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Estimation of the private investment functions for the South African economy

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ABSTRACT

In recent years, private investment has been recognised as a vital engine for economic growth. This growing significance of private investment is largely due to the need to revive global economic growth and consequent job creation following the 2008 global recession. Governments are operating at, or close to, the limits of their respective fiscal budgets because of the stimulus packages. