospect of good returns, and the current trajectory of declining economic growth is dimming those prospects. In addition, growth promotion will broaden the tax base and increase revenue.With higher economic growth more people will have income; hence an increase in VAT revenue and more people will be employed. There will also be more fund for the repayment of debt hence narrowing the budget deficit.

Therefore, this study recommends that an adequate supply of savings should be maintained as a central policy objective for economic stability. The government should give priority to boost both domestic and foreign saving. This would compensate for the reduction in income, as well as raise government revenue, which in turn will encourage government surplus (saving). The added benefit of consumption tax on is that it will discourage the consumption of harmful products.

In terms of external sources of finance, the government should aim at maintaining a stable political atmosphere to encourage portfolio flows which act as an additional source of funds for investment. Even though FDI is a substitute for domestic investment, government should aim at maintaining an optimal level of FDI because its benefits of the transfer of knowledge, skills and technology. With regards to the current account, there is need for the government to develop import dependent sector of the economy to enable the sector to produce products locally. This may reduce the levels of import in the economy and also alleviate that high import that has a negative impact net exports and gross domestic saving

Lastly, government should increase saving awareness education through the South African Savings Institute (SASI) and Savings and Credit Corporation (SACCO). This will help teach individuals the means and benefit of savings and thereby boost the saving culture of South Africa.

6.0.3 Limitations of the study and areas of further research

Future areas of research could consider the impact of stovel and other informal savings among households and individuals. This would provide a broader understanding to the conventional method of saving. Further studies could consider internal and external firm characteristic's that influence cash holding. Lastly, it would be beneficial to explore a trivariate analysis of the relationship saving, domestic investment and foreign direct investment.

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6.1 Appendix A

Table 6.1: List of sampled firms

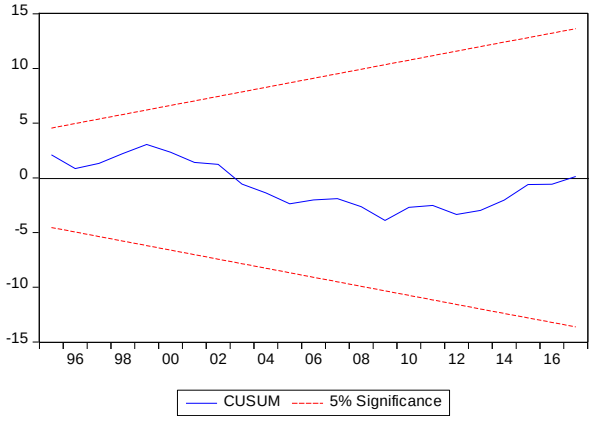
Company	Sector name
Barloworld Ltd.	General Industrials
Murray - Roberts Holdings Ltd.	General Industrials
Nampak Ltd.	General Industrials
Remgro Ltd.	General Industrials
Lewis Group Ltd.	General Retailers
Mr Price Group Ltd.	General Retailers
The Foschini Group Ltd.	General Retailers
Truworths International Ltd.	General Retailers
Verimark Holdings Ltd.	General Retailers
Woolworths Holdings Ltd.	General Retailers
Telkom SA SOC Ltd.	Fixed Line Telecommunications
Clicks Group Ltd.	Food - Drug Retailers
Pick n Pay Stores Ltd.	Food - Drug Retailers
Shoprite Holdings Ltd.	Food - Drug Retailers
The SPAR Group Ltd.	Food - Drug Retailers
Afrimat Ltd.	Construction - Materials
Aveng Ltd.	Construction - Materials
Basil Read Holdings Ltd.	Construction - Materials
Calgro M3 Holdings Ltd.	Construction - Materials
Distribution and Warehousing Network Ltd.	Construction - Materials
Esor Ltd.	Construction - Materials
African Oxygen Ltd.	Chemicals
Delta EMD Ltd.	Chemicals
Omnia Holdings Ltd.	Chemicals
Rolfes Holdings Ltd.	Chemicals
Sasol Ltd.	Chemicals
AfroCentric Investment Corporation Ltd.	Health Care Equipment - Services
Mediclinic International plc	Health Care Equipment - Services
Netcare Ltd.	Health Care Equipment - Services
Comair Ltd.	Travel - Leisure
Spur Corporation Ltd.	Travel - Leisure
Blue Label Telecoms Ltd.	Mobile Telecommunications
Huge Group Ltd.	Mobile Telecommunications
MTN Group Ltd.	Mobile Telecommunications
Vodacom Group Ltd.	Mobile Telecommunications
Caxton and CTP Publishers and Printers Ltd.	Media
Caxton and CTP Publishers and Printers Ltd.	Media
Naspers Ltd.	Media
Tiso Blackstar Group SE	Media
eMedia Holdings Ltd.	Media
eMedia Holdings Ltd.	Media

Anglo American Platinum Ltd.	Mining
Anglo American plc	Mining
Impala Platinum Holdings Ltd.	Mining
Lonmin plc	Mining
Royal Bafokeng Platinum Ltd.	Mining
Wesizwe Platinum Ltd.	Mining
Efora Energy Ltd.	Oil - Gas Producers
Erin Energy Corporation	Oil - Gas Producers
Montauk Holdings Ltd.	Oil - Gas Producers
Oando Plc	Oil - Gas Producers
Adcock Ingram Holdings Ltd.	Pharmaceuticals - Biotechnology
Ascendis Health Ltd.	Pharmaceuticals - Biotechnology
Aspen Pharmacare Holdings Ltd.	Pharmaceuticals - Biotechnology
4Sight Holdings Ltd.	Software - Computer Services
AYO Technology Solutions Ltd.	Software - Computer Services
Adapt IT Holdings Ltd.	Software - Computer Services
Allied Electronics Corporation Ltd.	Software - Computer Services
MICROmega Holdings Ltd.	Support Services
Marshall Monteagle PLC	Support Services
Metrofile Holdings Ltd.	Support Services
Taste Holdings Ltd.	Travel - Leisure
Tsogo Sun Holdings Ltd.	Travel - Leisure
Wilderness Holdings Ltd.	Travel - Leisure
British American Tobacco plc	Tobacco
Alviva Holdings Ltd.	Technology Hardware - Equipment
Mustek Ltd.	Technology Hardware - Equipment
Accentuate Ltd.	AltX
African Dawn Capital Ltd.	AltX
Alaris Holdings Ltd.	AltX
Ansys Ltd.	AltX
Indequity Group Ltd.	Development Capital
ARB Holdings Ltd.	Electronic - Electrical Equipment
CAFCA Ltd.	Electronic - Electrical Equipment
Consolidated Infrastructure Group Ltd.	Electronic - Electrical Equipment
Ellies Holdings Ltd.	Electronic - Electrical Equipment
Grindrod Ltd. Industrial	Transportation
Imperial Holdings Ltd.	Industrial Transportation
Nu-World Holdings Ltd.	Leisure Goods

6.2 Appendix B

Figure 6.1: Model Stability tests

CUSUM graph



CUSUM of squares