SAVING AND INVESTMENT IN SOUTH AFRICA: A CAUSALITY STUDY

by

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ABSTRACT

This study aims to investigate the relationship between private saving and investment for South Africa using a Vector Error Correction Framework. Saving and investment are considered to be important factors for sustainable economic growth in the country, particularly as these variables have been recorded at significantly lower levels than those of other developing nations. By examining the direction of causality between saving and investment, the most suitable policy measures can be used in stimulating either savings or investment, and as a result aggregate growth. The study found a positive two-way causality to exist between these two variables, proving that both saving and investment-led policies are necessary in raising saving and investment levels. With the inclusion of credit extension as the third variable used to remove any variable bias, the study not only found credit extension to Granger cause private saving, but the reverse relationship was found to be present as well. This relationship was however found to be negative, confirming that lower borrowing constraints may have a negative effect on saving levels. The negative relationship between credit supply and private saving (substitution effect) proves that credit supply will only yield a positive result for savings if channelled through investment expenditure.

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CHAPTER ONE

INTRODUCTION

1.1 CONTEXT OF RESEARCH

According to the World Bank (2011:1), developing countries contributed almost half of global growth in 2010, their combined GDP growth being 5.4 percent. South Africa's growth rate however lagged behind this average at 2.8 percent in the same year. Though this figure increased to 3.6% in 2011 before shrinking to a mere 2.5% in 2012 (South African Reserve Bank, 2013), it is still not comparable to the growth rate of other developing nations. The World Bank (2011:5) emphasises that in order to position South Africa for a higher GDP growth trajectory, it will be important to ensure the significantly higher levels of fixed investment necessary to sustain faster economic growth. Fixed investment is required to improve a country's overall standard of living. Economic theory suggests that investment must be funded either from domestic savings, credit extension or foreign capital inflows. However, according to the Commission on Growth and Development, there is no case of a sustained high investment path not backed up by high domestic savings (World Bank, 2008:54).

The relationship between savings and investment is important. South Africa's savings are lower than those in other emerging economies, having reached its lowest level of 15 percent of GDP between 2005 and 2007 (World Bank, 2011:16). If domestic savings are required to fund investment, and thus growth, then countries such as South Africa are trapped in low growth by their low savings rate. Government policies should therefore focus on first increasing savings so that space is provided for investment to rise. But if high investment causes high savings, then policy should focus rather on stimulating investment, which will promote the necessary supply of savings. Alternatively an economy, particularly a developing one, could rely on foreign savings (capital inflows) to fund its investment-savings shortfall. If so, why did the Commission on Growth and Development (World Bank, 2008) find that no developing country had successfully done so?

It is important for an economy to rely on its own resources when financing its investment needs. The reason for this being that dependence on foreign funding, whether short-term (portfolio

inflows) or long-term (foreign direct investment), may have severe consequences for a country's sustainable growth. Portfolio inflows are associated with volatility, whereas foreign direct investment may lead to the unfavourable control of host country companies by foreign firms (Loungani and Razin, 2001). The domestic financial sector therefore plays a critical role in providing funding to potentially profitable domestic firms who are financially constrained. The ability of banks to lend may not necessarily depend on the saving deposits of various stakeholders however. As Keynes (1937) emphasises, investment expenditure is not limited by a bank's savings but rather by its liquidity. "The investment market can become congested through shortage of cash. It can never become congested through shortage of saving" (Keynes, 1937:222). Keynes (1937:222) further adds that "there will always be *exactly* enough ex post saving to take up the ex post investment and so release the finance which the latter had been previously employing". Thus causality from the Keynesian perspective is found to be from investment to saving as opposed to the traditional view of savings being necessary before any investment expenditure takes place. Analyzing the causality between these two variables gives direction on how to enhance the saving-investment association.

1.1.1 The Saving-Investment Relationship

Both theoretical and empirical studies have reached conflicting results concerning the direction of causality between domestic savings and investment. Theoretically, savings are believed to be an important determinant of investment in the Classical model. An increase in savings increases the supply of available funding relative to the demand, which forces interest rates down, making borrowed money more affordable to firms and thus increasing investment. In the Keynesian model, interest rates are determined by the supply and demand for money not by saving and investment as in the Classical model. Through the multiplier, changes in investment, via its impact on income, cause a change in savings exactly equal to the change in investment in a closed economy. Savings and investment are therefore always equal. The direction of causality is from investment to savings and not from savings to investment as stated in the Classical model. A version of the Keynesian model, known as the Modern Monetary Theory (MMT), states that money supply is endogenous and not exogenous as is commonly believed. This relatively new school of thought has generated several followers (Mosler, 2010; Moore, 2006; Galbraith, 2005; Bell, 1998; Wray, 1998) who believe that savings are dependent on the level of credit extended

in the economy. Moore (2006) argues that when investment demand is funded by bank borrowing, this results in newly-created bank deposits. This newly created deposit is the new saving.

Empirically, the pioneering work of Feldstein and Horioka (1980) found domestic savings to finance the investment of 16 OECD countries, concluding that the positive relationship between these two variables was due to limited capital mobility. Similar findings were reached by Onefowara, Oweye & Huart (2011) and Apergis & Tsoulfidis (1997) who found causality to run from savings to investment in the UK and the Netherlands amongst other developed economies. Investment was found to cause higher domestic savings in Denmark, Germany and Luxembourg (Onefowara, Oweye & Huart, 2011), and Hong Kong, Malaysia, Myanmar and Singapore (Sinha, 2002). Interestingly, a bi-variate causality framework between domestic saving and investment was found for South Africa (Afzal, 2007), as well as between saving and economic growth (Romm, 2005; Odhiambo, 2009). Understanding the direction of causality between savings and investment is relevant for its policy implications (Ramakrishna & Rao, 2012).

1.2 GOALS OF RESEARCH

The goals of the research include:

- Determining whether a long-run relationship between private saving and investment exists in South Africa.
- Establishing the direction of causality between investment and savings if a long-run relationship is found to be present.
- Lastly, to examine the policy recommendations for stimulating either private saving or investment, depending on the direction of causality between these two variables.

1.3 METHODOLOGY

In order to avoid any bias involved in the bi-directional causality between savings and investment, credit extension was included to make it a tri-variate causality framework. The Johansen Vector Error Correction Model (VECM) (Johansen, 1988) will be used to determine the long-run co-integration between private saving, investment and credit extension, as well as to determine what impact short-run dynamics have for the long-run.

Quarterly data from Q1 1995 to Q4 2011 will be used. Data is obtained from the South African Reserve Bank (SARB) statistical database.

1.4 ORGANISATION OF STUDY

Chapter Two presents the literature review in which empirical studies on the saving-investment, saving-credit extension, and investment-credit extension relationships are discussed. In Chapter Three, the various economic theories explaining the correlation between saving and investment are examined. These theories include the Classical Theory, Neoclassical Theory, Keynesian Theory and Endogenous Money Theory. Chapter Four provides the econometric methodology used in the study, specifically, the Johansen co-integration approach. In Chapter Five, the results of the Johansen approach are presented, whereas Chapter Six gives the conclusion and policy recommendations needed to improve the saving-investment relationship and hence stimulate sustainable economic growth in South Africa.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

As stated in Chapter One, in order for South Africa to achieve a higher GDP trajectory, it will be important to ensure significantly higher levels of fixed investment. South Africa's fixed investment as a percentage of GDP averaged 17.3 percent of GDP during 1994 and 2012 (South African Reserve Bank, 2013), with the country having achieved an average GDP growth rate of only 3.3 percent since 1994 (World Bank, 2011:15). The investment average increased to 20.5 percent during 2006 and 2010 (World Bank, 2011:16), yet no significant improvements in the growth rate were made. This compares with the thirteen economies, including amongst others China and Botswana[1], which experienced investment levels of 25 percent of GDP and higher in order to achieve sustained growth rates of 7 percent or more over 25 years since World War II (World Bank, 2008:34). Investment is necessary to make additions to the capital stock as well as to replace existing depreciated stock. For high rates of investment to be sustained, high domestic saving rates are believed to be necessary. According to the Commission on Growth and Development, there is no case of a sustained high investment path not backed up by high domestic savings (World Bank, 2008:54). National savings in South Africa during 2006-2010 were recorded at a significantly lower rate then that of investment, averaging just under16 percent of GDP (World Bank, 2011:16). As a result, the current account deficit averaged 4.5% of GDP between 2006 and 2010.

Foreign savings are used to fund the country's savings-investment shortfall i.e. its current account deficit. Capital inflows in the form of foreign portfolio investment have been South Africa's main source of foreign funding since 1994. They have however been perceived to be the most volatile source of investment. This perception is based on the frequency of capital account reversals in the international community, with reversals having varied between 5.3 percent for industrial countries and 22.8 percent for African regions (Smit, 2008:72). Studies by Bresser-Pereira & Nakano (2003) and Prasad, Rajan and Subramanian (2007) found countries dependent

[1] The thirteen economies include Botswana, Brazil, China, Hong Kong, Indonesia, Japan, Malaysia, Malta, Oman, Republic of Korea, Singapore, Taiwan and Thailand.

on capital inflows to be associated with lower economic growth rates. In addition, relying on foreign funding may adversely overvalue the exchange rate (Dullien, 2009:4).

In order to diminish the country's dependence on foreign funding, increasing domestic savings has been recognized as being necessary to fund increased domestic investment (World Bank, 2008). Therefore, the question that needs to be answered is whether a country's investment demand is dependent and therefore constrained by the level of domestic savings, or whether it is instead demand for investment which produces the necessary savings to finance it. In understanding the relationship between domestic saving and investment, credit extension was included in this study as an intermittent variable to make this bi-variate causality framework into tri-variate causality model. The inclusion of this intermittent variable stems from a number of studies supporting the link between domestic investment and credit extension (Romm, 2005; Bekaert, Harvey & Lundblad, 2005; Munir, Awan & Hussain, 2010; Maganga & Abdi, 2012; Keynes, 1937), as well as the connection between domestic savings and credit extension (Romm, 2005; Tan, 2012; Loayza, Schmidt-Hebbel & Serven, 2000; Moore, 2006; Keynes, 1937). These are discussed in Section 2.6 and Section 2.7. Under the prior savings assumption, credit extension demonstrates the extent to which financial intermediaries can channel savings into investment (Romm, 2005:18). If on the other hand investment leads to higher savings, the financial system serves to provide the purchasing power (credit extension) which investors use to increase the capital stock which creates the income that provides *ex post* for the savings needed to finance the investment (Dullien, 2009:2). Additionally, by adding a third variable the adverse effects of omitted variable bias may be mitigated (Odhiambo, 2009).

This chapter will be divided as follows: Section 2.2 provides a detailed description of the nature of saving and investment, Section 2.3 examines the historical saving trend in South Africa, while Section 2.4 looks at the historical investment trend. In Section 2.5, previous studies on the link between saving and investment will be discussed, while Section 2.6 includes studies on the credit extension - investment relationship. Section 2.7 discusses the domestic saving - credit extension correlation, and Section 2.8 concludes this chapter.

2.2 SAVING AND INVESTMENT COMPOSITION

Savings can be defined as income that is not consumed in a particular time period and is therefore viewed as postponed consumption (Strydom, 2007:1). Prinsloo (2000:1) describes savings as the amount of resources or income produced in the economy in a given year, which is not consumed immediately, but is rather put to use in a way that will provide returns to the economy in years to come. From these definitions, saving involves a conscious effort of putting aside a certain proportion of income. This description expresses the more traditional definition of domestic savings. According to Moore (2006:2), 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 (2000:3) 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.

There are three types of savings. Namely, household saving, corporate saving as well as government saving.

2.2.1 Household Saving

According to Strydom (2007:2), household sector saving constitutes that part of current household income that is not consumed after the payment of direct taxes. Household saving can also include current payments made in the form of a reduction in household liabilities, such as the repayment of capital on loans for housing as well as of consumer durables (Prinsloo, 2000:4). Household savings can be divided between two categories; namely, discretionary and contractual savings. Contractual saving involves individuals making payments such as premiums on insurance policies, contributions to pension funds as well as the capital amount paid for households' mortgage loans (Prinsloo, 2000:4). With 9 million members and more than R2 trillion in assets, South Africa already has among the world's largest pension schemes in relation to the size of its economy (World Bank, 2011:42). Discretionary saving on the other hand refers to types of saving (eg. saving accounts) where households are not bound by any fixed commitments (Prinsloo 2000:4). In other words, it is all the saving that occurs at the discretion of the individual.

There are several motives behind household saving. The more common motives behind household saving include the precautionary saving motive, saving for education, saving to purchase a house, as well as saving for retirement (see Alessie, Lusardi, & Aldershof, 1997; Johnson, 1999; Bucks, Kennickell & Mack, 2009; Yao, Wang, Weagley & Liao, 2011). The life-cycle theory and permanent income theory provide theoretical perspectives to explain why households save (discussed in Chapter Three).

2.2.2 Corporate Saving

Corporate saving can be described as a company's net income not paid out in dividends to its shareholders but is instead retained within the firm as retained earnings (Love, 2011:2). It "is estimated as the sum of the gross operating surpluses of companies, less the net dividend, interest, rent and royalties payable by them to the other sectors of the economy and to the rest of the world, less direct taxes on income and wealth and other net transfer payments made to the general government, the household sector and the rest of the world" (Prinsloo, 2000:4). Net corporate saving is therefore equal to gross corporate saving less the provision for depreciation and any changes in inventories after valuation adjustment (Prinsloo, 2000: 4). The World Bank (2011:19) states that over the period from 1995 to 2007, improvement in macroeconomic stability in South Africa made corporations less risk averse and as a result lowered their precautionary saving motive. Net corporate saving fell as a consequence.

There are several reasons which influence a company in retaining its profits (corporate savings) over distributing them as dividends. According to Van Rijckeghem (2010:18), the main motivation for corporate saving is to finance investment, particularly when investment opportunities are promising but other sources of finance such as equity, debt or bank loans are unavailable or more expensive. The allocation of corporate saving to either physical or financial investment is reflected in the company's balance sheet. According to Love (2011:3) "as retained earnings add to the equity balance (reflected in the equity and liability side of the balance sheet), the asset side of the balance sheet has to accommodate the increase by increasing liquid assets, working capital or fixed assets".

Regarding the taxation of dividend income vs. capital gains, with higher dividend income tax than capital gains tax, there would be an incentive for firms to retain earnings since capital gains

would be taxed at a lower rate (Van Rijckeghem, 2010:18). Regarding the taxation of company profits, Strydom (2007) and Prinsloo (2000) argue that the tax system in South Africa encourages households to accumulate saving in the corporate sector through tax arbitrage. The large difference in corporate and household tax rates in 2007, where the maximum marginal income tax rate on individuals stood at 40 percent compared to a flat rate of 29 percent on companies, provided an incentive for individuals to channel their income into companies (Strydom 2007:5). The ability of individuals to be able to channel their income into companies is referred to as households "piercing the corporate veil" (discussed in Chapter Three).

2.2.3 Government Saving

While the World Bank (2008:54) describes government saving as that percentage of its investment that is financed out of revenues, Strydom (2007:2) describes it as "retained taxes and other receipts which are not disbursed on current expenditure as well as retained profits of public enterprises" i.e. government income that is not spent on consumption. These savings are used to fund government's investment expenditure or future consumption.

Prinsloo (2000:15) mentions that a motive for government saving is to be in a position to be able to pay back foreign and local debt as well as for government's borrowing requirement (funds borrowed by government to cover its expenditure) to diminish. Government may also save to boost the level of national savings. In South Africa, for example, government has been urged to run surpluses at times of rapid economic growth and when investment levels are high to reduce resultant current account deficits (World Bank, 2011). However, a number of studies (Aizenman & Powell, 1998; Strydom, 2007; Prinsloo, 2000) state that low government savings have sometimes led to lower national savings. In this regard, Barro (1974) mentions that the Ricardian Equivalence Proposition (REP) reveals that if the private sector is fully rational and cares about the future of the generations to come, they will use these ideals when forming their consumption and saving decisions. Specifically, if the government sector were to decrease taxes today, the private sector would save the money made from these tax cuts for their descendents, thus increasing private saving. Conversely, a rise in taxes is met by reduced household savings. There would be no change in national savings.

An additional motive to increase government saving is due to political factors. Aizenman & Powell (1998:68) argue that when a political party is in power, they may save below the optimal level if the possibility arises that the rewards from future investment or consumption made from saving resources are benefited by other political parties gaining power in the future. Therefore if a ruling political party believes that it will not be removed from power in future, it may save at the optimal level.

While government saving may form an important part of national saving, it usually does not constitute the majority of these savings. In South Africa, corporate savings remain the largest component of aggregate gross saving, accounting for more than 90 percent in the 2000s (World Bank, 2011:19). It is for this reason that private savings (corporate plus household saving) will form the focus of this study.

2.2.4 Investment

Investment expenditure, also referred to as fixed capital formation, can be defined in the national accounts as acquisition less the disposal of assets intended to be used in the production of other goods and services for a period of more than a year (OECD, 2009). Investment is therefore an asset that is purchased today with the hope that it will generate income in the future. There are two forms of investment, namely, fixed investment as well as financial investment. Fixed investment consists of the purchase of capital such as land and machinery which are used in the production process and which earn increased profits (Myles, 2003). Financial investment on the other hand is the purchase of securities such as bonds and stocks. Public investment as well as private investment makes up a country's total investment spending. Public investment consists of investment expenditure made by the general government and public enterprises (World Bank, 2011) while private investment is investment undertaken by both the business and household sectors.

An important question to ask is whether a country should focus on increasing public investment or private investment; which of these contributes more to growth? Khan and Kumar (1997:72) argue that the share of public investment might be expected to be higher than private investment in developing countries as their need for infrastructural and related capital is greater. They found public investment accounts for nearly half of total investment in developing nations compared

with only a fifth of total investment in industrial countries. According to the World Bank (2011:139), investment in infrastructure by the public sector is necessary for growth and development since it expands the range of opportunities for and returns on private investment. As a result, public investment "crowds-in" private investment instead of replacing it, a contrary finding to Mittnik and Neumann (2001) who argue that a substitution effect exists between these two forms of investment. Kollamparambil and Nicolaou (2011) found public investment not to crowd in/out private investment but found it rather to exert an indirect impact on private investment through the accelerator effect.

Serven and Solimano (1990), Khan and Kumar (1997), the World Bank (2011) and Khan and Reinhart (1990) however found private investment to have a larger impact on economic growth than public investment. Due to its impact on growth and because of its importance in shifting an economy from a developing state to an industrial state, the focus of this study will be on private investment.

2.3 SAVINGS TREND IN SOUTH AFRICA

National savings in South Africa (see Figure 2.1) have experienced a downward trend since peaking at 35 percent of GDP in 1980 as a result of the high gold prices at that time which boosted corporate profits (World Bank, 2011:16). Before this downward trend occurred, South Africa's saving rate was among the highest in both developing economies as well as middle-income economies (Odhiambo, 2009:710). Domestic savings have declined from an average of 24 percent between 1968 and 1994 to only 16 percent between 1995 and 2008 (World Bank, 2011:26). While the reduction in national savings prior to 1994 was mainly the result of a deteriorating government saving ratio (Aron and Muellbauer, 2000; Prinsloo, 2000; World Bank, 2011), low savings levels after 1994 were mainly caused by low private sector savings (corporate and household savings).

Economic stability after 1994 put businesses in a position to increase dividend payouts between 1995 and 2007, a consequence of them being less risk-averse (World Bank, 2011:19). Their "precautionary saving motive" had thus been lowered. In addition, easier access to domestic and global credit made borrowing cheaper for businesses relative to saving to self-finance their investment (World Bank, 2011:19). The financial crisis of 2008 increased their precautionary

savings, however. Corporate savings increased from R25 116 million in 2008 to R119 633 in 2009, and eventually peaked at R203 119 (16.9% of GDP) in 2010 (South African Reserve Bank, 2013). The World Bank (2011:16) states that the corporate sector started saving as a result of the uncertainty caused by the global crisis (precautionary saving motive) and as banks became increasingly conservative in lending. In 2011, corporate savings diverted from this positive trend by falling from 16.9 percent of GDP in 2010 to 15 percent of GDP in the first quarter of 2011 (South African Reserve Bank, 2011). This decline is a reflection of the weaker growth in operating surpluses of incorporated business enterprises as well as the increase in dividend payments in the first quarter of 2011 (South African Reserve Bank, 2011:12). The lower national savings in the first quarter of 2011 were a result of the decline in corporate savings (South African Reserve Bank, 2011:11). Gross national saving decreased from 16.3 percent of GDP in the fourth quarter of 2011 to 15.2 percent in the first quarter of 2012 (South African Reserve Bank, 2012). The cause of this decline is due to lower gross saving by the corporate sector as well as an increase in the pace of dis-saving by general government (South African Reserve Bank, 2012:11). Corporate savings still remain the largest components of aggregate gross saving, "accounting for more than 90 percent in the 2000s" (World Bank, 2011:19).

As a percentage of GDP, household saving declined sharply from 3.2 per cent during the 1980s to 0.2 per cent between 2000 and 2008 (National Treasury, 2009:2). According to Prinsloo (2000:13), the decline in household savings since the 1980s has been part of a global weakening in the saving performance of households, where the personal saving ratios in a number of industrialized countries have declined. The decline in household income growth has also contributed to this downward trend, due in great part to the significant rise in unemployment rates in the country (National Treasury, 2012; Prinsloo, 2000; World Bank, 2011). In addition to low income growth and unemployment, the National Treasury (2012:6) mentions "a bias towards present consumption" as a factor contributing to the country's low saving levels. Household saving rates have been negative since 2006. For the period 2006 to 2011, household saving rates as a percentage of disposable income have been recorded annually as -0.8%, -1.2%, -1.2%, -0.8%, -0.5%, and -0.2% (South Africa Reserve Bank, 2013). Easier access to credit has allowed households to borrow in order to fund their consumption behaviour, which may have reduced their incentive to save. According to the National Treasury (2012:6), the ratio of debt to

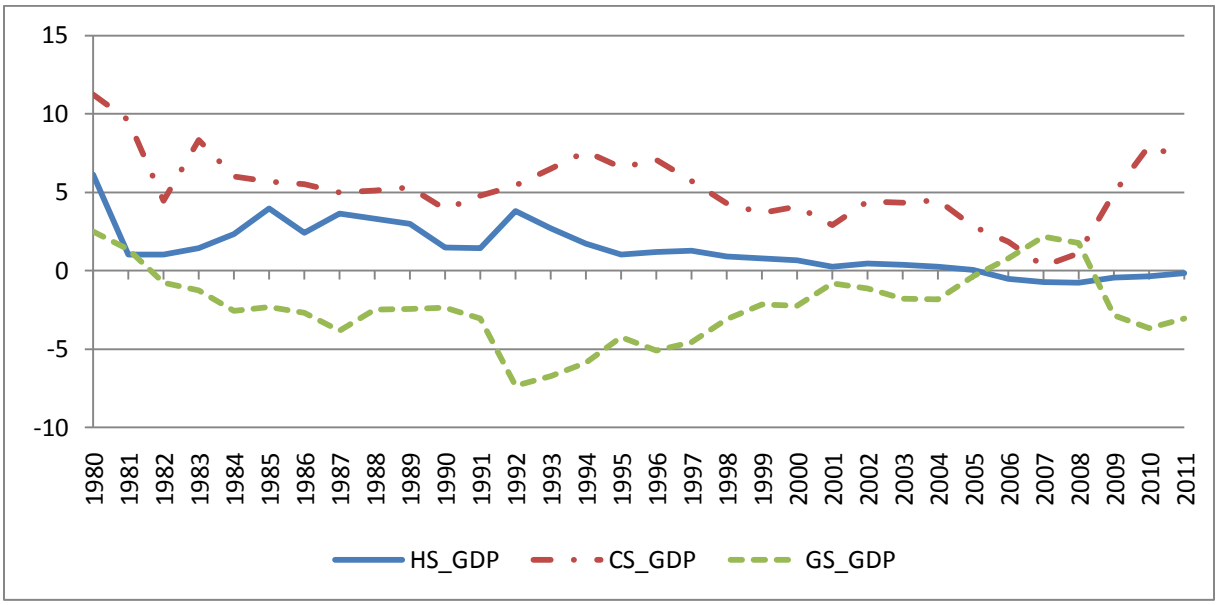
disposable income for households has risen from an average of 45 percent in the 1970s to 56 percent between 2000 and 2005 before reaching 78 percent over the period 2006-2011.

Strydom (2007:5) mentions that the country's declining government deficit had an adverse impact on household savings, where government savings had been negative since the early 1980s, but started reflecting an upward trend in the mid 1990s. They reached a positive balance in 2007. The fiscal policies used to increase government saving, such as a high marginal tax rate on individuals, implies a "tax burden that enforces tax payments out of saving" (Strydom, 2007:5). The World Bank (2011) also recognizes the rising government savings as a factor that may have reduced household savings in South Africa. This suggests that "Ricardian equivalence" held true over this period.

Regarding public savings, the government sector has been unable to consistently sustain a positive savings balance. "General government savings declined sharply in the period leading up to 1994, stayed negative until 2000, and then recovered on the back of fiscal consolidation until 2008. They then fell back into negative territory in 2009 and 2010 as the government embarked on countercyclical policies" (World Bank, 2011:16, 17). The weakening in government saving pre-1994 can be mainly attributed to significant increases in the level of government consumption expenditure as well as the growing cost of servicing debt (Prinsloo, 2000:15). General government increasingly had to borrow funds to finance capital spending as well as a portion of recurring expenditure (Prinsloo, 2000:14). According to Strydom (2007:5), the major reasons for the improvement in the government deficit in the second half of the 1990s is due to the increased efficiency by government in collecting taxes as well as lower spending due to the poor delivery of public services.

Figure 2.1 below illustrates the relationship between private sector savings (household and corporate), as well as government savings over the period 1980 and 2011.

Figure 2.1: Domestic Savings as a Percentage of GDP



Source: South African Reserve Bank Statistical Database (2013)

Figure 2.1 illustrates the components of national saving in South Africa over the period 1980 to 2011. Specifically, these components include corporate saving (CS_GDP), household saving (HS_GDP) and government saving (GS_GDP) as percentages of GDP. It is evident that corporate savings form the largest component of domestic saving in the country, though a drastic decline in this variable since 1980, as a result of booming gold prices, can be seen. Household saving has also declined drastically since 1980 and is shown to move mainly in the same direction as corporate saving, casting doubt on the claim of households "piercing the corporate veil" (discussed in Chapter Three). Corporate savings seem to have increased significantly during 2008, perhaps as a result of the financial crisis, while household savings seem to have continued on a downward spiral. Government saving moves in an opposite direction to private savings (supporting the "Ricardian equivalence" proposition). It reported a positive balance only in 2007, before experiencing a downward trend as the fiscal deficit soared following the financial crisis.

2.4 INVESTMENT TREND IN SOUTH AFRICA

Investment expenditure in South Africa (Figure 2.2) has not experienced one constant trend but has rather gone through several periods of rising and falling trends. According to the World Bank

(2011:20) the country's investment expenditure has gone through three phases. The first phase occurred between 1960 and 1981 when the investment rate increased from 22 percent of GDP in 1960 to an all-time high of 33 percent in 1981. Rattso and Stokke (2007:617) state that this period of rising investment was driven by high returns to investment. The country's gold reserves were in great demand, particularly from the global market, which resulted in heavy investment in the mining sector. By 1970, foreign investment in mining and manufacturing had reached over 60 percent of total foreign investment (Byrnes, 1996). High investment during this period coincided with increased domestic savings, in part because the high gold price and high corporate profitability lead to high corporate savings.

The second phase, according to the World Bank (2011:20), saw the investment rate fall by more than 50 percent to 14 percent of GDP by 1993 and then stagnate until 2001. Sanctions imposed on the country due to the apartheid regime served as barriers to investment and productivity growth until 1994. These sanctions resulted in capital reversals, which lead to the formation of the financial rand in 1985 which attempted to control the large outflows of capital during this period. Great damage had been done to the economy however, where more than 350 foreign corporations sold off their South African investments (Byrnes, 1996).

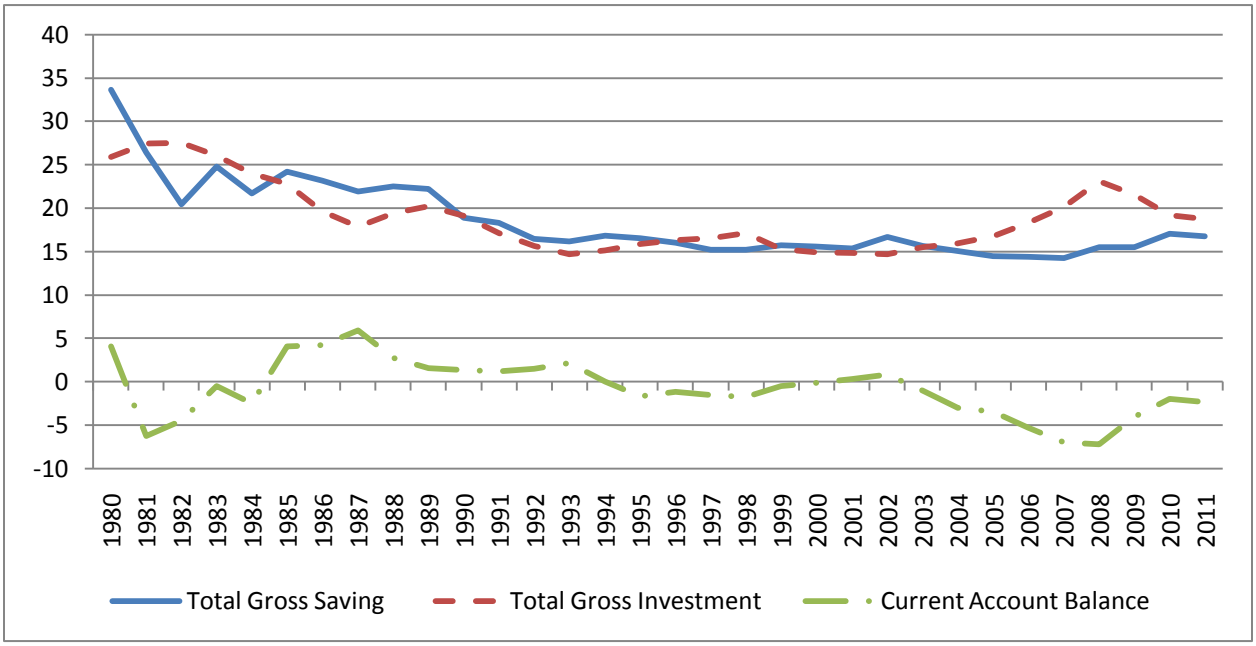
The FDI reversals increased government's reliance on loans rather than on equity capital to finance development so that in 1984 these loans constituted over 70 percent of South Africa's foreign liabilities compared with 27 percent from direct investments (Byrnes, 1996). Once most of the loans to the country were cut off, available investment capital was drastically diminished, which negatively affected growth in the country. When sanctions were removed on South Africa in 1994, capital and trade liberalization took place once again, stimulating economic growth. Investment however stagnated until 2001. The World Bank (2011: 23) notes that private investment in South Africa has become less responsive to the returns on investment since 1994, despite high and increasing real returns and even though the real interest rate (cost of capital) declined significantly, particularly during 1996-2001 (Eyraud, 2009:9). Foreign capital during this period primarily took the form of portfolio investment, a short-term and volatile source of capital, rather than direct investment (Byrnes, 1996). Foreign investors became more cautious about investing in South Africa. In addition, South Africans started investing heavily in other African countries, despite declining investments into the country.

The third phase saw the investment rate increase again from 15 percent in 2001 to 22.5 percent in 2008 before it was negatively affected by the financial crisis. According to Eyraud (2009:9), an important reason for this rise in the investment rate is due to the increase in domestic savings. The saving-to-GDP ratio increased from an average of 12 percent during 1996 and 2001 to 16 percent between 2002 and 2006. In addition to savings, a significant increase in FDI occurred in 2001. According to Moolman, Roos, Le Roux and Du Toit (2006:6), this drastic increase was mainly the result of two cross-border mergers and acquisitions. Frankel, Smit and Sturzenegger (2006:17) argue that part of the recovery in South Africa's investment can be attributed to the significant investment in non-tradable items such as electricity, telecommunications and construction rather than on tradable goods like gold.

The financial crisis of 2008 however saw considerable outflows of capital from South Africa. During periods of economic instability, capital is usually withdrawn from emerging economies as investors become uncertain about their investment decisions, particularly in more "risky" economies. Since South Africa now had more portfolio investments than FDI, it became easier reversing these capital flows as they were short-term in nature. FDI is viewed as a more reliable source of foreign funding, and is therefore encouraged. Long-term investment flows in Africa are most likely to come from neighbouring countries as these countries are less focused on purely natural resources and as a result are more likely to assist development (Labour Research Service, 2011).

Figure 2.2 shows the relationship between gross domestic saving, gross capital formation (investment) and the current account balance over the period 1980 to 2011.

Figure 2.2: Gross Saving, Gross Capital Formation and Current Account Balance as a Percentage of GDP



Source: South African Reserve Bank Statistical Database (2013)

Figure 2.2 shows there to be a close positive relationship between gross saving (Gross _Saving_GDP) and gross investment (Gross_Investment_GDP). The World Bank (2011:16) states that the country's domestic savings and investment rates are highly correlated. They found the coefficient correlation between 1960 and 2010 to be 0.72. A high positive correlation between domestic saving and investment has however yielded different interpretations on the causality of this relationship (discussed in Section 2.5). Since 1994 when South Africa became a liberalized economy, a current account deficit has been recorded most years. This reliance on foreign saving, particularly in the form of portfolio inflows, has been found to make the country vulnerable to foreign investors easily withdrawing their funds from the country (World Bank, 2011). Portfolio investment, unlike foreign direct investment, flow into the country's debt and equity markets, which are in turn subject to the rapidly changing attitudes of investors (Linde, 2012).

While a positive relationship may have existed between saving and investment since the 1980s, investment expenditure was consistently higher than domestic saving in the early 1990s and

since 2003. 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, 2013). Between 2003 and 2011, the annual ratio of the current account balance to GDP has been recorded at -1%, -3%, -3.5%, -5.3%, -7%, -7.2%, -4%, -2.8%, and -3.4%. The current account deficit, used as a proxy for foreign borrowing, has been financed mainly by international portfolio flows, "which cannot be relied on over an extended period" (World Bank, 2011:16). According to the South African Reserve Bank (2011:11), around 15.8 percent of the country's gross capital formation was financed by foreign capital in 2011, having increased from 14.6 percent in 2010. Portfolio flows are the most volatile source of foreign finance since investors may decide to reverse their transactions at any time. The World Bank (2011:10) states that in the last quarter of 2010, net portfolio flows turned negative as foreigners reduced their positions in South Africa while South Africans increased their portfolio investments abroad.

2.5 PREVIOUS STUDIES ON SAVING-INVESTMENT CORRELATION

The studying of the saving-investment relationship for various countries can be taken back to the pioneering work of Feldstein & Horioka (1980). The aim of their study was to analyze the relationship between savings and investment for 16 OECD countries with full international capital mobility over the period 1960-1974. In a closed economy a high positive relationship is expected, since investment is limited by domestic savings. In an open economy no correlation is expected as investment can now be funded by foreign savings, and domestic savings can be invested abroad. Feldstein and Horioka (1980) however found a strong relationship to exist 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 is a surprising result for countries which are integrated into global markets, which is why they concluded (Feldstein and Horioka, 1980) that these countries were in fact not integrated with the global community; they concluded that capital was immobile in these countries.

Several studies (Frankel, Dooley and Mathieson, 1986; Kollias, Mylonidis and Pateologou, 2008; Apergis and Tsoulfidis, 1997; De Hann and Siermann, 1994; Miller, 1988; Levy, 2000; Wahid, Salahuddin and Noman, 2008; Afzal, 2007; Coakley, Hasan and Smith, 1999; Kasuaga,

2004; Cyrille, 2010; De Wet and Eyden, 2005) have since then investigated the saving-investment relationship for various countries. By analyzing 64 countries, including 14 developed and 50 developing, Frankel *et al* (1986) found the developed countries to have larger saving-investment coefficients than the developing economies. Apergis and Tsoulfidis (1997) found that for 14 EU countries, savings and investment are still correlated. The implication of this relationship is that even after Europe became increasingly integrated, capital mobility was still low between these countries. By analyzing the saving-investment correlation for 15 EU economies, Kollias, Mylonidis and Pateologou (2008) found there to be a significant positive correlation between these two variables. De Hann and Siermann (1994) found there to be a co-integrating relationship between savings and investment in a number of OECD countries, whereas Miller (1988) found the saving-investment relationship to be stronger in the pre-war period and Levy (2000) in the post-war period.

Regarding developing economies, a weaker co-integrating relationship between saving and investment has been found than for advanced countries, implying higher capital mobility. Wahid, Salahuddin and Noman (2008) found there to be a low saving-investment correlation in India, Bangladesh, Sri Lanka, Nepal and Pakistan, whereas Afzal (2007) found no long-run relationship between saving and investment in seven developing countries. The same author (Afzal, 2007) did however find a long-run saving-investment relationship in South Africa. Coakley, Hasan and Smith (1999) found the cross-section saving-investment regression coefficient for less developed countries (LDCs) to be lower than the coefficient for OECD countries, while Cyrille (2010), having studied the long-run relationship between savings and investment for 15 Sub Saharan African countries, found a low co-integrating relationship to exist. De Wet and Eyden (2005) found evidence of high capital mobility for 36 Sub Saharan countries.

It must be mentioned however that a high positive relationship between domestic saving and investment may not always be the result of low capital mobility. In the same vein, high capital mobility may not necessarily be the cause of a low saving-investment correlation. Current account targeting, intertemporal budget constraints, country size, policy responses and demand and supply shocks are just some of the factors explaining a positive saving-investment relationship in various economies (see Kohler, 2005; Levy, 2003; Baxter and Crucini, 1993; Bayoumi, 1990; Coakley, Hasan and Smith, 1999).

A negative saving-investment relationship may also be present in certain countries. A study by Chinn and Ito (2007) found financial liberalization to weaken the relationship between domestic savings and investment. Capital outflows may occur in liberalized economies, which in turn lower the availability of funding for domestic investment projects, assuming that savings drive investment demand. Similarly, capital inflows which are found to positively influence capital formation may form an imperfect substitute for domestic savings (Corbo and Schmidt-Hebbel, 1991; Ahmad and Ahmed, 2002; Weisskopf, 1970; Schmidt-Hebbel, Webb and Corsetti, 1992). An increase in the deposit rate, as a result of financial liberalization, may increase the marginal propensity to save and as a result reduce aggregate demand (Arestis and Caner, 2004:6). A reduction in aggregate demand leads to a fall in output, thereby decreasing domestic investment as the return to investment would be reduced (Arestis and Caner, 2004:6). Permanent income shocks can also explain the negative correlation between domestic savings and investment. According to Cherif and Hasanov (2012), high volatility in income shocks, whether domestic or external, may induce savers to increase their precautionary savings, thereby reducing their investment in high yielding, riskier capital stock (assuming savings finance investment). Their study found high volatility of permanent income shocks to be associated with countries that save a lot yet invest relatively little. Lastly, expected future income is expected to rise due to advancement in capital formation, resulting in a rise in current consumption and therefore a decline in savings. This relationship between investment and saving is better known as the income effect (see Loayza, *et al*., 2000; Prinsloo, 2000).

More important is the causal relationship between private savings and investment, particularly for a developing nation like South Africa. Determining the direction of causality provides authorities with a plan of action for stimulating economic growth. If causality is found to flow from savings to investment, policies should focus on first increasing savings so that space is provided for investment to rise. If however higher investment results in greater savings, policy should instead focus on rather stimulating investment which in turn will promote the necessary supply of savings. Onefowara, Oweye & Huart (2011) found the UK and the Netherlands to exhibit evidence of a long-run unidirectional causality from savings to investment, while Esso and Keho (2010) found domestic saving lead to higher investment in Benin, Cote d'Ivoire and Niger. Afzal (2007) found a unidirectional causality from saving to investment in Pakistan and Sri Lanka.

The reverse has also been found to be true. Sinha (2002) found investment to lead to higher savings for Hong Kong, Malaysia, Myanmar and Singapore and Onefowara, *et al* (2011) found causality to run from investment to savings in Denmark, Germany and Luxembourg. Agrawal (2001) found that for several Asian economies, the direction of causality runs primarily from growth to savings rather than the other way round. Anoruo & Ahmed (2001) on the other hand found growth to cause higher savings in Kenya, Ghana, Zambia and Nigeria. Sahoo, Nataraj & Kamaiah (2001) as well as Carrol and Weil (1994) also found growth to Granger cause higher domestic savings in their studies.

There is also evidence of a bi-variate causality relationship, where domestic savings and private investment Granger cause each other, being present in South Africa. Afzal (2007) found there to be a bi-directional causality between saving and investment in South Africa, while Romm (2005) and Odhiambo (2009) both found a bi-directional causality between saving and growth to exist. Thus not only were higher savings required to fund investment, but an increase in investment demand led to a higher level of savings in South Africa. According to the World Bank (2011:29), high domestic savings were not a prerequisite for growth takeoff in Chile, India, China and Indonesia, but were rather a response to the higher growth achieved by these countries. As growth and disposable income increase significantly, domestic savings will tend to increase since consumption patterns change more slowly (World Bank, 2011:29). However, had savings failed to respond to growth in these countries, high growth rates would have faltered in the long-run (World Bank, 2011). Savings are therefore necessary for long-term investment and growth. Chapter Three discusses the different theories on the causality direction between these two variables.

2.6 PREVIOUS STUDIES ON CREDIT EXTENSION-INVESTMENT CORRELATION

Credit extension, a proxy for financial liberalization, is expected to have a positive influence on domestic investment demand. Loayza, *et al.* (2000:405) argue that by liberalizing domestic financial markets, particularly if done by strengthening the domestic financial sector, an improvement in the efficiency of financial intermediation and hence investment is achieved, thus contributing positively to higher growth. A developed financial sector promotes the formation of both physical and human capital, increases the efficiency in allocating capital, minimizes the cost

involved in acquiring information, improves the management of risk, and encourages innovation (Giovannini, Iacopetta & Minetti, 2013:3).

Bekaert, *et al.* (2005) found economic growth to increase after the financial sectors were liberalized in 30 emerging economies. They argue that improved risk sharing as a result of liberalization may lead to increased investment in riskier higher expected return projects, reduce the cost of capital and make markets more efficient (Bekaert, *et al*; 2005:2). Following financial liberalization, their study found the investment-to-GDP ratio to increase, the consumption-to-GDP ratio to fall and the trade balance to worsen; thus implying that any inflows in foreign capital are invested rather than consumed.

By analyzing the impact of savings, real interest rates on bank deposits, bank credit to the private sector and public investment on private investment, Munir, *et al.* (2010) found bank credit to have a positive and significant long-run relationship with private investment in Pakistan for the period 1973 and 2007. Specifically, a 1% increase in bank credit was found to raise private investment by 0.48 percent. A similar finding was reached by Majeed and Khan (2008) who found a positive but insignificant relationship between bank credit and private investment in Pakistan during 1970 and 2006. They argue that a constriction on credit availability may lead to a reduction in the level of private investment, resulting in adverse effects on the long-term productive capacity of the private sector (Majeed and Khan, 2008:11). A study by Maganga and Abdi (2012) found bank credit to have a long-run as well as a short-run positive relationship with private investment in Malawi during 1979 to 2009. A 1% increase in bank credit extension resulted in a 0.898% increase in private investment in the long-run, while in the short-term, private investment increased by 0.198%.

By analyzing the impact of financial intermediary development on economic growth in a cross-section of countries, which amongst others include South Africa and the USA, Levine, Loayza and Beck (2000) found credit to the private sector to have a positive influence on capital formation and economic growth. Similar findings were reached by Dailimi and Giugale (1991) who found the credit volume in conjunction with interest rates to have a joint positive influence on the behaviour of private investment in Brazil, Columbia, India, Korea and Turkey during 1965 to 1985.

There are, however, studies which show the impact of credit on investment to be negligible, and even negative. Lensink (1996) argues that in countries where informal financial intermediaries finance practically all investment projects, liberalizing the formal financial markets would not necessarily enhance credit allocation, but instead cause a shift of resources from the informal markets to the formal markets, resulting in the reduction of the quantity and quality of investment.

Financial liberalization may not necessarily translate into improved *access* to funding. As O'Toole (2012:26) asserts, "the lack of improvements of financial access despite a commitment to financial liberalization may go some way towards explaining why growth has been stunted in Africa". According to Arbelaez and Echavarria (2002:22), successful financial liberalization should go beyond just increasing the availability of credit, but also have an impact over credit allocation. As a consequence, the businesses which would constructively use this purchasing power are not necessarily the ones receiving it. Credit finance may instead be directed at firms involved in speculative behaviour instead of productive investment (Odekon, 2002; Arza and Espanol, 2008). An increase in speculation would penalize entrepreneurial behaviour and as a result reduce long-term investment (Keynes, 1936; Arza and Espanol, 2008).

2.7 PREVIOUS STUDIES ON CREDIT EXTENSION-SAVINGS CORRELATION

The relationship between domestic savings and credit availability has yielded conflicting results from a number of studies. While on one hand credit extension (financial liberalization) and private savings have been found to have a positive relationship (Gurley & Shaw, 1960; McKinnon, 1973; Shaw, 1973), a liberalized financial sector has also been found to negatively influence domestic savings (Arestis and Caner, 2004; Loayza, Schmid-Hebbel & Serven, 2000; Japelli and Pagano, 1994).

According to Tan (2012:8), the expansion of saving deposits provides banks with greater funds for lending purposes, thereby encouraging increased credit extension. As a result, the growth of deposits is expected to have a positive impact on private credit growth. This result is based on the writings of McKinnon (1973), Shaw (1973), and Gurley and Shaw (1960). These authors found financial liberalization to be a necessary condition in encouraging both savings and investment. While in a financially repressed economy savings mainly flow to the savers' own

investments, in a liberalized economy, savers are offered a wider menu of portfolio choice where even savings from the foreign sector also respond to liberalization (Shaw 1973:9-10). As the private sector is offered a variety of saving options, the higher the savings level will rise.

By analyzing the impact of bank credit on 21 emerging economies, Mohanty, Schnabel and Garcia-Luna (2006:24) found changes in bank deposits to have a significant impact on the banking system's ability to lend. Several other studies (Tan, 2012; Levine, 1997) have also found changes in the deposit base to influence the availability of credit to the private sector. Mohanty *el al.* (2006:24) did however find credit growth rises or falls by less than a third of a rise or fall in loanable funds, indicating that in the event of an undesirable shock to their deposit rates, banks are in the position to liquidate a fraction of their other assets in order to preserve their line of credit to the private sector.

This finding is in contrast to studies by Holmes (1969), Nell (1999) and Moore (2006) who found credit extension does not depend on bank deposits or the sale of assets, but rather on the ability of banking institutions to extend loans using bank entries (discussed in detail in Chapter Three). As Holmes (1969:73) states, "in the real world banks extend credit, creating deposits in the process, and look for the reserves later". A study by Nell (1999) found this to be true for South Africa during 1966 to 1997. Under direct control measures between 1966 and 1979, Nell (1999) found a 1 percentage increase in total bank credit led to a 0.75 percent increase in base money (ie. reserves). Between 1980 and 1997, a period of market-orientated monetary policy, a 1 percentage increase in credit led to a 0.92 percent increase in base money. Money supply was therefore found to be endogenous in the country during this period.

A negative relationship between domestic savings and credit extension may also exist. According to Arestis and Caner (2004), financial deregulation, by increasing competition between loan providers, boosts borrowing by agents who were previously constrained, leading to a fall in domestic saving. Additionally, the negative income affect of higher interest rates may be stronger than the positive substitution effect (Arestis and Caner, 2004; Loayza, Schmid-Hebbel & Serven, 2000; Japelli and Pagano, 1994).

For South Africa, Loayza, *et al*. (2000), Prinsloo (2000), World Bank (2011) all found an increase in the credit level negatively influences the country's domestic savings. Loayza *et al*.

(2000:405) found a 1 percentage point increase in the ratio of private credit flows to income reduces the long-term private saving rate by 0.74 percentage point, while the World Bank (2011:27) found that because private sector credit increased significantly after 1994, it would have resulted in a 1.4 percentage point decline in the saving rate. According to Loayza *et al*. (2000:405, 405), the channel through which credit supply affects private saving levels is known as the quantity channel, where credit extension is expected to have a direct, short-run and negative impact on private savings.

Aron and Muellbauer (2000) found financial liberalization in South Africa caused household saving and corporate savings to move in opposite directions. Their results suggest that financial liberalization reduced household savings by a larger amount than it raised corporate savings. When the corporate sector increases its savings in response to changes in inflation and dividend tax rates, this raises the value of equities held on behalf of the household sector, thereby reducing their saving (Aron and Muellbauer, 2000:511).

2.8 CONCLUSION

In this section, the saving and investment trends in South Africa were discussed where it was found that both these variables have experienced downward trends since the 1980s. The negative and positive links between domestic investment and saving, credit extension and investment, and lastly credit extension and saving were then analyzed by looking at previous studies. Conflicting results were obtained from these studies regarding the relationships of these variables, as well as the direction of causality between them.

The following chapter discusses the various theories on the saving-investment relationship. Specifically, the Classical Theory, Neoclassical Theory, Keynesian Theory and Endogenous Money Theory.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 INTRODUCTION

In this section, the different economic theories provide their interpretation on the saving-investment relationship. Specifically, their perception on the direction of causality between these two variables will be discussed. Understanding the theoretical framework helps interpret the empirical findings of the saving-investment relationship, thereby providing direction on how to enhance saving and investment for the achievement of sustainable growth.

The chapter will be divided as follows. Before analyzing the different economic theories, the national account identities are first described in Section 3.2. In Section 3.3, the different economic theories are discussed, specifically the Classical Theory in Section 3.3.1, the Neoclassical Theory in Section 3.3.2, the Keynesian Theory and Endogenous Money Theory in Sections 3.3.3 and 3.3.4 respectively. In Section 3.4 the household saving theories are discussed while Section 3.5 presents the hypothesis of "households piercing the corporate veil". In Section 3.6, the Ricardian Equivalence theory is discussed and the chapter is concluded in Section 3.7.

3.2 NATIONAL ACCOUNT IDENTITIES

The relationship between savings and investment is captured through the national account identities which state that national income and output are equal in a closed economy. This can be expressed as:

$$Y \equiv C + S + T = C + I + G \qquad (1)$$

where C = consumption, S = private saving, T = taxes, I = investment, and G = government spending.

Equation (1) can be rearranged as:

$$S + (T - G) = I \qquad (2)$$

Savings are the difference between what is earned and what is consumed. Therefore, from equation (2) it can be seen that domestic investment is equal to private savings (S) plus government savings (T – G). Government savings are added to private savings to give us national savings (S). Equation (2) can now be expressed as:

$$S = I \quad (3)$$

Thus the level of investment is constrained by the level of national savings.

In an open economy, exports (X) and imports (M) are added to the national accounts identities which become:

$$S - I = X - M \quad (4)$$

Equation (4) states that in an open economy, the difference between what a country saves and invests is equal to the balance on the current account of the Balance of Payments. Countries who invest more than they save will run a current account deficit. This deficit can be sustained only by depleting foreign exchange reserves or through foreign capital inflows (Prinsloo 2000:2). Thus in the open economy model, the level of investment is constrained by the level of domestic savings plus foreign capital inflows. This suggests that countries can grow faster than the rate determined by their level of savings, provided they can attract foreign capital inflows.

3.3 ECONOMIC THEORIES ON THE SAVING-INVESTMENT RELATIONSHIP

The relationship between savings and investment is treated differently in economic theories, particularly in their direction of causality. These theories include the Classical Theory, Neo-classical Theory, Keynesian Theory and Endogenous Money Theory. They are discussed below.

3.3.1 Classical Theory

In the Classical model, interest rate variations equate domestic savings with investment in a closed economy. In this model, "the interest rate is determined by the demand for and supply of loanable funds" (Rohlf, 2002:3). As savings increase, the supply of funds is in excess of its demand, resulting in a reduction of the price (interest rates) for the funds. Due to the interest rate being both the reward that households receive for saving as well as the price businesses pay to finance investment, a reduction in the interest rate would discourage saving yet encourage

investment at the same time (Rohlf, 2002:3). Conversely, low saving rates make loanable funds increasingly scarce, thereby raising interest rates and discouraging investment (Cui, 1998:285). All savings are invested at the equilibrium interest rate, achieving full employment. Savings and investment decisions are independent of each other in that both savers and investors have to actively participate in the market for the equilibrium level of loanable funds and the interest rate to be obtained. These funds are used to replace depreciating capital, as well as to add to existing capital stock (investment).

While an agent may use his savings for his own investment purposes, relying on retained earnings has the tendency of perpetuating the existing economic divisions and hierarchies in the market, which negatively influences small businesses and start-up firms (Cui, 1998:283). Since Classical economists uphold the principle of Say's Law which states that supply creates its own demand[2], hoarding money for personal use removes it from circulation, thereby prohibiting firms from borrowing money for investment purposes (Rohlf, 2001:4). Consequently, total spending may decline as a reduction in investment demand causes aggregate supply to be greater than aggregate demand, though unemployment may not necessarily arise as "wage and price adjustments would compensate for any deficiency in total spending", maintaining full employment (Rohlf, 2002:4).

Studies conducted by Gurley & Shaw (1960), McKinnon (1973), Shaw (1973) argue that financial market development is essential in effectively channeling savings into profitable investment projects. According to Shaw (1973:10), by developing a country's financial markets, savings are allocated more efficiently to the investment opportunities competing for these funds. While in a financially repressed economy savings flow mainly to savers' own investments, in a liberalized financial system, savers are offered a wider menu of portfolio choice which encourages them to increase their savings (Shaw, 1973:9-10). Ensuring that savings are channelled efficiently into productive investment can be achieved by providing alternative

[2]According to Rohlf (2002:2), during the process of producing output, businesses simultaneously create sufficient income for the household sector to ensure that all output produced will be sold.

methods to the commitment of retained earnings to productive projects or by encouraging the business of venture capital[3] (Cui, 1998:284).

3.3.2 Neoclassical Theory

Unlike the Classical theory, the Neoclassical model acknowledges that output growth depends on more than just capital accumulation and labour. Utility maximization for individuals and profit maximization for firms play an important part in the equilibrium level of output (Hicks, 1939). Investment decisions are therefore not just based on interest rates, but on the marginal benefits of capital stock. Capital stock in this model is measured by its value rather than its cost. The loanable funds market therefore has a weaker impact on changes in the capital stock than in the Classical model.

Neoclassical growth models show how increased savings can lead to higher economic growth through their impact on physical capital. Amongst these growth models include the Solow growth model (1956) and Romer growth model (1986). Solow's model (1956) suggests that savings lead to higher growth levels only in the short-run due to the temporary impact that capital formation has on growth. Long-term growth in this model is caused by structural demographic variables (Edwards, 1995).

In the Neoclassical model, higher saving rates generate more investment per unit of output than it did before – which will in turn lead to an expansion of capital per worker (Romm, 2005). Given the assumption of constant returns to scale in the model, a higher capital/labour ratio without a corresponding increase in the labour input growth rate will result in diminishing returns to output. Returns, though at a diminishing rate, will increase until the steady-state equilibrium point and the higher capital/labour ratio are equal, after which no more increases in growth will occur. Froyen (2009:415) states that once the new output to capital ratio has reached the long-term growth path, capital formation will have returned to the initial equilibrium rate equal to the growth rate in the labour force. Increasing the savings rate only temporarily increases the growth rate in output for each worker. It does however increase the output level per worker. In the

[3]Venture capital can be described as the long-term investment of funds in start-up firms, usually in exchange for equity stake (Cui, 1998:284).

Solow model, the long-run equilibrium growth rate depends on population growth and technological change instead of the savings rate which only has a temporary impact.

While the Solow model shows the temporary impact saving has on growth, the Romer (1986) model shows how savings have a permanent impact on growth. In the Romer model, technological change or population growth are assumed to be endogenous to the model instead of exogenous variables as stated in the Solow model (Froyen, 2009). The model has the following equation:

$Y = f(K, L, A)$

Where K is the physical capital used in production, L is the labour input, and A is the level of technology[4], which though exogenous in the Solow model, is an endogenous variable in the Romer model.

Aghion & Howitt (1998:1) state that 'economic growth involves a two-way interaction between technology and economic life: technology transforms the very economic system that creates it'. Technological advancement or knowledge leads not only to a higher level of per capita output, but to a higher growth rate of per capita output (Romm, 2005:8). Because of the interaction between capital and technology, in that if capital input increases knowledge increases in response, a higher growth rate in output can be realised, where even explosive growth can be achieved according to Froyen (2009:419). In the Romer model, diminishing returns to growth are not realized as the interaction between technological advancement and capital accumulation, and therefore savings, allows output to grow at a constant rate, or even achieve increasing returns (Froyen, 2009).

3.3.3 Keynesian Theory

Unlike the Classical model, aggregate demand drives aggregate supply in the Keynesian model. "The more that consumers, investors, and others plan to spend, the more output businesses will expect to sell and the more they will produce" Rohlf (2002:7). As a result, any disruptions in total spending (aggregate demand) may cause a fall in output and employment. By increasing the

[4] Technology is also referred to as knowledge in other studies.

saving level beyond the level desired by businesses to invest, output falls below the equilibrium level as spending expectations diminish.

The Keynesian model instead supports the view of savings being the result and not the cause of increased investment. Instead of the equilibrium level of savings and investment being determined through interest rate adjustment, it is instead the income level which adjusts to bring savings and investment into equilibrium. According to Keynes (1936:10), an increased inducement to invest increases both incomes and output. As a result, the effort of individuals "to consume a part of their increased incomes will stimulate output until the new level of incomes provides a margin of saving sufficient to correspond to the increased investment" (Keynes, 1936:79). The multiplier therefore indicates the marginal effect an increase in the rate of investment has on national income (Lange, 1943:228). The standard formula representing the multiplier impact is given by:

$$\Delta Y = \Delta I/(1-c)$$

where ΔY is change in income, ΔI is a change in investment, and c is the marginal propensity to consume.

The resulting increase in income will be higher than the initial increase in investment expenditure. The reason for this is because an increase in investment leads to induced increases in consumer demand as income increase (Froyen, 2009:84). According to Froyen (2009:84), in order to restore equality of income and aggregate demand, the equilibrium income must rise by an amount equal to the increase in investment (ΔI) plus the income induced increase in consumer demand (ΔC). Therefore:

$$\Delta Y = \Delta I + \Delta C \quad (1)$$

Rearranging equation (1) gives:

$$\Delta Y - \Delta C = \Delta I \quad (2)$$

or

$$\Delta S = \Delta I \quad (3)$$

Through the multiplier effect, changes in investment, via its impact on income, cause a change in savings exactly equal to the change in investment in a closed economy. Savings and investment are therefore always equal. Due to the increase in savings being caused by the multiplier impact on income (marginal propensity to save) and not a conscious decision by savers to increase their savings, investment and savings decisions are not independent of each other as in the case of the Classical/Neoclassical models.

If investment expenditure is believed to result in higher savings through the multiplier effect, the question to then ask is how the initial investment is financed if previous savings are unavailable. Cui (1998:286) states that Keynes believed that banks would accept a temporary decline in their liquidity in order to fund the initial investment before the multiplier effect takes place. Criticisms by Robertson (1936), Ohlin (1973) and Asimakopulos (1983) however claim that banks would not agree to a reduction in their liquidity without high interest rate compensation (Cui, 1998:286). Higher interest rates would in turn increase the cost of capital and as a result discourage investment. Savings would therefore once again determine investment expenditure since without a previous increase in saving, the demand for higher interest rates by banks to compensate their liquidity loss cannot be resisted (Cui, 1998:286).

In an open economy, a discrepancy between national saving and investment may occur. A current account deficit can exist due to the leakages from the multiplier impact on income caused by the marginal propensity to import. Thus in the Keynesian model of the open economy the change in investment now equals the change in savings plus the change in imports. Appleyard, Field and Cobb (2006:601) argue that an autonomous increase in imports reflects a decrease in spending on domestic goods, which in turn leads to lower income. As a result, the savings function is applied to a lower level of income, which leads to smaller increases in savings than in a closed economy. The country's savings are lower than is required by their investment demand, leading to an inflow of foreign savings to fund this demand. Therefore, $I - S = M - X$ and the difference between saving and investment equals the current account deficit.

In the short-run, the interest rate and business expectations are the primary determinants of investment expenditure in the Keynesian model (Froyen, 2009:79). Interest rates are however determined in the money market, unlike in the Classical model where these rates are determined by the interaction of domestic savings and investment. While in the Classical model, real factors

and monetary factors are viewed as being independent of each other, Keynes believed that these factors were interlinked – as illustrated by the IS/LM model. Keynes argued that factors causing disturbance in the money market (where interest rates are determined), would in turn cause a rift in the capital market (real market) and hence on growth. "The quantity of money determines the supply of liquid resources, and hence the rate of interest, and in conjunction with other factors the inducement to invest, which in turn fixes the equilibrium level of income, output and employment (Keynes, 1936:11).

3.3.4 Endogenous money theory

Though the Endogenous money theory may be a version of the Keynesian model, there are some differences between the two theories. A study by Moore (1988) states that "the equality of planned investment and saving does not occur through the adjustment of income, as the Keynesian income-multiplier approach asserts" (Dalziel, 1995:1). Moore found the Keynesian multiplier to be fundamentally flawed. In the Endogenous money theory, savings are not equal to investment through the income multiplier, but rather through the reasoning that in all modern banking systems loans create deposits. Several studies (Mosler, 2010; Moore, 2006; Galbraith, 2004; Bell, 1998; Wray, 1998; Lavoie, 2000, Kaldor, 1985) show money supply to be endogenous and not exogenous as is argued in mainstream finance theory. Money is endogenous in the sense that it would occur as a result of the level of credit extended in the economy rather than be its cause.

While the bartering system used commodities such as gold and silver as money, the adoption of a monetary regime no longer made use of these commodities (Kaldor, 1985:7). Instead bank notes (fiat money) or a simple bookkeeping entry in the accounts of banks became the norm (Kaldor 1985:7). Advocates of the Modern Monetary Theory (MMT) argue that the bartering system reasoning has however been incorrectly applied to the monetary economy. The mainstream 'money multiplier' idea has been identified as a result of this type of reasoning. According to the 'money multiplier' idea, new credits (loans) can only be granted when banks are the recipients of new deposits; a situation that would occur when the central bank purchases government bonds using open market operations, giving commercial banks the reserves needed to lend out (Lavoie 2000:2). The central bank therefore controls the money supply. Wray (2001:2) states that from the mainstream 'money multiplier' perspective, the central bank controls the money supply by

providing the required reserves, "to which a deposit multiplier is applied to determine the quantity of privately supplied bank deposits".

The MMT gives a different explanation of how money is actually created. Lavoie (2000:2) states that loans are created at the "stroke of a pen, or by punching a key on the computer, as long as the borrower is credit-worthy." When credit is extended to a borrower, there is an immediate counterpart in the liabilities of the bank – the creation of an equivalent additional deposit (Lavoie 2000). This deposit is the new saving. Thus savings are dependent on the level of credit extended in the economy. In other words, credit leads to saving.

Moore (2006) states that in the modern economies, most saving takes the form of passive accumulation of higher values of equities, bank deposits and other liquid financial assets and that individuals therefore need no longer to 'volitionally' abstain from current income in order to fund investment expenditure. While the accumulation of bank deposits has been discussed, the higher value of equities has not. Moore (2006) argues that one half of investment finance is provided by corporate retained earnings, which results in increases in the market value of corporate equities. This increase in corporate earnings is the non-volitional increase in saving.

Since money reserves are not necessary prior to this process, the only limit to the amount of credit extended is the demand for these loans. Commercial banks meet this demand by extending credit to credit-worthy customers. The demand for these loans in turn is limited by prevailing interest rates. Unlike in the 'money multiplier' view, the MMT states that interest rates control money supply, since banks can always meet demand. Interest rates are exogenously determined by the central bank. Wray (1992) states that it is this 'accommodative' rate which central banks use to control money growth. Since commercial banks are required to hold a certain percentage of their deposits as reserves, an increase in deposits will require a proportionate increase in reserves. Commercial banks in need of these reserves may either borrow them from the inter-bank market or from the central bank (lender of last resort) at a key interest rate. It is through this interest rate that the central bank controls money growth. Commercial banks base their lending rates at a level higher than the 'accommodative' rate to earn a profit.

Lending by banks would be limited if they were unable to receive required reserves. However, as the central bank is lender of last resort, and since it can lend without prior funding,

commercial banks can *always* receive reserves, and thus they can offer unlimited credit at the prevailing interest rate. Unlike the "money multiplier" where causation runs from reserves to deposits to loans, causation in the MMT runs from loans to deposits and then to reserves (Wray, 2001:2).

3.4 HOUSEHOLD SAVING THEORIES

While the Keynesian Theory upholds the principle of income leading to higher savings, an increase in the income level may not have the desired effect of raising the saving level. While a higher income level may cause households to raise their saving levels, increased savings may not necessarily arise due to the positive impact income has on current consumption. The different household saving theories are discussed below.

3.4.1 Life-Cycle Hypothesis

Life-Cycle Hypothesis (LCH) made famous by Modigliani and Brumberg (1954) provides the theoretical explanation for why households save. According to Ozcan, Gunay and Ertac (2003:1406), the LCH states that "individuals spread their lifetime consumption over their lives by accumulating savings during earning years and maintaining consumption levels during retirement". In other words, in order to maintain the same level of consumption during retirement as in earning years, households should save in their earning years "in order to accumulate a stock of wealth which will eventually be used to support consumption" during their retirement years (Modigliani, 1970:163). As the accumulation of stock of wealth occurs during earning years, the implication is that income positively affects saving rates. Modigliani (1970:161) states that a positive association between income growth and saving exists; the saving-income ratio will remain constant if income and saving grow at a constant rate. Faster growing economies are therefore expected to have a higher aggregate saving.

3.4.2 Permanent Income Hypothesis

The Permanent Income Hypothesis was made famous by Friedman (1957). With regards to this hypothesis, a differentiation is made between the permanent and transitory components of income as determinants of saving. Ozcan *et al* (2003:1406) explain the difference: while permanent income can be defined in terms of the long time income expectation over a planning

period, transitory income is the difference between actual and permanent income. The consumption decisions of individuals are based on the long term or permanent income of that individual. What a person consumes today is not based on his or her current income, but rather on their lifetime or permanent wealth. An assumption made by the Permanent Income hypothesis is that higher growth, or higher future income, reduces current saving. According to Ozcan *et al* (2003:1412), the permanent income hypothesis upholds that increasing growth would imply higher anticipated future income, which would in turn urge individuals to dissave or reduce their current saving against future earnings. The permanent income hypothesis as a result contradicts the life-cycle hypothesis.

3.5 PIERCING THE CORPORATE VEIL

While the composition of domestic saving in the country may not be as important as the overall level (Prinsloo, 2000:25), understanding the relationship between corporate and personal saving may give direction on how to actually improve South Africa's national saving level. The concept of households "piercing the corporate veil" involves households being able to alter their saving decisions in response to the decisions of companies. Because individuals or households are viewed as the owners of these companies, they are able to perfectly view the budget constraints of corporations. David and Scadding (1974) describe such individuals as being "ultrarational" as they are able to regard the corporate sector as an extension of themselves. "The difference between corporate and household sectors is therefore a legal one and not an economic one" (David and Scadding, 1974:226).

Since households base their consumption behaviour on their net worth, whether corporate earnings are distributed in the form of dividends or retained as corporate savings should have no effect on consumption (Poterba, 1992). In other words, individuals perceive corporate savings as being a substitute for, or an extension of household savings (Prinsloo 2000: 25). Therefore, households rationally reduce their saving to reflect the fact that when saving by corporations increase in response to a change in inflation and tax rates, this raises the value of the equities held by households on their behalf (Aron and Muellbauer, 2000). An overall change in private savings would therefore not occur, only a change in its composition. As a result, certain authors (Prinsloo, 1994; Barr and Kantor, 1994; and Tsikata, 1998) suggest that policies directed towards improving national saving should be focused on raising the government's saving rate, rather than

the rate of private saving (Aron and Muellbauer 2000). "Households piercing the corporate veil" has significant implications for growth since increasing corporate savings will not lead to higher private savings and therefore investment (if causality is found to run from saving to investment).

3.6 RICARDIAN EQUIVALENCE HYPOTHESIS

In addition to the offsetting relationship between corporate and household saving, the question of whether government deficits or surpluses have any impact on private saving has raised debate over the years. The Ricardian Equivalence Hypothesis states that "fully rational households discount the financial implications of public expenditure decisions or, in other words, they internalize the government's intertemporal borrowing constraint" (de Castro and Fernandez, 2009:11). It therefore makes no difference whether public expenditure is financed with debt or a tax increase, as households realize that public debt will have to eventually be repaid, presumably through higher taxes, and thus increase their savings accordingly to be able to pay these future taxes. Whether households are taxed now, or later, has no impact on their consumption behaviour.

A negative relationship between private saving and government saving is expected since a decrease in government saving, either by cutting taxes or increasing public borrowing, will lead to higher private savings. Increases in government spending therefore have no influence in increasing overall national saving; only its components are altered. If private savings are to be raised to finance domestic investment, assuming savings lead to investment, reducing the government saving level may prove advantageous. Similarly, increases in government saving may have negative implications for private saving. Eyraud (2009) however finds government saving increases through public expenditure cuts as opposed to tax increases to be more sustainable, as the offset in private saving caused by tax increases is greater. By analyzing the impact of government saving on private saving in thirteen economies, Corbo and Schmidt-Hebbel (1991) found a $1 transitory increase in government saving achieved by cutting current public spending to reduce private saving by only 16 to 50 cents. On the other hand, an increase in government saving as a result of a temporary tax hike reduced private saving by approximately 48 to 65 cents (Corbo and Schmidt-Hebbel, 1991). Public expenditure cuts are found to have a more favourable impact on private saving than tax increases.

3.7 CONCLUSION

In this chapter, the different saving-investment theories were discussed. While the Classical and Neoclassical theories perceived prior savings to be necessary in financing investment, the Keynesian and Endogenous Money Theories argue that savings occur only after investment has taken place. In addition to these theories, the household saving theories as well as the Ricardian Equivalence Theory discuss how private savings react to income changes and fiscal balance adjustments. The households "piercing the corporate veil" hypothesis on the other hand looks at the relationship between household and corporate savings.

CHAPTER FOUR

METHODS, PROCEDURES AND TECHNIQUES

4.1 INTRODUCTION

After discussing the literature and theoretical models on the saving-investment relationship in Chapter Two and Chapter Three respectively, the next process is to construct an analytical model which can measure the relationship between domestic investment and saving in South Africa.

This chapter aims to determine whether a long-run relationship between saving and investment exists in South Africa, and if it does, in which direction does causality occur; do savings lead to higher investment or is investment the driving force behind higher savings? According to the World Bank (2011:16), South Africa's saving and investment rates have been highly correlated over the period 1960 to 2010 with a coefficient of correlation of 0.72. However, compared with other emerging economies, the country is still lagging behind in terms of growth. For South Africa to achieve an economic growth rate of 6-7 percent per annum, addressing the country's low saving and investment levels is imperative (World Bank, 2011:11).

The Johansen (1991) co-integration methodology will be used to study the relationship between domestic saving and investment. This approach will be used specifically to study the relationship between private saving and fixed capital formation. The focus on private saving stems from a number of studies (Aron and Muellbauer, 2000; Prinsloo, 2000; Harjes and Ricci, 2005; Tsikata, 1998) finding evidence in favour of South African households "piercing the corporate veil". Households perceive the saving decisions of the corporate sector to be taken on their behalf, and as a result view corporate saving as a substitute for household saving (Prinsloo, 2000:25). Importance should then rather be placed on the overall level of private saving instead of its composition (Prinsloo, 2000:25).

Even if households were found to not pierce the corporate veil (see Poterba, 1992; Feldstein, 1973; Feldstein and Fane, 1973; Howrey and Hymans, 1978 and Baker, Nagel and Wurgler, 2007), and as a result an incomplete offset between corporate saving and personal saving is achieved, the somewhat different determinants of corporate and household saving would likely cause an explosion in the number of co-integrating vectors in the data, as well as a related

increase in the data requirements needed for estimation (Romm, 2005). Thus the focus of this study will be on the overall private saving level.

Additionally, private saving constitute a larger portion of gross (total) saving compared to government savings in South Africa (see Chapter Two) and the "behavioural foundations" of the government saving rate differ to those of the private sector (Romm, 2005:16).

In order to reduce any variable bias that may exist between private saving and investment, credit extension was included in the bi-directional causality framework to make it a tri-variate causality framework. Studies by Odhiambo (2009) and Romm (2005) have each included a third variable in their models. While Odhiambo (2009) included capital inflows as a third variable to study the relationship betweens domestic savings and economic growth in South Africa, Romm (2005) included private investment. By adding a third variable, also referred to as an intermittent variable (Odhiambo, 2009:709), the adverse effects of omitted variable bias may be mitigated. Incorporating a third variable can alter both the inference and magnitude of the estimates (Odhiambo, 2009:713). According to Romm (2005), a multivariate framework not only captures the impact of endogeneity between the variables, but any feedback effects that may exist between the dependent variables as well.

The Chapter will be divided as follows: Section 4.2 provides the methodology which will be used to determine the saving-investment relationship in South Africa, Section 4.3 describes the data used in the study, section 4.4 the *a priori* expectations, and section 4.5 the Johansen co-integration framework. Section 4.6 provides a brief description of block exogeneity and Granger causality, and Section 4.7 discusses the impulse response function and variance decomposition. Section 4.8 provides a conclusion to this chapter and an introduction to the next.

4.2 METHODOLOGY

Co-integration can be defined as an occurrence where non-stationary variables can have linear combinations that are stationary (Brooks, 2008:336). It is an approach used to measure the long-run relationship between variables. The two most common methods used to analyze the co-integrating relationships between variables include the two-step Engle and Granger (1987) model as well as the Johansen (1988) estimation technique. In the Engle and Granger (1987) framework, a regression using ordinary least squares is estimated in order to test the null

hypothesis of there being no co-integration between a set of integrated order one [I(1)] variables. From the residuals obtained from the regression, unit root tests are then applied, where if the null hypothesis of a unit root is rejected, evidence in favour of co-integration exists.

There are a number of drawbacks with the Engle and Granger approach, however. Brooks (2008) and Enders (2010) state that a limitation of the Engle and Granger method is that it can only estimate up to one co-integrating relationship between the variables. Enders (2010:385-386) also finds that due to the fact that the Engle and Granger procedure requires the dependent variable be placed on the left-hand side of the equation and the independent variables on the right-hand side, it is possible to find that one regression may indicate that the variables are co-integrated, whereas interchanging the variables may indicate no co-integration. The test for co-integration should be consistent irrespective of the variable order, thus making the Engle and Granger method unreliable at times. In addition, due to the Engle and Granger technique consisting of two steps, where the first step involves generating the residual series and the second step involving using these generated errors to estimate a regression, any error introduced in the first step will be carried into the second step (Enders, 2010:386).

These drawbacks led to the development of the Johansen (1988) method. Unlike the Engle and Granger (1987) approach, the Johansen vector autoregression (VAR) procedure allows for the possibility of dealing with more than one co-integrating vector (Romm, 2005). Additionally, the Johansen method allows the testing of restricted versions of the long-run co-integrating vector(s) and the short-run speed-of-adjustment parameters (Enders, 2010:386). It does however have certain drawbacks. According to Sorensen (2005:9), interpreting the results of the Johansen procedure may take some time since in the VAR system all variables are treated symmetrically, as opposed to the standard univariate models, which have a clear interpretation in terms of exogenous and endogenous variables. Additionally, the multidimensional VAR model uses many degrees of freedom (Sorensen, 2005:9). Since the degrees of freedom play a significant role in estimating the prediction accuracy of a fitted model (Zou, Hastie and Tibshirani, 2007:2), a limited number of degrees of freedom leads to estimates which are both imprecise and which contain large standard errors (Canova, 2007:351).

Despite the Johansen method's limitations, Afzal (2007:102) states that it is currently the most reliable test for integration and that it has superior small sample properties. It is because of these benefits that the procedure will be adopted in this study.

4.3 DESCRIPTION OF DATA

Time-series data obtained from South Africa Reserve Bank Statistical database for the period 1995 to 2011 was used in the study. Before the end of apartheid in 1994, South Africa operated under a regime of strict capital controls which limited the ability of foreign capital inflows to fund domestic investment. The relationship between savings and investment may have changed once exchange controls on foreigners were scrapped in February 1995. For this reason quarterly data from 1995 to 2011 are used. The time period covers the period after the 2008 global financial crisis which may also have impacted on the ability of countries to fund higher levels of investment externally or through bank credit growth. Thus the study differs from similar studies by Afzal (2007), Odhiambo (2009) and Romm (2005) in that only the period after the scrapping of exchange controls on foreigners is tested.

The quarterly private saving, fixed capital formation and credit extension time-series are each represented as ratios of GDP for comparative reasons. Quarterly gross private saving data was obtained by subtracting net government saving as well as the annual depreciation values of net government and public corporations from gross (total) saving. As the depreciation data are only available annually the assumption was made that the annual depreciation series is unchanged for each quarter. Quarterly gross capital formation of private businesses was used to represent private investment. As no quarterly series was available for credit extension, quarterly data on credit extension was taken from monthly data and expressed as a percentage of seasonally adjusted annualised quarterly GDP.

4.4 *A PRIORI* EXPECTATIONS AND GRAPHICAL REPRESENTATION

4.4.1 *A Priori* Expectations

The relationship between credit extension, a proxy for financial liberalisation, and private saving is expected to be negative *a priori*. Financial liberalisation strengthens a country's financial sector and, as a result, reduces the borrowing constraints faced by households and corporations

(Arestis and Caner, 2004; Loayza, Schmid-Hebbel & Serven, 2000; Japelli and Pagano, 1994). Individuals and companies can now borrow funds more easily from both domestic and foreign capital markets, thereby discouraging them from increasing their savings in order to finance their investment and consumption spending.

Private saving and gross capital formation (investment) are expected to have a positive relationship *a priori*. According to the World Bank (2008:54), there is no case of a sustained high investment path not backed up by high domestic savings. While several studies (Onefowara, Oweye & Huart, 2011; Esso and Keho, 2010; Afzal, 2007) have found prior savings to be necessary in funding domestic investment expenditure, others (Sinha, 2002; Agrawal, 2001; Anoruo & Ahmed, 2001) found savings to be the result of increased investment and not the cause. A positive relationship between private investment and saving is therefore expected, irrespective of the direction of causality.

The relationship between credit extension and investment has yielded conflicting results amongst different studies. On one hand, the more sophisticated a country's financial sector, the easier it is to obtain funding for investment purposes. By extending credit to previously constrained private agents, financial liberalization has resulted in both business sector investment expenditure and household consumption expenditure (World Bank, 2011:27). Other studies (O'Toole, 2012; Arza and Espanol, 2008) however found the impact of credit extension on investment to be negligible and even negative in certain economies. In this study though, a positive relationship between gross capital formation and credit extension is expected *a priori.*

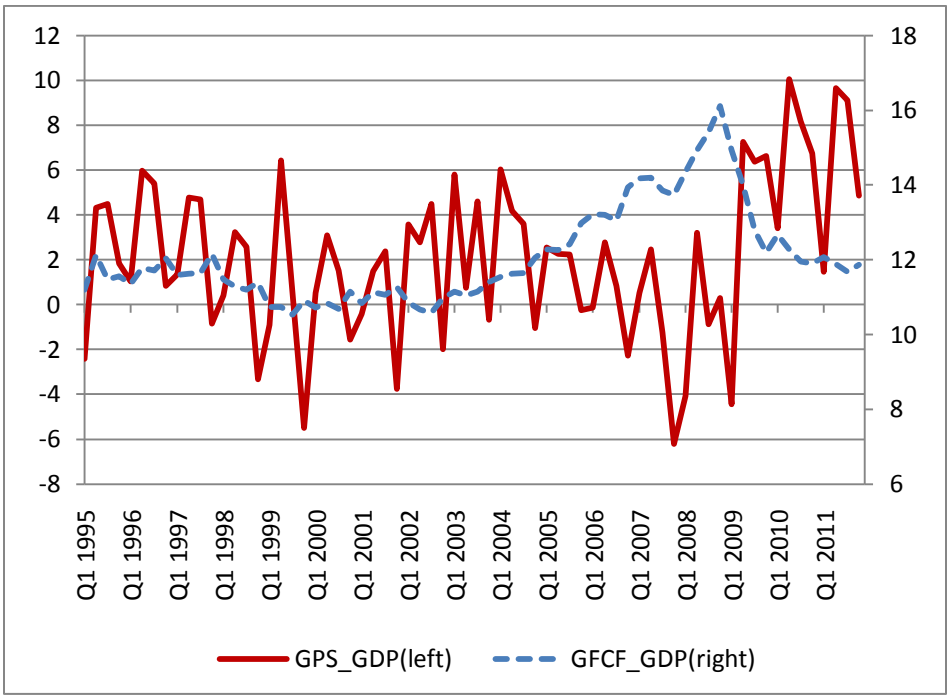
4.4.2 Graphical Analysis

In this section, the graphical representation of the saving-investment, saving-credit extension and investment-credit extension relationships in presented in order to analyse past trends between the variables.

In Figure 4.1, the gross private saving and gross fixed capital formation time series are shown, where both these variables are presented as ratios of GDP. A clear relationship between these variables is not visible due to the volatility in gross private saving. However, between 2005 and 2009, an increase in the gross capital formation series and a decrease in the private saving series

is evident. As theory suggests, this distortion may be caused by large capital inflows into South Africa at that time.

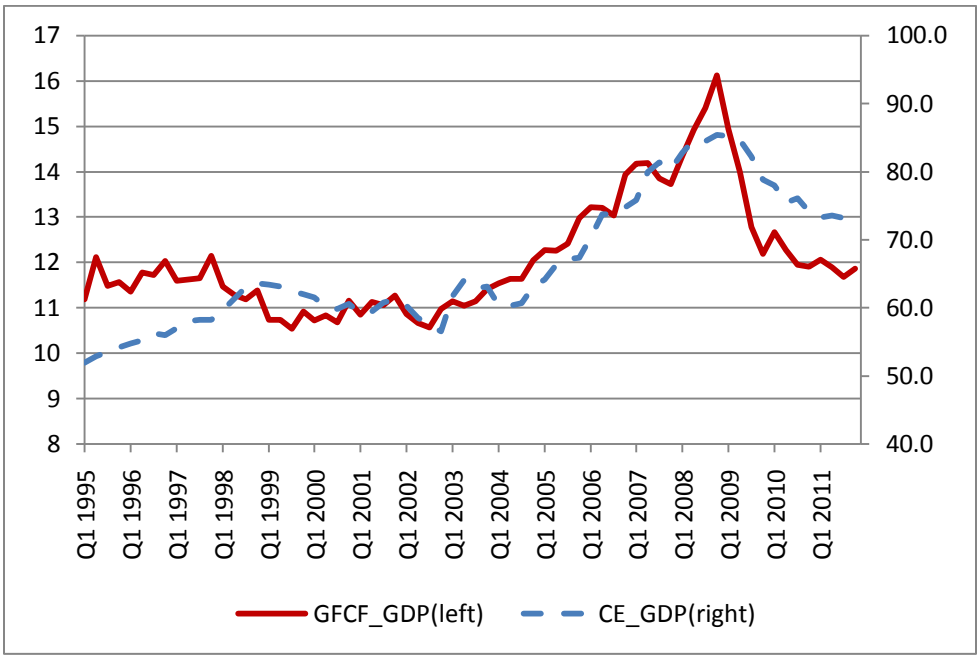
Figure 4.1: Gross Private Saving and Gross Fixed Capital Formation (% of GDP)



Source: South African Reserve Bank Statistical Database (2013)

In Figure 4.2, it is evident that credit extension forms a significantly greater percentage of GDP than gross private investment in South Africa. Both variables seem to have remained stable before 2003 but thereafter a significant increase in both variables can be seen. In 2009, a declining trend was however experienced for these two variables, perhaps as a result of the financial crisis. It seems as though a significant positive relationship between the credit extension and private investment variables exists, as found by several studies (Bekaert, *et al.*, 2005; Loayza, *et al.*, 2000; Munir, *et al.*, 2010). Investment expenditure is expected to rise with an increase in purchasing power (credit expenditure).

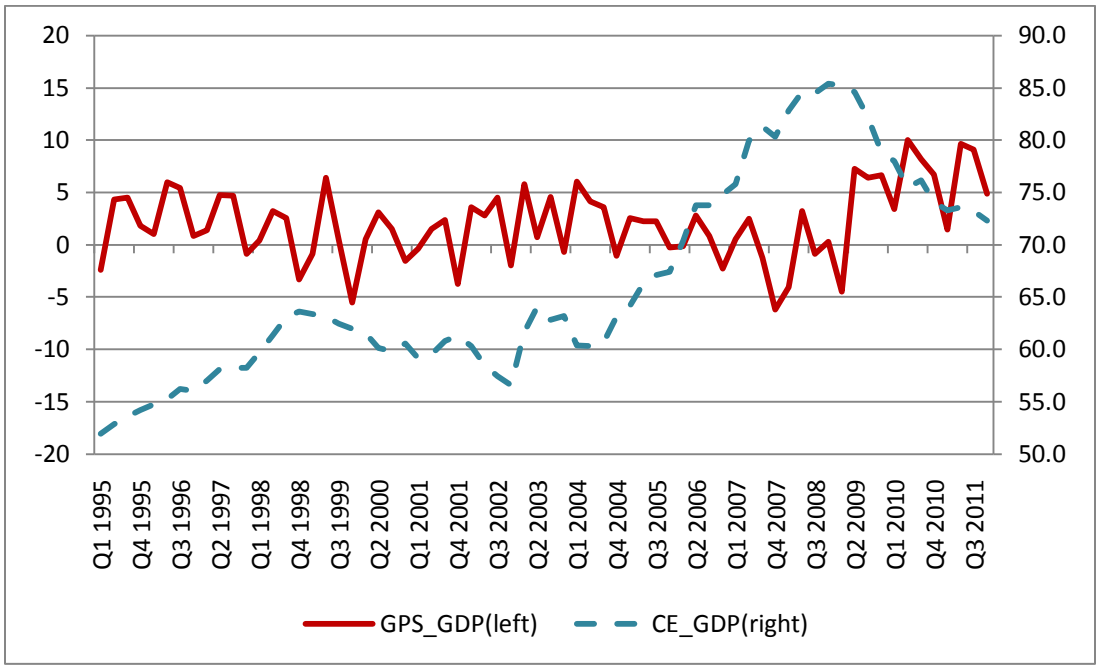
Figure 4.2: Gross Fixed Capital Formation and Credit Extension (% of GDP)



Source: South African Reserve Bank Statistical Database (2013)

In Figure 4.3, once again a clear relationship between private saving and credit extension is not clear due to the volatility in gross private saving. During 2008 and 2011, however, a slight rise in gross saving is shown to occur whereas the credit extension to GDP ratio seems to diminish. This negative relationship may arise as a result of the positive impact higher borrowing constraints has on domestic saving levels (Arestis and Caner, 2004; Japelli and Pagano, 1994). It was during 2008 and 2011 that the financial crisis was most severe, explaining the downward trend in credit extension.

Figure 4.3: Gross Private Saving and Credit Extension (% of GDP)



Source: South African Reserve Bank Statistical Database (2013)

4.5 JOHANSEN CO-INTEGRATION FRAMEWORK

As previously mentioned, the Johansen co-integration approach will be used in this study. There are a number of steps involved when using this method. The first step is to determine the order of integration for each of the variables. Unit root tests and stationarity tests are used to determine the order of integration. According to Brooks (2008:318), it is important to be able to identify stationary variables from non-stationary (integrated) since, firstly, the fact that a series is stationary or not may strongly influence its behaviour and properties. Secondly, using non-stationary data may increase the likelihood of spurious regressions (Brooks, 2008:319). Lastly, the use of non-stationary variables can violate the assumptions made for asymptotic analysis; specifically, the *t*-ratios and *F*-statistic will not follow a *t*-distribution and *F*-distribution respectively (Brooks, 2008:320).

Afzal (2007:102) states that before the co-integration procedure can be applied, it is necessary for the variables to be integrated of the same order. While it is a commonly believed that *all* the variables need to be integrated of the same order in order for the Johansen approach to be valid,

two non-stationary variables, at the least, which are integrated of the same order are needed to make the co-integration approach valid (Ahking, 2002:57).

The next step is to estimate an unrestricted vector autoregressive (UVAR) model. As the VAR is used for non-cointegrated variables (Hill, Griffiths & Lim, 2008:347), it needs to be determined whether the variables are co-integrated or not. The trace test and maximum eigenvalue test are performed to identify the number of co-integrating vectors existing in the model. If one or more co-integrating vectors exists, the Vector Error Correction Model (VECM) is then performed to measure the long-run and short-run relationships between the dependent variables and independent variables. If however no long-run relationship (co-integration) is found, the VAR model is estimated.

Finally, the VECM will be used to perform the Granger causality and block exogeneity tests in order to determine the causal relationships between private saving, private investment and credit extension, where credit extension is used as an intermittent variable to mitigate the omission of variable bias between private investment and saving. Additionally, once the residual series from the VECM are found to be white noise, the impulse response functions and variance decompositions will be analysed.

A more detailed explanation of each of these stages is given below. Each of these steps is required in the estimation of a well-specified VECM using the Johansen approach.

4.5.1 Unit root tests for stationarity

Unit root tests are used to determine the order of integration for time series. Consistent with the Johansen approach, unit root tests are first performed to confirm that the variables are integrated order 1, i.e. *I*(1) (Sjo, 2008:7). Time series containing unit roots may either have a long-run relationship (co-integration) or exhibit an unauthentic or spurious relationship. While in general linear combinations contain unit roots, there may be some linear combination that is stationary; it is this combination that is co-integrated (Cochrane, 2005:122).

Time series data can be expressed in the form of ARMA (Autoregressive Moving-Average) models as these models "allow a convenient and flexible way of studying time series, and capture the extent to which series can be forecast" (Cochrane, 2005:9). ARMA models state that

the current value of a series, y_t, depends linearly on its own lags (y_{t-i}) plus a combination of current and previous values of a white noise error term u_t (Brooks, 2008:249). This can be expressed as:

$$y_t = \beta_1 + \beta_i y_{t-i} + \emptyset_i u_{t-i} + u_t \quad (4.4)$$

The white noise error term is assumed to be determined independently of the other variables and their error terms. The assumptions of the white noise error term include (Brooks, 2008; Hill, Griffiths and Lim, 2008; Enders, 2010):

1. $E(u_t) = 0$
2. $var(u_t) = \sigma^2$
3. $cov(u_i, u_j) = 0 \text{ for } i \neq j$

which are representative of a weak stationary series.

There are several unit root tests and a stationarity test which can be used to establish the order of integration in a time series. For the purposes of this study, the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test will be employed. By using both the unit root tests and stationarity test, the results obtained are more robust if the same conclusion is reached for each test.

The ADF test, an extension of the Dickey-Fuller (DF) test, examines the following regression: $\Delta y_t = \psi y_{t-1} + u_t$, where the null hypothesis [H_0: $\psi = 0$] for a unit root series is tested against the alternative hypothesis [H_1: $\psi < 0$] of stationary series. If the null hypothesis is rejected, the conclusion made is that a stationary time-series exists. The PP unit root test is similar to the DF and ADF tests in testing for unit roots. The null hypothesis [H_0: $y_t \sim I(1)$] represents a non-stationary series, whereas the alternative [H_1: $y_t \sim I(0)$] expresses a stationary time series (Brooks, 2008:382). The PP test differs from the DF and ADF tests in that it automatically modifies the test statistic to correct for any serial correlation that may occur in the residuals (Tripathy, 2011:215). The KPSS stationary test employs the null hypothesis [H_0: $y_t \sim I(0)$] to test for stationarity and the alternative hypothesis [H_1: $y_t \sim I(1)$] to test for the existence

of a unit root in the series. If the KPSS fails to reject the null hypothesis of stationarity, the series may be co-integrated (Tripathy, 2011:216).

4.5.2 Estimation of the VECM

Cochrane (2005:122) describes co-integration as a process where integrated (i.e. unit root) time series possess a linear combination that is stationary. Engle and Granger (1987:275) state that if time series x_t is stationary only after it has been differenced, yet a linear combination $\alpha' x_t$ need not to be differenced, the time series are co-integrated of order (1,1) with co-integrating vector α. The co-integrating vector is an indication of the existence of a long-run relationship between the variables. According to Brooks (2008:335), a co-integrating relationship may be seen as a long-term trend since there is a possibility for the co-integrating variables to deviate from their relationship in the short-run, but to return to their equilibrium relationship in the long-run. If long-run equilibrium is to be attained, the movements of at least some of the variables must respond to the magnitude of the disequilibrium (Enders, 2010:365).

The purpose of an error correction model is to correct for the deviation from the long-run trend. Due to the long-run implying that the variables have converged to some long-term values and are no longer changing, differencing the variables without adding an error correction term will result in a model with no long-run solution (Brooks, 2008:338). For instance, given two time-series, y_t and x_t, which are both $I(1)$, the following model would be estimated:

$$\Delta y_t = \beta \Delta x_t + u_t \tag{4.5}$$

Since the long-run implies non-changing variables, then $\Delta y_t = 0$ and $\Delta x_t = 0$. Due to all the differenced terms being equal to zero, everything in the equation will cancel out (Brooks, 2008:390). It offers no explanation as to whether a long-run relationship between the two time-series exists. However, a class of models using combinations of first differenced and lagged level of co-integrated variables may overcome this problem (Brooks, 2008:390). This class of models are better known as error correction models (ECM), which are explained by the following equation:

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 (y_{t-1} - \gamma x_{t-1}) + u_t \tag{4.6}$$

where β_1 describes the short-run relationship between changes in x and y, β_2 describes the speed of adjustment back to the long-term trend. The speed of adjustment parameter measures the proportion of last period's error that is corrected for in the current period. γ defines the long-run relationship between x and y.

The error correction term ($y_{t-1} - \gamma x_{t-1}$) will be stationary even though the y_t and x_t variables are co-integrated, and therefore non-stationary, with the co-integrating coefficient γ (Brooks, 2008:390). Enders (2010:366) suggests that if the short-term deviation is positive (if $y_{t-1} - \gamma x_{t-1} > 0$), then the explanatory variable, x_t, will rise and the dependent variable, y_t, will fall until long-run equilibrium is attained ($y_t = \gamma x_{t-1}$), all other things equal.

An ECM can, however, be estimated when more than two variables are included. The Johansen technique can be used to analyse such a relationship. After the unit root tests have been conducted on each variable in the system, the VAR model is then estimated. The general specification of the VAR can be estimated as (Romm, 2005:15):

$$z_t = A_k z_{t-1} + \cdots + A_m z_{t-k} + \delta + v_t \qquad (4.7)$$

Where z_t is a (nx1) matrix, k is the lag length, δ a deterministic trend and v_t an error term.

In the Johansen approach, the VAR in equation 4.7 needs to be turned into a VECM of the following form (Brooks, 2008:350):

$$\Delta y_t = \Pi y_{t-k} + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \ldots + \Gamma_{k-1} \Delta y_{t-(k-1)} + u_t \qquad (4.8)$$

Where $\Pi = (\sum_{j=1}^{k} \beta_i) - I_g$ and $\Gamma_i = (\sum_{j=1}^{i} \beta_j) - I_g$ (4.9)

If y_t is $I(1)$, then Δy_t is $I(0)$ (Maddala and Lahiri, 2009:570). The rank of the matrix Π in the stationary equation (4.8) represents the number of co-integrating vectors in the system. The objective of the Johansen method is to examine the long-run coefficient matrix. According to Enders (2010:387), if Π consists of all zeros, [i.e. rank (Π) = 0], the variables in the system are not co-integrated, as there is no linear combination in the time-series that is stationary. If $\Pi = 0$, there is no long-run relationship between the variables and the matrix rather represents a VAR model in first differences. If Π is of the rank n, the vector process is stationary, whereas if rank (Π) = 1, there is one co-integrating vector and the expression Πy_{t-1} is the error-correction term

(Enders, 2010:390). For the cases where 1 < rank (*Π*) < *n*, there are multiple co-integrating vectors.

Selecting the lag length of the VAR is an important criterion in the specification of the model. If the appropriate lag length is not determined, the estimates obtained in the model may differ from those of the true lag length, as may the impulse response functions and variance decompositions (Ozcicek and McMillin, 1999). Selecting a higher order lag length (overfitting) than the true lag length may increase the forecasting errors of the VAR, while selecting a lower order (underfitting), usually generates autocorrelated errors. Therefore, the error terms should be white noise for the model to be well specified (Enders, 2010:286). The optimal length in this study will be obtained by using *EViews*. According to Enders (2010:286), the optimal lag length may be selected by using the Akaike information criterion (AIC) or the Schwarz Bayesian criterion (SBC).

In testing whether a co-integrating relationship between private investment, private saving and credit extension exists, we estimate the following:

$$\pi = \alpha\beta' \tag{4.10}$$

Hjalmarsson and Österholm (2007:5) state that if the coefficient matrix *Π* has reduced rank *r* < *n*, there are *n x r* matrices α and β which exist, each with rank *r* so that $\pi = \alpha\beta'$ and $\beta' y_t$ is stationary. The stationarity of $\beta' y_t$ represents a long-run relationship between the y_t variables. *ß* is the matrix of co-integrating parameters and α is the matrix of the speed-of-adjustment parameters. According to Enders (2010:394), α can also be viewed as the matrix of weights with which each co-integrating vector enters the *n* equations of the VAR. The following equation provides an illustration of the relationship between the two matrices:

$$\Delta y_t = \alpha_y(y_{t-1} - \beta x_{t-1}) + \varepsilon_{yt} \tag{4.11}$$

Rearranging the equation gives:

$$\Delta y_t = \alpha_y(\varepsilon_{t-1}) + \varepsilon_{yt} \tag{4.12}$$

If $\alpha_y < 0$, y_t will decrease in response to a positive deviation from long-run equilibrium ($\varepsilon_t > 0$). Similarly, if $\alpha_y > 0$, y_t will increase in response to a negative deviation from long-run

equilibrium (Enders, 2010:370). In a study by Koop (2009:225-226), the speed-of-adjustment parameter is assumed to be negative whether a positive or negative deviation occurs. When ε_{t-1}, the deviation from long-run equilibrium, is positive, the term $\alpha\varepsilon_{t-1}$ will also be negative since α is assumed to be negative. As such, y_{t-1} will start falling in the next period. Similarly, in the case where $\varepsilon_{t-1} < 0$, $\alpha\varepsilon_{t-1}$ will be positive, which in turn causes Δy_t to be positive, increasing *y* in the next period.

When determining the rank of the *Π* matrix, the trace test and maximum eigenvalue tests are used. They can be stated as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} ln(1-\hat{\lambda}_i) \tag{4.13}$$

$$\lambda_{max}(r, r+1) = -T\, ln(1-\hat{\lambda}_{r+1}) \tag{4.14}$$

where $\hat{\lambda}_i$ are the estimated values of the characteristic roots (also referred to as eigenvalues) obtained from the estimated π matrix and *T* is the number of usable observations (Enders, 2010:391). Hjalmarsson and Österholm (2007:5) states that the trace test tests the null hypothesis of *r* co-integrating vectors against the alternative hypothesis of *n* co-integrating vectors, while the maximum eigenvalue test on the other hand tests the null hypothesis of *r* co-integrating vectors against the alternative hypothesis of *r + 1* co-integrating vectors. The critical values of $\lambda_{trace}\ and\ \lambda_{max}$ statistics are obtained using the Monte Carlo approach (Enders, 2010:391). If the test statistic is found to be greater than the critical value, the null hypothesis of there being *r* co-integrating vectors is rejected in favour of the alternative of there being *r + 1* for the maximum eigenvalue statistic and more than *r* co-integrating vectors for the trace test (Brooks, 2008:351). The process is continued until the null hypothesis is no longer rejected for the alternative hypothesis, and *r* co-integrating vectors are found.

According to Enders (2010:393), an important aspect of the Johansen approach is that it allows the testing of restricted forms of the co-integrating vector(s). Due to there being a number of co-integrating relationships in this approach, the resulting estimates may not be unique and directly interpretable, thus leading to a need of imposing certain identifying restrictions (Boswijk and Doornik, 2003:2). Hendry and Juselius (2000:20) state that the first and most important step in estimating co-integrating relationships is to empirically discriminate between zero and non-zero

eigenvalues in the data, and then to impose an appropriate co-integrating rank restriction *r* on the Π matrix.

Enders (2010:404) argues that once the co-integrating vectors have been determined, the next step in the Johansen procedure is to analyse the normalised co-integrating vector(s) and speed-of-adjustment coefficients. According to Boswijk (2001:153), if there is more than one co-integrating relationship between nonstationary time series, then identifying restrictions are required to separate them. Moreover, identification requires some normalisation rule to be imposed (Boswijk, 2001:153). Normalisation involves labelling one of the variables in each equation as a *dependent* variable so that its coefficient in the model will equal unity (Greene, 2003:411).

Regarding the speed-of-adjustment parameter (α), if this parameter is equal to zero, the variable in question is weakly exogenous, and as a result does not respond to the discrepancy from the long-run equilibrium relationship (Enders, 2010:407). The null hypothesis of there being weak exogeneity is tested against the alternative hypothesis of the variable in question being endogenous. If the null hypothesis is rejected, the conclusion is that the variable is instead endogenous and will therefore respond to a discrepancy from long-run equilibrium.

4.6 BLOCK EXOGENEITY AND GRANGER CAUSALITY TESTS

Even though regression estimation may involve the dependence of one variable on other variables, it may not necessarily imply causation. Causality can only occur if the information in one variable is helpful in predicting a second variable. As Granger (1969:428) stated, "Y_t is causing X_t if we are able to predict X_t using all available information than if the information apart from Y_t had been used". Due to causality relying on the availability of information at a specific point in time, time-series can offer valuable inference regarding causality. According to Koop (2008:228), time-series make strong statements about causality by simply exploiting the fact that time does not run backwards.

While causality may involve one variable leading to another, Granger causality means only that a correlation between the current value of one variable and the past values of other variables exists. Enders (2010:318) states that the Granger causality test tests whether the lags of one variable enter into the equation for another variable. Granger causality is important as it answers one of

the goals of this study: to determine in which direction 'causality' occurs between private saving and investment so as to establish whether domestic savings form a constraint on domestic investment or whether domestic investment creates the savings it needs to finance it.

According to Brooks (2008:297), when a VAR includes many lags of its variables, it makes it difficult to determine which sets of variables have significant effects on each of the dependent variables, and which ones do not. Several tests are therefore performed that restrict all the lags of a particular variable to zero. By restricting the lags of a variable, determining which variables have significant effects can be achieved. Enders (2010:318) states that block exogeneity is useful in identifying whether to include an additional variable into a VAR. According to Jarocinski and Mackowiak (2011:6), the vector of variables y_i is block-exogenous with respect to the vector of variables y_j if the features of y_j have no impact in improving the forecast of any variable included in y_i that is based on lagged values of all the elements of y_i alone. Evaluating the significance of the variables in the VAR occurs by performing joint tests on all the lags of a particular variable in an equation (Brooks, 2008:297). Performing a block-exogeneity test assists in determining whether the lags of one variable Granger cause any other variable in the model (Enders, 2010:318).

4.7 IMPULSE RESPONSE FUNCTION AND VARIANCE DECOMPOSITION

According to Enders (2010:315), impulse analysis and variance decompositions (together called innovation accounting) can be useful tools in examining the relationship between economic variables. Both these techniques analyse the behaviour of an error shock to each variable on its own future trends as well as on the future behaviour of the other variables in the VECM system (Gunasekarage, Pisedtasalasai and Power, 2004:9).

Concerning an impulse response function, a unit shock is applied to the error of each variable in each equation, and the effects upon the VAR system are noted over time (Brooks, 2008:299). The effect of an error shock on the time path of the system depends on the magnitude of the current and subsequent shocks, where a one-unit positive shock will have a different time path than a one-unit negative shock, and where the size of the shocks matters (Enders, 2010:472). Brooks (2008:299) states that given the stability of the system, the shock should gradually taper off. The study will analyse the size and persistence of the responses of each variable (private

saving, gross capital formation, credit extension) to shocks in the independent variables included in the VECM.

Variance decompositions provide the proportion of the movements of the dependent variables that are explained by their own shocks compared to the shocks of other variables (Brooks, 2008:300). According to Brooks (2008:300), a shock to a specific variable will not only directly affect that variable, but will be transmitted to all the other variables in the system through the dynamic structure of the VAR. Assuming that private saving, private investment and credit extension are co-integrated, the variance decomposition will measure proportion of change in the dependent variables against movements in the independent variables in each model.

Erjavec and Cota (2003:142) state that both the variance decomposition and impulse response functions assist in determining Granger causality in macroeconomic activity.

4.8 CONCLUSION

In this chapter, the methodology used in analysing the nature of the relationships between the private saving, fixed capital formation and credit extension was discussed. The Johansen methodology is used to analyse the long-run co-integrating relationships between the dependent and explanatory variables. This method not only measures the long-run relationships, but also the direction of causality between these variables in order to identify the constraints on investment.

Once the data and proxy variables used in the study were described, the steps involved in the Johansen approach were explained. The first step, performing the ADF and PP unit root tests as well as the KPSS stationarity test, briefly explained the use of these tests to determine the order of integration between the variables. The second step explained the reasoning behind performing the trace test and eigenvalue test to identify the number of co-integrating vectors in a model. By performing these tests, it can be established whether the I(1) variables represent a spurious regression or do indeed exhibit a long-run relationship (co-integration). The following step is then to perform the VECM to correct for any deviations from long-run equilibrium. The chapter also discussed the use of the VECM to perform the Granger causality and block exogeneity tests in order to determine the causal relationships between the dependent variables.

The next chapter involves a discussion on the empirical results obtained from using the Johansen approach.

CHAPTER FIVE

ESTIMATION RESULTS

5.1 INTRODUCTION

In this chapter, the results obtained from the estimation of the Johansen specification will be discussed. As stated in Chapter Four, the Johansen framework is used to analyze the co-integrating (long-run) relationships between private savings, gross fixed capital formation and credit extension. It is a widely used test due to its capability for measuring more than one co-integrating vector and allowing for restricted versions of the co-integrating vector(s). The Johansen VECM can also adjust any short-run deviations from long-run equilibrium and can determine Granger causality between the different variables. By interpreting the results obtained from the Johansen specification, the question of whether low savings in South Africa are a constraint on investment expenditure can be answered.

The chapter will be divided as follows: Section 5.2 presents the correlation matrix and descriptive statistics of the included variables, Section 5.3 displays the results obtained from the unit root tests and stationarity test discussed in Chapter Four. Section 5.4 covers the results obtained for the rest of the steps involved in the VECM. Specifically, it covers the selection process of the optimal lag length, determining the number of co-integrating vectors through the trace and max eigenvalue tests, and interpreting the VECM results. Section 5.5 presents the results of the Granger causality tests, Section 5.6 the impulse response functions and variance decompositions results, and Section 5.7 the results for the Weak Exogeneity test. Section 5.8 displays the VECM residual diagnostics and Section 5.8 concludes the chapter.

5.2 CORRELATION MATRIX AND DESCRIPTIVE STATISTICS

In this section, the correlation matrix and descriptive statistics for the gross fixed capital formation, private savings and credit extension variables are examined. These values give important information on the variables to be analyzed. Table 5.1 presents the correlation results.

Table 5.1: Correlation Matrix

	GFCF_GDP	GPS_GDP	CE_GDP
GFCF_GDP	1	-0.180048	0.808232
GPS_GDP	-0.180048	1	0.010674
CE_GDP	0.808232	0.010674	1

The table shows GFCF_GDP and GPS_GDP to be negatively correlated, implying that an open economy may have caused these variables to move in opposite directions. GPS_GDP and CE_GDP on the other hand were found to be positively correlated, indicating that lower borrowing constraints may have a positive impact on private saving levels. The size of the correlation was however found to be relatively small. A high positive correlation between CE_GDP and GFCF_GDP was found, illustrating the importance of credit extension on private investment levels.

Table 5.2 displays relevant descriptive statistics for each variable included in the study. These statistics include the mean, median, maximum value, minimum value, standard deviation, skewness, kurtosis and Jarque-Bera (JB) test. A brief interpretation of these values will then follow.

Table 5.2: Descriptive Statistics

	MEAN	MEDIAN	MAX	MIN	STD. DEV	SKEWNESS	KURTOSIS	JARQUE-BERA
GFCF_GDP	0.1208	0.1166	0.1612	0.1054	0.0128	1.2189	3.8481	18.8757**
GPS_GDP	0.0208	0.0224	0.1004	-0.0620	0.0359	-0.0155	2.7211	0.2231
CE_GDP	0.6642	0.6308	0.8537	0.5192	0.0960	0.5831	2.0866	6.2180*

Note: * and ** represent the 5% and 1% significance levels respectively

Regarding the mean, defined as "a measure of central tendency in the distribution of a random variable" (Woolridge, 2006:862), Table 5.2 shows the variable CE_GDP to have the highest value and GPS_GDP the lowest. The median differs from the means in that while the mean measures the average value of a random distribution, the median identifies the middle value in a sample, in order for there to be "a 50% chance of being below it and a 50% chance of being

above it" (Woolridge, 2006:862). Again, GPS_GDP displays the lowest median value while CE_GDP the highest. CE_GDP had the highest maximum value and GPS_GDP the lowest minimum.

The standard deviation, which measures the spread or dispersion of a distribution (Hill, Griffiths and Judge, 2001:21), shows the CE_GDP variable to be the most dispersed. In a normal distribution, perfectly symmetric residuals will have a skewness of zero while the kurtosis statistic will be three. Table 5.2 shows the GPS_GDP to have a skewness value closer to zero than the other variables. GFCF_GDP on the other hand has a value closer to unity. The kurtosis statistic is close to 4 for GFCF_GDP and 2 for CE_GDP. This may be a sign of a skewed distribution. A kurtosis value closer to 3 was displayed by GPS_GDP.

The JB test is another popular statistic used to determine whether a series is normally distributed. According to Brooks (2008:161), it is one of the most commonly used tests for normality. By comparing the critical value from a chi-squared (X^2) distribution with the JB test statistic, the null hypothesis of normally distributed errors is rejected if it is found that the test statistic is greater than the critical value. This hypothesis can also be tested by comparing the probability value of the JB test to the 1% and 5% levels of significance. Therefore, at the 5% significance level, the null hypothesis is rejected for CE_GDP, while at the 1% level of significance the null hypothesis is rejected for GFCF_GDP. The GPS_GDP variable is the only variable with normally distributed errors.

5.3 UNIT ROOT TEST RESULTS

Unit root tests and stationarity tests are performed in order to determine the orders of integration for time series data. In this study, the ADF and PP unit roots tests as well as the KPSS test for stationarity were used to produce more robust results. If the null hypothesis of non-stationarity is to be rejected, both the ADF and PP test statistics should be greater than the 5% or 1% critical values. Similarly, if the null hypothesis of stationarity for the KPSS test is not rejected, the test statistic should be greater than these critical values.

Table 5.3 displays the results of both the unit root and stationarity tests conducted on each of the variables in this study.

Table 5.3: ADF, PP and KPSS Test Results

	ADF			PP			KPSS		
Variable	**Level**	**1st Differences**	**Order**	**Level**	**1st Differences**	**Order**	**Level**	**1st Differences**	**Order**
GFCF_GDP	-1.4606	-7.5012**	I(1)	-1.5256	-7.5012**	I(1)	1.5731**	0.1401	I(1)
GPS_GDP	-4.4491**	-12.1412	I(0)	-6.0948**	-12.1412	I(0)	0.3676	0.0125	I(0)
CE_GDP	-1.4010	-5.4769*	I(1)	-1.3969	-5.4769*	I(1)	2.7474**	0.3017	I(1)

Note: * represents significance at 5% and ** significance at 1%

The unit root and stationarity test results show the GFCF_GDP and CE_GDP variables to be integrated by order one, implying that a unit root is present for each of these variables. The GPS_GDP series on the other hand contains no unit root [ie. I(0)], as illustrated by both the unit root and stationarity test at the 1% significance level. While it is commonly believed that all the variables need to be integrated of the same order for the Johansen approach to be valid, two non-stationary variables, at the least, which are integrated of the same order (in this case I(1)) are necessary to make the cointegration approach suitable (Ahking, 2002:57). As a result, the Johansen method may be used in the study.

5.4 JOHANSEN APPROACH RESULTS

The Johansen method of co-integration enables the examination of the long-run relationships between the included variables in each model. In this study, the Johansen approach will be used to determine whether a long-run relationship between private savings, credit extension and investment exists, and therefore if savings have been a constraint on investment over the years in South Africa. The results for each process in the Johansen approach will now be discussed.

5.4.1 VAR Model Estimation

5.4.1.1 Selecting the Optimal Lag Length

The choice of lag order in a VAR model is of great importance as all inference depends on correct model specification (Gutierrez, Souza & de Carvalho Guillen, 2007:3). An incorrectly specified model may have severe consequences. As Braun and Mittnik (1993) indicate, the estimates of a VAR model whose lag length differs from the true lag length may be inconsistent,

as are the variance decomposition and impulse response functions. Selecting a lag length higher than the true lag length (i.e. overfitting) may cause an increase in the mean-square forecast errors of the VAR model, while underfitting the lag length may result in autocorrelated errors (Luthephol, 1993). Statistical criterion such as the Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) are some of the more commonly used criteria in lag length determination (Gutierrez *et al*., 2007; Yang, 2002). Appendix 1 presents the results obtained from the different VAR lag order selection criteria.

Due to the information criteria selecting conflicting lag lengths, an alternative method had to be used to obtain the optimal lag length. The Lagrange Multiplier (LM) residual test was used to test for serial correlation at each lag length so as to determine the optimal lag length where serial correlation is removed (see Born and Breitung, 2011; Boswijk and Franses, 1992). Specifically, the optimal lag length was obtained by selecting the smallest VAR lag interval and increasing it to a length where the LM test found evidence of no serial correlation. An optimal lag length of five was subsequently chosen.

Table 5.2 presents the results of the LM serial correlation test performed on the Unrestricted VAR for lag interval 1 to 5. Since the null hypothesis specifies that no serial autocorrelation exists at lag *h*, rejecting the null hypothesis would lead to the conclusion that serial autocorrelation is present among the residuals. Table 5.4 shows there to be evidence of autocorrelation at lag three and four at the 10% significance level. The other lags show no signs of being serially correlated. While there is some evidence of autocorrelation in the unrestricted VAR, the testing for co-integration and VECM estimation are continued with the expectation that any remaining autocorrelation would be captured and eliminated in the final VECM.

Table 5.4: VAR Residual Serial Correlation LM Test

LAGS	LM STATISTIC	PROBABILITY
1	7.771122	0.5574
2	8.564457	0.4784
3	16.90262	0.0503
4	16.07838	0.0653
5	10.91057	0.2819

5.4.1.2 Trace and Maximum Eigenvalue Test Statistics

Once the lag order has been selected, the next step is to analyse the trace and maximum eigenvalue test statistics which determine the number of co-integrating vectors to be estimated in the VECM. The 5% significance level was used for each model where an intercept and trend were specified as the CE_GDP variable exhibited a linear trend. Both the maximum eigenvalue test and trace test found there to be one co-integrating relationship present in the model. Appendix 2 provides a summary of the results from both tests at the 1 to 5 lag interval.

5.4.1.3 VECM Estimation and Results

Normalization was performed on gross private saving (GPS_GDP) in determining the long-run relationship between private saving and investment. While certain studies have normalized on the investment variable (Narayan, 2005; Jiranyakul & Brahmasrene, 2008), others have normalized on the saving variable to establish whether the Keynesian perspective of investment expenditure leading to higher savings indeed holds (see Sinha, 2002; Sinha & Sinha, 1998). Having normalized on the domestic saving rate for Japan, Thailand and Indonesia, Sinha (2002) found there to be a long-run positive relationship between gross saving and investment in all three countries. Similarly, Sinha and Sinha (1998) normalized on domestic saving for India and found a positive relationship between domestic saving and investment. This study will follow the approach of Sinha (2002) and Sinha and Sinha (1998). By making private saving the dependent variable in the study, the impact of investment and credit on the saving level can be tested. Table 5.5 and 5.6 below present the co-integrating and error correction results respectively.

Table 5.5: Co-integrating Vector Results

	Equation 1
GPS_GDP_{t-1}	1
$GFCF\_GDP_{t-1}$	3.6939** (0.8209) [4.4996]
CE_GDP_{t-1}	-0.8663** (0.1482) [-5.8464]
Constant	0.0642
R^2	0.84

Note: ( ) represents standard errors and [ ] represents t-statistics
**** denotes 1% significance level**

Eviews signs have been reversed to make for the more usual interpretation

where a +ve sign means a positive relationship and a –ve sign a negative relationship.

Table 5.6: Error Correction Estimates

	D(GPS_GDP)	**D(GFCF_GDP)**	**D(CE_GDP)**
Equation 1	-0.5390** (0.1754) [-3.0729]	-0.0591 (0.0310) [-1.9089]	-0.2606 (0.1106) [-2.3563]
F-statistic	14.6547	2.4197	3.2790

Note: ( ) represents standard errors and [ ] represents t-statistics

**** denotes 1% level of significance**

5.4.1.4 Analysis of VECM Results

Table 5.5 presents the co-integrating (long-run) relationship. A statistically significant positive relationship between gross saving and investment was found. Specifically, a 1% increase in GFCF_GDP is related to a 3.7% rise in gross savings as percentage of GDP at the 1% significance level. This result conforms to *a priori* expectations. A higher level of investment is expected to be associated with a higher level of savings, even in an open economy (Feldstein and Horioka, 1980; Esso and Keho, 2010; Kohler, 2005; Levy, 2003; Murphy, 1984). Though several businesses may view foreign saving as an imperfect substitute for domestic saving, the need to save internally to fund investment expenditure may still be necessary. Similarly, an increase in the saving rate may prove to be the result of higher investment spending.

The impact of credit extension on gross domestic saving was found to yield a negative result at the 1% significance level. Specifically, a 1% increase in CE_GDP was found to reduce GPS_GDP by 0.87%. The relationship also conforms to *a priori* expectations. A higher credit ratio is expected to lower borrowing constraints for the private sector, which in turn would lower savings. As Romm (2005:19) states, "a higher credit ratio should negatively affect the saving rate because it puts less of a constraint on current consumption". Though private investment may be positively associated with the country's private saving level, access to capital markets has reduced the need to finance investment through internal savings. The negative long-run relationship between saving and credit extension does, however, contradict the findings of Gurley and Shaw (1960), McKinnon (1973) and Shaw (1973), who state that a financially liberalized economy leads to higher savings through wider portfolio choices and diversified financial markets. Similarly, the negative relationship between domestic credit and saving opposes the Endogenous Money Theory, which states that bank credit creates deposits (saving) in modern economies.

The speed-of-adjustment parameters, which measure the proportion of the previous period's errors that are corrected for in the current period, are displayed in Table 5.6. Roughly 54% of the adjustment back to long-run equilibrium takes place in the first quarter. This value is both negative and statistically significant, thereby implying that the private saving variable is endogenous to the model. An error correcting mechanism is found to exist in the private saving model, thus representing an acceptable model.

5.5 GRANGER CAUSALITY TESTS

The Pair-wise Granger Causality test results are displayed in Table 5.6. As Granger (1969:428) stated, "Y_t is causing X_t if we are able to predict X_t using all available information than if the information apart from Y_t had been used".

Table 5.7: Pair-wise Causality Results

NULL HYPOTHESIS	OBS	F-STATISTIC	PROBABILITY
GPS_GDP does not Granger Cause GFCF_GDP	63	2.90322**	0.0219
GFCF_GDP does not Granger Cause GPS_GDP		3.71290***	0.0060
GPS_GDP does not Granger Cause CE_GDP	63	2.34279*	0.0542
CE_GDP does not Granger Cause GPS_GDP		2.80163**	0.0258

Note: *, ** and * represent the 10%, 5% and 1% significance levels respectively**

The null hypotheses of GPS_GDP not Granger causing GFCF_GDP as well as GFCF_GDP not Granger causing GPS_GDP were both rejected at the 5% and 1% level of significance respectively. There is therefore evidence of bi-variate causality between these two variables. Private saving is a requirement for increased investment and at the same time is a result of investment expenditure. Afzal (2007) also found a bi-variate causality between saving and investment to exist for South Africa, while Romm (2005) and Odhiambo (2009) found a bi-variate causality between private savings and growth. The Keynesian theory proposes that the financial sector has the ability to create the purchasing power that investors use to increase capital stock, while the incomes generated in this process provide only *ex post* the necessary savings to finance the investment (Dullien, 2009:2). Thus by improving investment and hence income, a developed financial industry has an indirect positive influence on private savings. Private savings were also found to Granger cause investment rates, confirming that savings play an important role in financing investment expenditure. According to Dullien, (2009:5), while the retained savings of firms plays a vital role in financing private investment, strong credit creation is also an important condition for profit growth in an economy since it is only if credit creation helps maintain a high level of aggregate demand (i.e. investment demand) that firms will be able to make adequate profits (ie. savings) (Dullien, 2009:5).

With respect to the relationship between credit extension and private savings, CE_GDP was found to Granger cause GPS_GDP at the 5% significance levels, whereas GPS_GDP Granger causes CE_GDP at the 10% level of significance. A negative bi-variate relationship is therefore found to be present between private saving and credit extension. This relationship suggests that while the extension of credit may have a positive impact on private savings through increased investment and income, its direct influence on saving decisions may be negative. Improved access to credit allows households to increase their consumption needs without first raising their saving levels. Studies by Aron and Muellbauer (2000), Prinsloo (2000), Japelli and Pagano

(1994) and Loayza *et al*., (2000) have likewise all found an increase in household borrowing to negatively affect domestic saving levels. Similarly, improved access to credit may discourage businesses from increasing corporate savings, as obtaining funding from financial intermediaries may prove less costly and less time-consuming. As GPS_GDP was also found to Granger cause CE_GDP, there is evidence of private saving levels influencing credit supply in South Africa. An increase in the saving rate is an indication of the private sector's willingness to raise savings to finance their expenditure as opposed to approaching financial intermediaries if, for instance, the cost of credit is high, or during economic downswings (precautionary motive). Prinsloo (2000) found household and corporate saving to increase during an economic downturn in South Africa.

The results for the VEC Granger Causality/Block Exogeneity Wald test are given in Table 5.8. Both the Pair-wise causality and Block Exogeneity tests effectively examine whether the lags of the excluded variable have any influence on the dependent variable. If the null hypothesis signifies that the lagged coefficients of the excluded variables have no significant impact on the dependent variable, then by rejecting this hypothesis, the conclusion is reached that lagged variables Granger cause the dependent variable.

Table 5.8: VEC Granger Causality/Block Exogeneity Test Results

Dependent variable: D(GPS_GDP)			
EXCLUDED VARIABLE	**CHI-SQUARE**	**Df**	**PROBABILITY**
D(CE_GDP)	5.230731	5	0.3884
D(GFCF_GDP)	21.02002**	5	0.0008
All	32.88033**	10	0.0003

Note: ** represent the 1% significance level

Given that D(GPS_GDP) was made the dependent variable, the null hypothesis of no causality with D(GFCF_GDP) is rejected at the 1% level of significance. There is therefore evidence of causality from gross capital formation to private savings. This result not only corresponds to the Pair-wise Granger Causality result, but it reinforces the Keynesian and Endogenous Theories that prior savings are not necessary in financing investment demand but occur only once investment demand has taken place. With regards to D(CE_GDP), the null hypothesis was not rejected, suggesting that credit extension may not have a significant (negative) impact on private saving levels. This result contradicts the pair-wise causality finding as well as the findings of Aron and

Muellbauer (2000), Prinsloo (2000), Japelli and Pagano (1994) and Loayza *et al*., (2000). This finding, if valid, would suggest the Classical Theory assumption of savings being channelled through the banking system into investment may therefore in fact be correct (see Gurley & Shaw, 1960; McKinnon, 1973; Shaw, 1973).

A different explanation of the failure of D(CE_GDP) to reject the null hypothesis is given by Lindner (2013) who argues that the ability to lend is not associated with a change in the saving level. According to Lindner (2013), when a bank extends credit, it will not only increase its gross financial assets (create a loan), but it will increase its gross liabilities too (create a deposit). There is therefore no change in the bank's net financial assets (ie. no saving); a change in the composition of the assets alone (exchange money holdings for the new loan) occurs. A change in saving can only arise by spending less than one earns, not through credit creation.

However, as the joint block exogeneity test χ^2 is significant at the 1% level, the lags of both D(CE_GDP) and D(GFCF_GDP) may affect the endogenous variable D(GPS_GDP). Additionally, as the Block exogeneity results display short-run effects, D(CE_GDP) may still have a significant impact on D(GPS_GDP) in the long-run and the pair-wise causality finding may in fact be valid in the long-run.

5.6 IMPULSE RESPONSE FUNCTION AND VARIANCE DECOMPOSITION

Both impulse response and variance decomposition analysis illustrate the effect of a shock to each variable on its own future trends as well as on the future behaviour of the other variables in the VECM system (Gunasekarage, Pisedtasalasai and Power, 2004:9). The results for both the impulse response functions and variance decompositions are presented in Appendix 3.

Concerning the impulse response function, a unit shock is applied to the error of each variable in each equation, and the effects upon the VAR system are noted over time (Brooks, 2008:299). The response of GPS_GDP to its own innovations is fluctuating. A possible reason for GPS_GDP responding in this manner could be due to the ability of the private sector to invest savings abroad, resulting in volatility in the domestic saving rate. The response of GPS_GDP to a shock in GFCF_GDP is volatile, though a positive increase does occur over time. The response of GPS_GDP to a shock in CE_GDP on the other hand seems to be a negative. It is however not clear whether long-run equilibrium is reached again.

In terms of the variance decompositions, 100% of the variation in GPS_GDP is attributed to changes in GPS_GDP alone in period one. At period five, the variation of GPS_GDP as a result of its own innovations was 56.3%, while the variation due to CE_GDP and GFCF_GDP is 28% and 15.7% respectively. In period 20, the variation in GPS_GDP due to its own shocks is to 39% while that of CE_GDP and GFCF_GDP are to 49% and 12% respectively. Based on these findings, credit extension seems to explain a larger proportion of gross savings than GFCF_GDP does, suggesting that the impact of financial liberalization on the country's private saving level may have been significant.

5.7 WEAK EXOGENEITY TESTS

In this section, the study determines whether the included variables in the VECM are weakly exogenous or endogenous by using the adjustment matrix. Table 5.9 presents the results. By rejecting the null hypothesis, it can be concluded that the variable is endogenous to the system.

Table 5.9: VECM Weak Exogeneity Test Results

VARIABLE	CHI-SQUARED	P-VALUE	CONCLUSION
D(GPS_GDP)	8.885857***	0.002874	Endogenous
D(GFCF_GDP)	3.346988*	0.067328	Endogenous
D(CE_GDP)	5.393238**	0.020215	Endogenous

Note: * , **and * represent the 10%, 5% and 1% significance levels respectively**

D(GFCF_GDP), D(GPS_GDP) and D(CE_GDP) are all found to be endogenous variables. This result justifies the normalization on private saving, as its significance confirms that GPS_GDP is part of the co-integrating relationship. Endogenous variables are error correcting, adjusting to any disequilibrium that may occur in gross private saving.

5.8 VECM DIAGNOSTICS

In this section, a number of diagnostic tests are conducted on the VECM. Regarding serial correlation, both the VEC Residual Serial Correlation LM test and correlograms suggest no serial correlation. The LM test failed to reject the null hypothesis of no serial correlation in the residuals at different lag lengths. The LM test results are presented in Table A.4 in the Appendix 4. The correlograms also showed evidence of a white noise process, where the results are displayed in Figure A.2 of the Appendix 4.

The Jarque-Bera (JB) statistic testing suggests the presence of normally distributed residuals, as the null hypothesis of the residuals being jointly multivariate normal is not rejected at the 1% level (see Table A.5 in Appendix 4). In addition, the VEC Residual Heteroscedasticity test shows evidence of no heteroscedasticity in the model (see Table A.6 in Appendix 4). Finally, the co-integrating relationship as well as the graphs of the residuals of each variable are presented in Figure A.3 and Figure A.4 of Appendix 5 respectively.

5.9 CONCLUSION

This chapter presented and analysed the VECM results. As shown by the co-integrating vector results, a long-run positive relationship between private saving and investment was found to exist, conforming to *a priori* expectations. As shown in Table 5.5, a 1% increase in gross fixed investment is associated with a 3.7 percentage increase in private savings at the 1% significance level. The positive response of GPS_GDP to innovations in GFCF_GDP is however gradual over time, as illustrated by the impulse response function. Additionally, the causality tests show there to be a two-way causality between private saving and investment, indicating that while savings may finance investment expenditure (Prinsloo, 2000; Aron and Muellbauer, 2000; Khan and Kumar, 1997), investment is expected also to encourage the savings which finance it (Onefowara, Oweye and Huart, 2011; Dullien, 2009). An improvement in investment levels raises savings indirectly through income, as suggested by the Keynesian Theory.

A statistically significant long-run negative relationship between credit extension and private saving was also found. Specifically, a 1% increase in CE_GDP is associated with a 0.9% decline in GPS_GDP. Not only did the weak exogeneity test find CE_GDP to be endogenous to the private saving model, but the credit extension variable explains larger variations in gross private savings than GFCF_GDP, as shown by the variance decomposition. This suggests that the impact of financial liberalization on the country's private saving level may have been significant and contributed to the fall in private savings since 1995. Interestingly, causality was found to go from credit extension to private saving as well as from private saving to credit extension, suggesting that a negative two-way causality exists between these variables. Lower borrowing constraints encourage the household and business sectors to reduce their savings, in the same way that an increase in private savings places less importance on debt finance. The Endogenous

Money Theory, which proposes a more direct response of savings to credit extension through an accumulation in banking deposits, was not found to have significance in this study.

As illustrated by the negative coefficient in the error correcting results, an acceptable private saving model is found to be present. The significant negative error correction term and endogneity of the GPS_GDP variable justify the normalization of the private saving variable, and indicate that a unique relationship between private saving, credit extension and fixed capital formation exists in South Africa.

In the following Chapter, the importance of policies to improve simultaneously both the saving and investment levels in South Africa, due to the bi-variate causality, will be discussed.

CHAPTER SIX

SUMMARY OF FINDINGS, POLICY RECOMMENDATIONS AND CONCLUSION

6.1 INTRODUCTION

The purpose of this study was to analyse the relationship between domestic saving and investment so as to determine in which direction causality occurs between these two variables. South Africa's low domestic saving and investment levels have been identified as important factors trapping the country in slow economic growth. Empirically studying the saving-investment relationship is therefore important if sustainable growth is to be achieved.

According to the Commission for Growth and Development (World Bank, 2008:54), no case exists of a high investment path not backed up by high domestic savings. However, the importance of domestic saving in financing this investment has led to contradictory results. While certain studies have found savings to be necessary in financing domestic investment, others have found the demand for investment to be the driving force behind an increase in the domestic savings level, with the investment expenditure in turn depending on the ability of banks to extend credit without prior savings.

The chapter will be divided as follows: Section 6.2 will summarise the findings of the study and Section 6.3 will provide policy recommendations to enhance the saving-investment relationship. Section 6.4 concludes the chapter and thesis.

6.2 SUMMARY OF FINDINGS

The results obtained from private saving model, in particular the relationship between private saving and investment as well as private saving and credit extension were found to conform to *a priori* expectations. A statistically significant positive relationship between domestic saving and investment was found for South Africa between 1995 and 2011. A positive relationship between domestic saving and investment is expected, even in an open economy. As the pioneering work of Feldstein and Horioka (1980) has established, domestic savings tend to stay in the country of origin instead of being invested abroad. Moreover, a statistically significant negative relationship

between credit extension and private saving was found, conforming to *a priori* expectations. Lower borrowing constraints discourage increases in private saving as the need to save to finance investment or consumption expenditure is reduced.

Regarding the direction of causality between the included variables, a bi-directional causality between private saving and investment was found to exist, confirming that while an increase in saving may lead to higher investment, additional investment expenditure may also result in a rise in private saving. This two-way causality between private savings and fixed capital formation not only illustrates the impact of one variable on the other, but it provides policy-makers with several options on how to improve the saving-investment relationship. Specifically, policy-makers may implement policies which simultaneously encourage both private sector saving and investment.

Odhiambo (2009), who found a bi-variate causality framework to be present for South Africa for the period 1950 to 2005, recommends that policies should be geared toward stimulating both economic growth and saving in the short-run, whereas a stronger focus should be placed on boosting economic growth in the long-run. Romm (2005) also found a two-way causality framework to exist between saving and economic growth for South Africa during the period 1946 and 1992. More importantly, Romm (2005) found evidence of savings being channelled into investment. According to Romm (2005), financial intermediation has two contrasting affects on growth: it may either promote growth by increasing the rate of return on capital through a more efficient allocation of credit to investment, or an efficient capital market may hinder growth as a result of a lack of liquidity constraints.

Similar to Romm (2005), who found financial intermediaries to use private savings for lending purposes, channelling savings into the financial system to lend them to financially constrained firms is supported by the study. While savings may not be necessary for credit to rise, it does not mean that they are not channelled through the financial system.

The credit extension variable was found to Granger cause private savings. Equally, the private saving variable rejected the null hypothesis of not Granger causing credit extension. This relationship suggests that even though credit supply may have a direct negative effect on savings, a positive result may occur when this credit is used for investment purposes. Credit supply and private savings can be thought of as substitutes. Thus, when credit extension rises, savings will

fall, and similarly when savings increase, credit supply will fall. It is only when credit extension results in increased investment that savings will rise. By focusing on policies aimed at enhancing private investment, and more importantly the bank financing needed to kick-start this investment, increases in the saving levels can also be achieved. As Kaldor and Trevithick (1981) emphasise, elasticity in bank credit enables the increase in productive investment, generating the savings needed to finance this investment in the process through higher income.

6.3 POLICY RECOMMENDATIONS

With respect to investment led policies, ensuring real returns to capital are continuously attractive to private investors is necessary in increasing South Africa's investment levels. Keeping inflation and interest rates low is one of the ways this can be achieved. When the cost of purchasing capital equipment falls (proxied by bank lending rates), the return to that investment automatically increases (World Bank, 2011:22). In addition to real returns, political and financial stability are necessary conditions in raising investment expenditure, as is education and skills development. Improving both the quality of and access to education ensures that individuals are equipped with the necessary knowledge and skills to maximise the returns to physical capital, and thereby contribute positively to economic growth.

Bertocco (2006:12) notes that "the supply of credit does not depend on saving decisions but depends on the decisions taken by banks and that it is independent of the savings flow". This is strengthened by the study finding credit extension to Granger Cause savings negatively. However, financial liberalization may raise private saving rates in the long run through faster income growth (Loayza, *et al*., 2000: 405). By liberalizing domestic financial markets, the efficiency of financial intermediation and hence investment is improved, which contributes to higher growth (Loayza, *et al*., 2000:405). "If growth and disposable income pick up substantially savings will tend to go up because consumption patterns will change more slowly" (World Bank, 2011: 28-29). Economic growth therefore plays an important role in raising South Africa's low saving levels. Other countries, specifically China, Chile, India and Indonesia, have illustrated the importance of having income growth and savings reinforce each other (World Bank, 2011: 29). As a result, the need for a productivity led growth shock is necessary (World Bank, 2011:29).

Increases in investment demand require credit to be directed at productive investment and not consumption or speculative behaviour. As Dullien (2009) emphasises, the creation of credit plays a vital role in maintaining a high level of investment. An increase in investment in turn stimulates company profits and savings through higher income, as illustrated by capital formation Granger Causing private saving in the study. Yet new businesses face difficulties in obtaining finance from formal financial intermediaries due to insufficient collateral. Both the value and quality of collateral[5] may prevent businesses from obtaining funding. To remedy this, financial institutions could for instance consider allowing moveable property in addition to fixed property as collateral. Using vehicles and machinery as collateral allows poorer, yet potentially profitable entrepreneurs, access to previously unattainable finance. However, ensuring an easily accessible registry from which banks may view the security interests on the asset is necessary in reducing their exposure to risk.

Similarly, microfinance, a more common source of finance for small businesses in the informal sector, may prove to be inappropriate for investment purposes. The short maturity periods, high interest rates, and low credit values make microfinance an unattractive option for small businesses (Dullien, 2009:13-14). Lengthening the terms of maturity for loans and offering lower interest rates, specifically for small businesses, may spur investment credit demand. In addition, the value of the loan itself should be large enough to purchase fixed assets such as equipment and machinery instead of being sufficient only as working capital.

Since a two-way causality between saving and investment was found in the study, promoting saving policies is also necessary in enhancing investment growth. There are several policies which may be used to improve South Africa's private saving level. According to Ruggeri & Fougere (1997:143), "various governments have provided preferential income tax treatment to certain saving vehicles commonly known as tax-assisted savings plans (TASPs)". For instance, in Canada, personal contributions made to Registered Retirement Saving Plans (RRSPs) are tax deductible up to a certain limit, and the earnings which accumulate are not taxed (Ruggeri & Fougere, 1997: 144). Similarly, tax relief to the business sector is important in accumulating corporate saving. As Poterba (1987) mentions, increasing tax liabilities exerts downward

[5]The quality of collateral refers to non-standard forms of collateral, for example, property which the borrower has no title deed to.

pressure on corporate saving by reducing the after-tax income available for paying out dividends to shareholders or retaining it within the business as corporate saving. Providing tax relief to both the corporate and household sector is therefore necessary in raising the private saving level.

Though an improvement in the budget balance (government saving) may reduce private saving (Ricardian equivalence), the national saving level is raised as government saving only partially offsets private saving, thereby raising aggregate savings. However, increasing government saving by relying on tax increases has proven to be less sustainable than public expenditure cuts (Eyraud, 2009; Corbo & Schmidt-Hebbel, 1991). Higher national savings may have a positive impact on investment levels, considering a bi-variate causality between saving and investment was found.

If a positive saving-investment relationship is to be present in South Africa, the attractiveness of domestic currency and assets, and therefore willingness to hold them, needs to be continuously maintained so as to prevent a surge in capital outflows by domestic savers. This can be achieved by firstly ensuring inflation in the country remains low as this represents price stability, and secondly, preventing excessive exchange rate fluctuations as foreign currency is expected to lose less value, and therefore becomes more attractive, with erratic exchange rate fluctuations (Dullien, 2009:20). Not only do foreign outflows depreciate the exchange rate, but international reserves are depleted as well. Consequently, capital flow measures (CFM) should be implemented to restrict a drastic outflow in capital. However, CFM's cannot be implemented in isolation, but with the support of appropriate macroeconomic, structural and financial sector policies (International Monetary Fund, 2012:35). Some of the measures that may be used to control outflows include deposit withdrawal restrictions, waiting periods for non-residents to sell their profits from domestic assets, as well as imposing restrictions on loans and transfers in foreign currency (International Monetary Fund, 2012).

Similarly, a surge in capital inflows, in particular short-term inflows, may not always prove to be beneficial for the domestic economy. Unlike foreign direct investment (FDI), portfolio inflows are short-term in nature, making them vulnerable to reversals during adverse economic conditions. Imposing measures to restrict sudden drastic outflows of capital may in turn discourage inflows as foreign investors find the difficulty in extracting their funds a deterrent

when investing. FDI too may not necessarily produce the long-term results expected from this source of foreign funding. While FDI may prove to be resilient during financial crises, and though it allows for the transfer of technology, there is evidence of this source of funding flowing into riskier countries or countries with inefficient financial markets (Loungani and Razin, 2001). According to these authors, economies with lower quality institutions and with inefficient markets attract foreign investors who exercise control over host country companies and markets, and not necessarily for the benefit of the host country. Thus reliance on foreign savings, whether long-term or temporary, should be limited and instead emerging economies should concentrate on developing their financial institutions and markets, improving domestic investment and savings in the process.

6.4 CONCLUSION

The removal of exchange controls on foreigners in 1995 allowed South Africa to not only re-integrate with the international community, but to experience a surge in capital inflows, specifically short-term foreign inflows. The reliance on foreign portfolio savings to finance the country's investment needs may however have come at the expense of current account reversals, exchange rate volatility, and an increase in inflation.

For sustainable development to be achieved, relying on domestic resources to finance the country's investment expenditure is paramount. The study found the two-way causality between domestic saving and investment to illustrate the importance of both these variables in the growth process, whereas the bi-directional causality between credit growth and private savings shows how the use of credit, and therefore the purchasing power for profitable investment, leads to a lower saving level. Credit may only yield positive results if used for investment purposes as opposed to consumption, as lower borrowing constraints discourage households and businesses from saving. The development of the country's financial sector is therefore important in kick-starting the investment cycle, raising the savings which finance this investment in the process, and then stimulating further investment. Maintaining this virtuous cycle is necessary in lifting South Africa to a higher level of development.

APPENDICES

APPENDIX 1: VAR Lag Order Selection Criteria

Table A.1: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	386.4790	NA	4.54e-10	-12.99929	-12.89365	-12.95805
1	534.0798	275.1879	4.14e-12	-17.69762	-17.27507*	-17.53268
2	537.6953	6.372975	4.98e-12	-17.51509	-16.77563	-17.22644
3	548.0192	17.14823	4.79e-12	-17.55997	-16.50360	-17.14761
4	577.5508	46.04927	2.42e-12	-18.25596	-16.88267	-17.71988
5	592.8757	22.33795	1.99e-12	-18.47036	-16.78016	-17.81058*
6	597.0992	5.726750	2.41e-12	-18.30845	-16.30133	-17.52495
7	608.2291	13.95958	2.34e-12	-18.38065	-16.05662	-17.47344
8	618.2721	11.57499	2.39e-12	-18.41600	-15.77507	-17.38509
9	636.5257	19.18172*	1.89e-12*	-18.72968*	-15.77183	-17.57506

*indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX 2: Unrestricted Co-Integration Rank Test

Table A.2: Co-integration Rank Tests

Hypothesized No. of CE(s)	Trace Test Statistic	Trace 5% Critical Value	Max Eigenvalue Test Statistic	Max Eigenvalue 5% Critical Value
None	46.30379*	42.91525	28.38033*	25.82321
At most 1	0.152561	17.92346	10.26323	19.38704
At most 2	0.116224	7.660227	7.660227	12.51798

*denotes rejection of the null hypothesis at the 5% significance level

APPENDIX 3: Impulse Response Function and Variance Decomposition

Figure A.1: Impulse Response Function

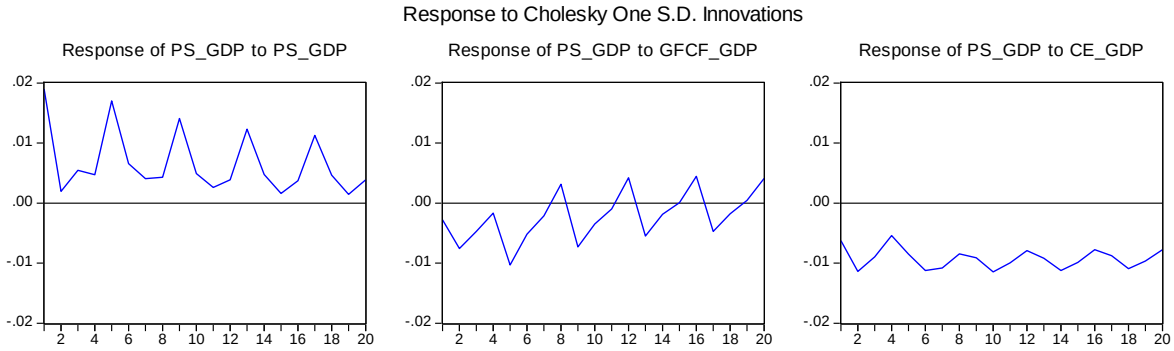


Table A.3: Variance Decomposition of GPS_GDP

Period	Standard Error	GPS_GDP	GFCF_GDP	CE_GDP
1	0.012719	88.38919	1.936009	9.674804
2	0.020998	60.81666	10.88875	28.29460
3	0.029961	53.86212	11.97460	34.16328
4	0.038468	52.96905	11.49833	35.53262
5	0.045430	56.29603	15.70024	28.00373
6	0.052276	51.65316	15.44364	32.90319
7	0.059846	48.19546	14.38787	37.41667
8	0.067143	46.43867	14.11743	39.44389
9	0.074307	48.55759	14.41039	37.03202
10	0.080999	45.95125	13.85949	40.18926
11	0.087786	44.10609	13.25548	42.63843
12	0.093934	42.97050	13.46638	43.56311
13	0.099546	44.37205	13.25320	42.37475
14	0.104884	42.76784	12.65930	44.57286
15	0.110355	41.38378	12.22419	46.39203
16	0.115439	40.55375	12.49867	46.94758
17	0.120180	41.63951	12.31954	46.04095
18	0.124672	40.50206	11.88826	47.60968
19	0.129261	39.45128	11.56770	48.98102
20	0.133563	38.84910	11.74570	49.40520

APPENDIX 4: VECM Residual Diagnostic Tests

Table A.4: VEC Residual Serial Correlation LM Test

LAGS	LM STATISTIC	PROBABILITY
1	11.64526	0.2341
2	18.02058	0.0349
3	17.82763	0.0372
4	12.31700	0.1960
5	6.663763	0.6721

Figure A.2: Correlograms

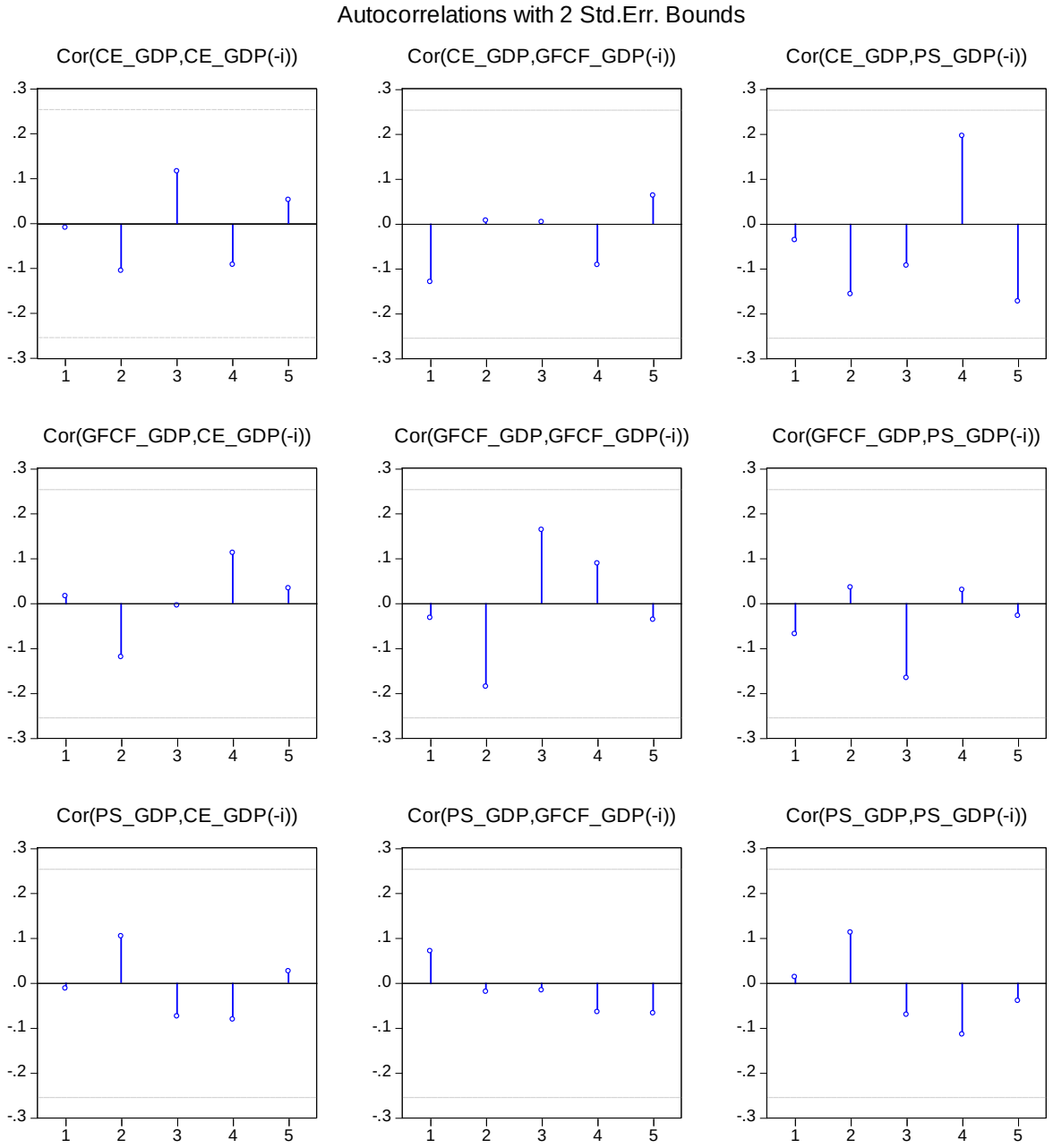


Table A.5: VEC Residual Normality Test

Component	Jarque-Bera	Df	Probability
1	3.222708	2	0.1996
2	4.619624	2	0.0993
3	4.882595	2	0.0870
Joint	12.72493	6	0.0476

Table A.6: VEC Residual Heteroscedasticity Test (No Cross Terms)

Joint Test		
Chi-squared	df	Probability
215.3297	192	0.1192

APPENDIX 5:Co-integrating Graph and Residual Graphs

Figure A.3: Co-integrating Graph

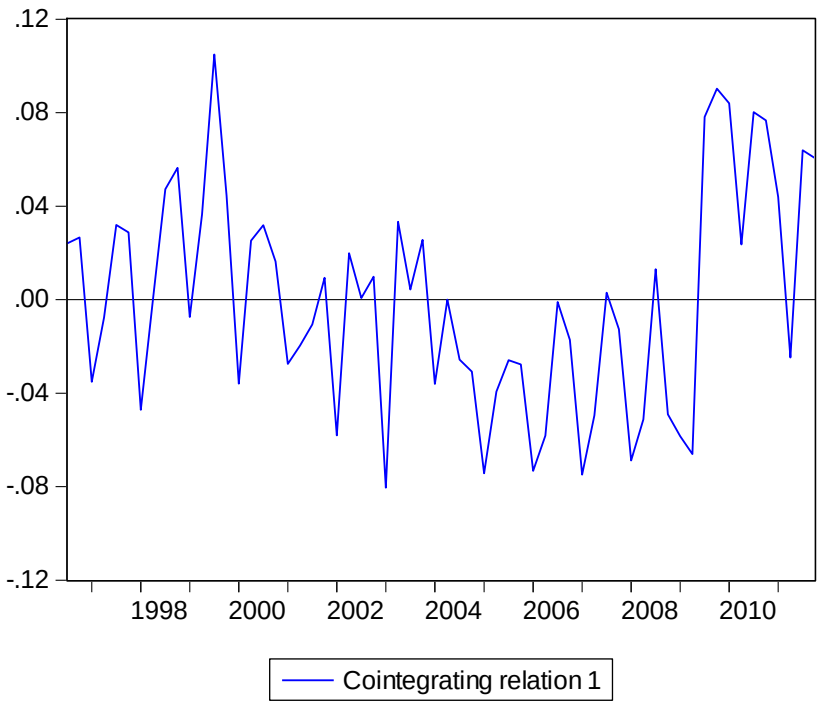
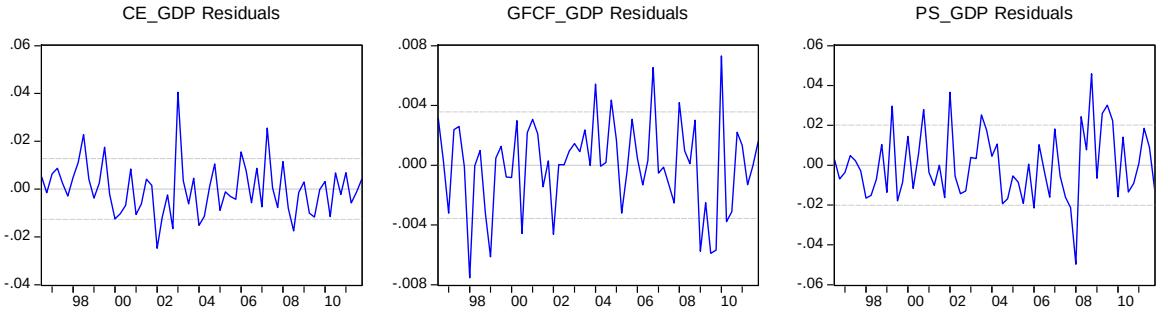


Figure A.4: Residual Graphs



BIBLIOGRAPHY

AFZAL, M., 2007. Saving and Investment in Developing Countries: Granger Causality test. *Philippine Review of Economics*, 44(2).

AGHION, P. & HOWITT, P., 1988. *Endogenous Growth Theory*. MIT Press: Cambridge.

AGRAWAL, P., 2001. The relationship between savings and growth: Cointegration and causality evidence from Asia. *Applied Economics*, 33(4): 499 – 513.

AHKING, F.W., 2002. Model mis-specification and Johansen's co-integration analysis: an application to the US money demand. *Journal of Macroeconomics*, 24: 51 – 66.

AHMAD, M.H. & AHMED, Q.M., 2002. Foreign Capital Inflows and Domestic Savings in Pakistan: Cointegration Techniques and Error Correction Modelling. *The Pakistan Development Review*, 41(4) Part II: 825 – 836.

AIZENMAN, J. & POWELL, A., 1998. The political economy of public savings and the role of capital mobility. *Journal of Development Economics*, 57(1): 67 – 95.

ALESSI, R., LUSARDI, A. & ALDERSHOF, T., 1997. Income and wealth over the life cycle: Evidence from panel data. *Review of Income and Wealth*, 43(1): 1 – 32.

ANORUO, E. & AHMED, Y., 2001. Causal relationship between domestic savings and economic growth: Evidence from seven African countries. *African Development Review*, 13(2): 238 – 249.

APERGIS, N. & TSOULFIDIS, L., 1997. The Relationship between Saving and Finance: Theory and Evidence from E. U. Countries. *Research in Economics*, 51: 333 – 358.

APPLEYARD, D. R., FIELD, A.J. & COBB. S. L., 2006. *International Economics*. 5th edition. McGraw-Hill: Boston.

ARBELAEZ, M.A. & ECHAVARRIA, J.J., 2002. Credit, Financial Liberalization and Manufacturing Investment in Columbia. *IDB Working Paper* No. 160.

ARESTIS, P. & CANER, A., 2004. Financial Liberalization and Poverty: Channels of Influence. *Economic Working Paper Archive*, wp 411.

ARON, J. & MUELLBAUER, J., 2000. Personal and Corporate Saving in South Africa. *World Bank Economic Review*, 14(3): 509 – 544.

ARZA, V. & ESPANOL, P., 2008. A Minskyan approach to the relation of credit and investment in Argentian during the 1990s. *Cambridge Journal of Economics*, 32(5): 739 – 759.

ASIMAKOPULOS, A., 1983. Kalecki and Keynes on Finance, Investment, and Saving. *Cambridge Journal of Economics*, 7: 221 – 233.

BAKER, M., NAGEL, S. & WURGLER, J., 2007. The Effect of Dividends on Consumption. *Brookings Papers on Economic Activity*, 38(2007-1): 231 – 292.

BARR, G. D. I. and KANTOR, B. S., 1994. The Changing Pattern of Savings in South Africa 1970 – 1991. *Journal of Studies in Economics and Econometrics*,18(3): 59 – 76.

BARRO, R.J., 1974. Are Government Bonds Net Wealth? *Journal of Political Economy*, 82(6): 1095 – 1117.

BAXTER, M. & CRUCINI, M.J., 1993. Explaining Saving-Investment Correlations. *American*

Economic Review, 83: 416 – 436.

BAYOUMI, T., 1990. Saving-Investment Correlations: Immobile Capital, Government Policy, or Endogenous Behaviour? *International Monetary Fund Staff Papers*, 37:360 – 387.

BEKAERT, G., HARVEY, C.R. & LUNDBLAD, C., 2005. Does Financial Liberalization Spur *Growth*? *Journal of Financial Economics*, 77(1): 3 – 55.

BELL, S., 1998. Can Taxes and Bonds Finance Government Spending? Reserve Accounting and Government Finance. *Levy Economics Institute*, Working Paper No. 244.

BERTOCCO, G., 2006. Some observations about the endogenous money theory. *Economics and Quantitative Methods*, qf0602, Department of Economics, University of Insurbia.

BORN, B. & BREITUNG, J., 2011. Simple Regression Based Tests for Spatial Dependence. *Econometrics Journal*, 14(2): 330 – 342.

BOSWIJK, H.P., 2001. Testing for a Unit Root with Near-Integrated Volatility. *Tinbergen Institute Discussion Papers* 01-077/4, Tinbergen Institute.

BOSWIJK, H.P. & DOORNIK, J., 2003. Identifying, Estimating and Testing Restricted Cointegrated Systems: An Overview. *Economics Series Working Papers* 2003-W10. University of Oxford, Department of Economics.

BOSWIJK, H.P. & FRANSES, P.H., 1992. Dynamic specification and cointegration. *Oxford Bulletin of Economics and Statistics*, 54: 369 – 381.

BRAUN, P.A. & MITTNIK, S., 1993. Misspecification in vector autoregressions and their effects on impulse responses and variance decompositions. *Journal of Econometrics*, 59(3): 319 – 341.

BRESSER-PEREIRA, L.C. & NAKANO, Y., 2002. Crescimento Econômico com Poupança Externa? *Brazilian Journal of Political Economy*, 23(2) (90): 3 – 27.

BROOKS, C., 2008. *Introductory Econometrics for Finance*. 2nd edition. Cambridge University Press: New York.

BUCKS, B.K., KENNICKELL, A.B. & MACK, T.L., 2009. Changes in U.S. family finances from 2004 to 2007: Evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin* , A1 – A56.

BYRNES, R.M., 1996. *South Africa: A Country Study*. GPO for the Library of Congress: Washington.

CANOVA, F., 2007. *Methods for Applied Macroeconomic Research*. Princeton University Press: Princeton.

CARROLL, C.D. & WEIL, D.N., 1994. Saving and Growth: A Reinterpretation. *Carnegie-Rochester Conference Series on Public Policy*, 40: 133 – 192.

CHERIF, R. & HASANOV, F., 2011. The Volatility trap: why do big savers invest relatively little? *MPRA* Paper No. 31286. [Online]. Available: http://mpra.ub.uni-muenchen.de/31286/ [Accessed 23 September 2012].

CHINN, M.D. & ITO, H., 2007. Current Account Balances, Financial Development and Institutions: Assaying the World "Savings Glut". *Journal of International Money and Finance*, 26: 546 – 569.

COAKLEY, J., HASAN, F. & SMITH, R., 1999. Saving, Investment, and Capital Mobility in LDCs. *Review of International Economics*, 7:632 – 640.

COCHRANE, J., 2005. Time Series for Macroeconomics and Finance. [Online]. Available: http://faculty.chicagobooth.edu/john.cochrane/research/papers/ [Accessed 17 May 2013].

CORBO, V. & SCHMIDT-HEBBEL, K., 1991. Public Policies and Saving in Developing Countries. *Journal of Development Economics*. 36(1): 89 – 115.

CUI, Z., 1998. *An Appendix on Saving and Investment*. Verso: London

CYRILLE, S.M., 2010. Saving-Investment Correlation and Capital Mobility in Sub-Saharan African Countries. A Reappraisal through Inward and Outward Capital Flows' Correlation. *International Journal of Economics and Finance, 2(2).*

DAILIMI, M. & GIUGALE, M., 1991. Reflections on Credit Policy in Developing Countries: Its Effect on Private Investment. *Policy, Research and External Affairs,* Working Paper No. 654.

DALZIEL, P., 1995. The Keynesian Multiplier Liquidity Preference and Endogenous Money. *Department of Economics and Marketing,* Discussion Paper No. 8.

DAVID, E.A. & SCADDING, J.L., 1974. Private Savings: Ultrarationality, Aggregation, and 'Denison's Law'. *Journal of Political Economy* (March/April): 225 – 249.

De CASTRO, F. & FERNANDEZ, J.L., 2009. The relationship between public and private saving in Spain: does Ricardian equivalence hold? *Banco de Espana,* Working Paper No. 0923.

De HAAN, J. & SIERMANN, C.L.J., 1994. Saving, Investment, and Capital Mobility: A Comment on Leachman. *Open Economies Review,* 5: 5 – 17.

De VITA, G. & ABBOTT, A., 2002. Are saving and investment cointegrated? An ARDL bounds testing approach. *Economic Letters*, 77: 293 – 299.

De WET, A. & Van EYDEN, R., 2005. Capital Mobility in Sub-Saharan Africa: A Panel Data Approach. *South African Journal of Economics*, 73:1 – 22.

DULLIEN, S., 2009. Central Banking, Financial Institutions and Credit Creation in developing countries. *UNCTAD Discussion Paper* No, 193.

EDWARDS, S., 1995. Why are saving rates so different across countries? An international comparative analysis. *NBER Working Paper* No, 5097.

ENDERS, W., 2010. *Applied Econometric Time Series.* 3rd edition. John Wiley & Sons, Inc.: United States of America.

ENGLE, R. F. & GRANGER, C. W. J., 1987. Co-Integration and Error Correction: Representation, Estimation and Testing. *Econometrica.* 55(2): 251 – 276.

ERJAVEC, N. & COTA, B., 2003. Macroeconomic Granger causal dynamics in Croatia: Evidence based on vector error-correction modelling analysis. *Economic Review,* 54(1-2): 139 – 156.

ESSO, L.J. & KEHO, Y., 2010. The Savings-Investment Relationship: Cointegration and causality evidence from UEMOA Countries. *International Journal of Economics and Finance*, 2(1).

EYRAUD, L., 2009. Why Isn't South Africa Growing Faster? A Comparative Approach. *International Monetary Fund Working Paper.* WP/09/25: 1 – 23.

FELDSTEIN, M.S., 1973. Tax incentives, corporate saving, and capital accumulation in the United States, *Journal of Public Economics*, 2: 159 – 171.

FELDSTEIN, M.S. & FANE, G., 1973. Taxes, corporate dividend policy and personal savings: the British postwar experience. *Review of Economics and Statistics*, 55: 399 – 411.

FELDSTEIN, M. & HORIOKA, C., 1980. Domestic Saving and International Capital Flows. *Economic Journal,* 90: 314 – 329.

FRANKEL, J., SMIT, B. & STURZENEGGER, F., 2006. South Africa: macroeconomic challenges after a decade of success. *CID Working Paper* No. 133.

FRANKEL, J., DOOLEY, M. & MATHIESON, D., 1986. International Capital Mobility in Developing Countries vs. Industrial Countries: What do Savings Investment Correlations tell us. *NBER Working Paper* 2043.

FRIEDMAN, M., 1957. *A Theory of the Consumption Function.* Princeton University Press: New Jersey.

FROYEN, R. T., 2009. *Macroeconomics: Theories and Policies.* 9th edition. Pearson Prentice Hall: New Jersey.

GALBRAITH, J. K., 2004. *The Economics of Innocent Fraud: Truth for Our Time*. Houghton Mifflin: Boston.

GIOVANNINI, A., IACOPETTA, M. & MINETTI, R., 2013. Financial markets, Banks, and Growth: disentangling the links. *Documents de Travail de I'OFCE*, 2013-23, Observatoire Farancais des Conjonctures Economiques (OFCE).

GRANGER, C. W. J., 1969. Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica,* 37(3): 424 – 438.

GUNASEKARAGE, A., PISEDTASALASAI, A. & POWER, D., 2004. Macro-economic influences on the Stock Market: Evidence from an Emerging Market in South Asia. *Journal of Emerging Market Finance,* 3(3): 285 – 304.

GURLEY, G. J. & SHAW, E. S., 1960. *Money in a theory of Finance*. The Brooklyn Institution: Washington, D.C.

GUTIERREZ, C.E.C., SOUZA, R.C. & de CARVALHO GUILLEN, O.T., 2007. Selection of Optimal Lag Length in Cointegrated VAR Models with Weak Form of Common Cycle Features. *Working Papers Series* 139, Central Bank of Brazil, Research Department.

HARJES, T. & RICCI, L. A., 2005. *Chapter Four: What Drives Saving in South Africa? In: Nowak, M. and Ricci, L. A. (eds). Post-Apartheid South Africa: The First Ten Years*. International Monetary Fund: Washington, D. C.

HENDRY, D.F. & JUSELIUS, K., 2000. Explaining Cointegration Analysis: Part 1. *The Energy Journal*, International Association for Energy Economics, 0(1): 1 – 42.

HICKS, J. R., 1939. *Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory*. Clarendon Press: Oxford.

HILL, R.C., GRIFFITHS, W.E. & JUDGE, G.G., 2001. *Undergraduate Econometrics*. 2nd

edition. Wiley & Sons: New Jersey.
HILL, R.C., GRIFFITHS, W.E. & LIM, G.C., 2008. *Principles of Econometrics.* 3rd edition. Wiley & Sons Incorporated: New Jersey.
HJALMARSSON, E. & OSTERHOLM, P., 2007. Testing for cointegration using the Johansen methodology when variables are near-integrated. *International Finance Discussion Papers* 915, Board of Governors of the Federal Reserve System (U.S.).
HOLMES, A., 1969. Operational Constraints on the Stabilization of Money Supply Growth. *Controlling Monetary Aggregates,* (Boston MA: Federal Reserve Bank of Boston): 65 – 77.
HOWREY, E.P. & HYMANS, S.H., 1978. The Measurement and Determination of Loanable-Funds Saving. *Brookings Papers on Economic Activity*, Economic Studies Program, The Brookings Institution, 9(3): 655 – 685.
INTERNATIONAL MONETARY FUND, 2012. *Liberalizing Capital Flows and Managing Outflows.* [Online]. Available: www.imf.org/external/np/pp/eng/2012/031312.pdf [Accessed 15 October 2013].
JAPPELLI, T. & PAGANO, M., 1994. Savings, Growth and Liquidity Constraints. *Quarterly Journal of Economics*, 109: 83 – 109.
JAROCINSKI, M. & MACKOWIAK, B., 2011. Choice of Variables in Vector Autoregressions. *Working Paper.*
JIRANYAKUL, K. & BRAHMASRENE, T., 2008. Cointegration between Investment and Saving in Selected Asian Countries: ARDL Bounds Testing Procedure. *MPRA* Paper No. 45076. [Online]. Available: http://mpra.ub.uni-muenchen.de/45076/ [Accessed 14 September 2013].
JOHANSEN, S., 1988. Statistical Analysis of Cointegrating Vectors. *Journal of Economic Dynamics and Control*, 12: 231 – 254.
JOHNSON, P.J., 1999. Saving practices of new Canadians from Vietnam and Laos. Journal *of Consumer Affairs*, 33(1): 48 – 75.
KALDOR, N., 1985. How monetarism failed, *Challenge*, 28(2): 4 – 13.
KALDOR, N. & TREVITHICK, J., 1981. A Keynesian perspective on money. *Lloyds Bank Review*, 108: 1 – 19.
KASUGA, H., 2004. Saving-Investment Correlations in Developing Countries. *Economics Letters*, 83(3): 371 – 376.
KAYA, H., 2010. Saving-Investment Association in Turkey. *MEEA Online Journal,* 12.
KEYNES, J. M., 1936. *The General Theory of Employment, Interest and Money.* MacMillan and Co. Ltd.: London.
KEYNES, J.M., 1937. The 'ex ante' theory of the rate of interest. *The Economic Journal*, 47: 663 – 669. Reprinted in: J.M. Keynes, *The Collected Writings*, 14: 215 – 223. Macmillan Press: London.
KHAN, M.S. & KUMAR, M.S., 1997. Public and Private Investment and the Convergence of

Per Capita Incomes in Developing Countries. *Oxford Bulletin of Economics and Statistics*, 59(1): 69 – 88.

KHAN, M.S. & REINHART, C.M., 1990. Private Investment and Economic Growth in Developing Countries. *World Development*, 18(1): 19 – 27.

KOHLER, M., 2005. International capital mobility and current account targeting in Central and Eastern Countries. *Discussion Paper/ZEW*, 05-51.

KOLLAMPARAMBIL, U. & NICOLAOU, M., 2011. Nature and Association of Public and Private Investment: Public Policy Implications for South Africa. *Journal of Economics and International Finance*, 3(2): 98 – 108.

KOLLIAS, C.M., MYLONIDIS, N. & PALEOLOGOU, S.M., 2008. The Feldstein-Horioka Puzzle Across EU Members: Evidence from ARDL Bounds Approach and Panel Data. *International Review of Economics and Finance*, 17: 380 – 387.

KOOP, G., 2009. *Analysis of Economic data*. John Wiley & Sons Ltd: England.

LABOUR RESEARCH SERVICE, 2011. South African MNCs in Africa – Trends in 2010/2011. [Online]. Available: www.fes-southafrica.org/media/pdf/LRS%20MNC%20trend%20report%20final.pdf [Accessed 23 May 2012].

LANGE, O., 1943. The Theory of the Multiplier. *Econometrica, Journal of the Econometric Society*, 11(3)(4).

LAVOIE, M., 2000. A Primer on Endogenous Credit-money. *Studies in the Modern Theories of Money*. [Online]. Available: aix1.uottawa.ca/~robinson/Lavoie/Courses/2007_ECO6183/childguide4.pdf [Accessed 21 March 2012].

LENSINK, R., 1996. *Structural adjustment in sub-Saharan Africa*. Longman: London.

LEVINE, R., LOAYZA, N. & BECK, T., 2000. Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46: 31 – 77.

LEVY, D., 2000. Investment-Saving Comovement and Capital Mobility: Evidence from Century Long U.S. Time Series. *Review of Economic Dynamics*, 2:100 – 136.

LEVY, D., 2003. Is the Feldstein-Horioka Puzzle really a Puzzle? *Working Papers 2003-02*, Department of Economics, Bar-Ilan University.

LINDE, K.L., 2012. *An analysis of the determinants and recent decline of private savings in South Africa*. Masters thesis, Rhodes University. [Online]. Available: eprints.ru.ac.za/3035/1/LINDE-MCom-TR12-68.pdf [Accessed 23 January 2013].

LINDNER, F., 2013. Does Saving Increase the Supply of Credit? A Critique of Loanable Funds Theory. *IMF Working Paper* 120-2013, IMK at the Hans Boeckler Foundation, Macroeconomic Policy Institute.

LOAYZA, N., SCHMIDT-HEBBEL, K. and SERVEN, L., 2000. Saving in Developing Countries: An Overview. *The World Bank Economic Review*, 14(3): 393 – 414.

LOUNGANI, P. & RAZIN, A., 2001. How Beneficial is Foreign Direct Investment for Developing Countries? *Finance and Development*, 38(2).

LOVE, I., 2011. Empirical Analysis of Corporate Savings in Egypt. *Policy Research Working Paper Series* 5634. The World Bank.

LUCAS, R., 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22: 3 – 42.

LUTKEPOHL, H., 1993. *Introduction to Multiple Time Series Analysis*. Springer: New York.

MADDALA, G.S. & LAHIRI, K., 2009. *Introduction to Econometrics*. 4th edition. Wiley & Sons, Incorporated: New Jersey

MAGANGA, A. & ABDI, E.K., 2012. Selected Macroeconomic variables affecting Private Investment in Malawi. *MPRA* Paper No. 40698. [Online]. Available: http://mpra.ub.uni-muenchen.de/40698/ [Accessed 19 October 2013].

MAJEED, MT. & KHAN, S., 2008. The Determinants of Private Investment and the Relationship between Public and Private Investment in Pakistan. *MPRA* Paper No. 49301. [Online]. Available: http://mpra.ub.uni-muenchen.de/49301/ [Accessed 23 June 2013].

McKINNON, R. I., 1973. *Money & Capital in Economic Development*. The Brooklyn Institution: Washington, D.C.

MILLER, S., 1988. Are Saving and Investment Cointegrated? *Economics Letters*, 27: 31 – 34.

MISHRA, P. K., DAS, J. R. & MISHRA, S. K., 2010. The Dynamics of Saving and Investment Relationship in India. *European Journal of Economics, Finance and Administrative Sciences*, 18: 163 – 172.

MITTNIK, S. & NEUMANN, T., 2001. Dynamic effects of public investment: Vector autoregressive evidence from six industrialized countries. *Empirical Economics*, 26(2): 429 – 446.

MODIGLIANI, F. and BRUMBERG, R., 1954. Chapter Fifteen: Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data. In: Kurihara, K. K. (ed). *Post-Keynesian Economics.* London: George Allen and Unwin Ltd.

MODIGLIANI, F., 1970. The Life Cycle Hypothesis of Saving and Intercountry Differences in the Saving Ratio, in W.A. Eltis, M.E.G. Scott, and J.N. Wolfe, eds. *Induction, Growth and Trade: Essays in Honour of Sir Roy Harrod*. Oxford: Clarendon Press.

MOHANTY, M., SCHNABEL, G. & GARCIA-LUNA, P., 2006. Banks and Aggregate Credit: What is New? *BIS Papers* No. 28.

MOOLMAN, C.E., ROOS, E.L., Le ROUX, J.C. & Du Toit, C.B., 2006. Foreign Direct Investment: South Africa's Elixir of Life? *Working Papers* 200605, University of Pretoria, Department of Economics.

MOORE, B., 1988. *Horizontalists and Verticalists: The Macroeconomics of Credit Money.* Cambridge: Cambridge University Press, 1988.

MOORE, B., 2006. Saving is never a constraint on investment. *South African Journal of Economics*, 74(1): 1 – 5.

MOSLER, W., 2010. *Seven Deadly Innocent Frauds of Economic Policy*. Valance Co. Inc.: USA.

MUNIR, R., AWAN, R.U. & HUSSAIN, Z., 2010. Investment, Savings, Interest Rate and Bank Credit to the Private Sector Nexus in Pakistan. *International Journal of Marketing Studies*, 2(1).

MYLES, G.D., 2003. *Investment Analysis*. [Online]. Available: www.people.ex.ac.uk/gdmyles/Books/IA.pdf. [Accessed 23 September 2012].

NARAYAN, P.K., 2005. The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics*, 37(17): 1979 – 1990.

NATIONAL TREASURY, 2009. *Speech at the Launch of Savings Month SA Savings Institute Breakfast*. [Online]. Available: www.treasury.gov.za/comm_media/speeches/2009/2009070601.pdf [Accessed 16 June 2012].

NATIONAL TREASURY, 2012. Incentivising non-retirement savings. Technical Discussion Paper D. [Online]. Available: www.treasury.gov.za/comm_media/press/2012/incentivising%20non-retirement%20savings.pdf [Accessed 14 Jun 2013].

ODEKON, M., 2002. Financial Liberalization and Investment in Turkey. *Briefing Notes in Economic*, Issue No. 53. [Online]. Available: http://www.richmond.ac.uk/bne [Accessed 13 March 2013].

ODHIAMBO, N. M., Savings and economic growth in South Africa: A multivariate causality test. *Journal of Policy Modelling*, 31: 708 – 718.

OECD, 2009. *Investment*. [Online]. Available: www.oecd-ilibrary.org/sites/na_glance-2013-en/03/03/index.html;jsessionid=dip86rhep36.x-oecd-live-01?contentType=/ns/StatisticalPublication,/ns/Chapter&itemId=/content/chapter/na_glance-2013-14-en&containerItemId=/content/serial/22200444&accessItemIds=&mimeType=text/html [Accessed 22 June 2012].

OHLIN, B., 1937. Some Notes on the Stockholm Theory of Saving and Investment. *Economic Journal*, 47(185): 53 – 69.

ONAFOWARA, O. A., OWEYE, O. & HUART, F., 2011. The Temporal Relationship between Saving and Investment: Evidence from Advanced EU Countries. *International Journal of business and Social Science*, 2(2): 1 – 12.

O'TOOLE, C.M., 2012. Does Financial Liberalization Improve Access to Investment Finance in Developing Countries? *United Nations University* Working Paper No. 2012/67.

OZCAN, K.M., GUNAY, A.M. & ERTAC, S., 2003. Determinants of Private Savings Behavior in Turkey. *Applied Economics*, 35(12): 1405 – 1416.

OZCICEK, O. & McMILLIN, W.D., 1999. Lag length selection in vector autoregressive models: symmetric and asymmetric lags. *Applied Economic*, 31(4): 517 – 524.

POTERBA, J.M., 1987. Tax Policy and Corporate Saving. *Brookings Papers on Economic Activity*, 1987(2): 455 – 515.

POTERBA, J.M., 1992. Dividends, Capital Gains, and the Corporate Veil: Evidence from

Britain, Canada, and the United States, *NBER Working Papers* 2975, National Bureau of Economic Research, Inc.

PRASAD, E.S., RAJAN, R.G. & SUBRAMANIAN, A. 2007. Foreign Capital and Economic Growth. *Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution*, 38(1): 153 – 230.

PRINSLOO, J. W., 2000. The Saving Behaviour of the South African Economy. *South African Reserve Bank. Occasional Paper* No. 14: 1 – 34.

RAMAKRISHNA, G & RAO, S.V., 2012. The Long run Relationship between Savings and Investment in Ethiopia: a Cointegration and ECM Approach. *Developing Country Studies,* 2(4): 1 – 8.

RATTSO, J. & STOKKE, H.E., 2007. A growth model for South Africa. *South African Journal of Economics*, 75(4): 616 – 630.

ROBERTSON, D.H., 1936. Some Notes on Mr Keynes's General Theory of Employment, *Quarterly Journal of Economics,* 51.

ROHLF, W.D., 2002. Keynes and the Classical Economists: The Early Debate on Policy Activism. [Online]. Available: *http://wps.aw.com/wps/media/objects/11/11640/rohlf_keynes_and_classical_pdf* [Accessed: 30 November 2012].

ROMER, P., 1986. Increasing returns and long-run growth. *Journal of Political Economy,* 94: 1002 – 1037.

ROMM, A. T., 2005. The Relationship between Savings and Growth in South Africa: an Empirical Study. *South African Journal of Economics*, 73(2): 171 – 189.

RUGGERI, G. & FOUGERE, M., 1997. The Effect of Tax-based Savings Incentives on Government Revenue. *Fiscal Studies,* 18(2): 143 – 159.

SACHSIDA, A. & CAETANO, A., 2000. The Feldstein-Horioka Puzzle Revisited. *Economic Letters,* 68: 85 – 88.

SAHOO, P., NATARAJ, G. & KAMAIAH, B., 2001. Savings and economic growth in India: the long-run nexus. *Savings and Development*, 25(1): 67 – 80.

SCHMIDT-HEBBEL, K., WEBB, S.B. & CORSETTI, G. 1991. Household saving in developing countries: first cross-country evidence. *Policy Research Working Paper Series* No. 575.

SERVEN, L. & SOLIMANO, A., 1990. *Private Investment and Macroeconomic Adjustment: Theory, Country Experience and Policy Implications*. The World Bank: Washington DC.

SHAW, E. S., 1973. *Financial Deepening in Economic Development*. Oxford University Press: London.

SINHA, D. & SINHA, T., 1998. The long run relationship between saving and investment in India. *Indian Economic Journal*, 45: 118 – 123.

SINHA, D., 2002. Saving-Investment Relationships for Japan and other Asian countries. *Japan and the World Economy*, 14:1 – 23.

SJO, B., 2008. *Testing for Unit Roots and Cointegration*. [Online]. Available: http://www.iei.liu.se/nek/ekonometrisk-teori-7-5-hp-730a07/labbar/1.233753/dfdistab7b.pdf [Accessed 24 October 2012].

SMIT, B., 2008. *Capital flows, current-account adjustment and monetary policy in South Africa.*

SOLOW, R. M., 1956. A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics,* 70: 65 – 94.

SORENSEN, B. E., 2005. *Cointegration.* [Online]. Available: www.uh.edu/~bsorense/coint.pdf. [Accessed 14 April 2013].

SOUTH AFRICA RESERVE BANK, 2011. *Quarterly Bulletin*, June 2011. No. 260: 1 – 82.

SOUTH AFRICAN RESERVE BANK, 2012. [Online]. Available: http://www.resbank.co.za/Publications/Detail-Item-View/Pages/Publications.aspx?sarbweb=3b6aa07d-92ab-441f-b7bf-bb7dfb1bedb4&sarblist=21b5222e-7125-4e55-bb65-56fd3333371e&sarbitem=51/Smit.pdf [Accessed 25 September 2012].

SOUTH AFRICAN RESERVE BANK, 2013. Online Statistical Query, Online Download Facility. Available: http://www.resbank.co.za/Research/Statistics/Pages/OnlineDownloadFacility.aspx [Accessed July to December 2013].

STRYDOM, P., 2007. *Saving Behaviour by South African Households.*[Online]. First National Bank. Available: https://www.fnb.co.za/economics/econhtml/docs/SavingHouseholds.pdf [Accessed 16 June 2012].

TAN, T.B.P., 2012. Determinants of Credit Growth and Interest margins in the Philippines and Asia. *IMF Working Paper*, 12(123).

TRIPATHY, N., 2011. Causal Relationship between Macro –Economic Indicators and Stock Market in India. *Asian Journal of Finance and Accounting,* 3(1): 208 – 226.

TSIKATA, Y., 1998. Saving in South Africa: An Empirical Investigation. (unpublished; Washington: World Bank).

Van RIJCKEGHEM, C., 2010. Determinants of Private Saving in Turkey: An Update. *Working Papers* 2010(04), Bogazici University, Department of Economics.

WAHID, A.N.M., SALAHUDDIN, M. & NOMAN, M.A., 2008. Saving Investment Correlation in South Asia: A Panel Approach. *European Journal of Economics, Finance and Administrative Sciences,* Issue 11: 153 – 159.

WEISSKOPF, T.E., 1970. The Impact of Foreign Capital Inflow on Domestic Savings in Undeveloped Countries. *Economic Development Report* No. 156.

WOOLRIDGE, J.M., 2006. *Introductory Econometrics. A Modern Approach*. MIT Press: Cambridge, Massachusetts.

WORLD BANK, 2011. South Africa Economic Update: Focus on Savings, Investment, and Inclusive Growth. *The World Bank Group: Africa Region Poverty Reduction & Economic Management*. Issue 1: 1 – 46.

WORLD BANK, 2008. *The Growth Report: Strategies for Sustained Growth and Inclusive Development.* The Commission on Growth and Development. World Bank: Washington, D.C.

WRAY, L. R., 1998. Modern Money. *The Levy Economics Institute.* Economics Working Paper Archive, w.p_252.

WRAY, L.R., 2001. The endogenous money approach. *CFEPS Working Paper* No. 17. University of Missouri Kansas City.

YAO, R., WANG, F., WEAGLEY, R.O. & LIAO, L., 2011. Household Saving and Motives: Comparing American and Chinese Consumers. *Family and Consumer Sciences Research Journal*, 40(1): 28 – 44.

YANG, M., 2002. Lag length and mean break in stationary VAR models. *Econometrics Journal*, 5(2): 374 – 387.

ZOU, H., HASTIE, T. & TIBSHIRANI, R., 2007. On the degrees of freedom of the lasso. *The Annals of Statistics,* 35(5): 1849 – 2311.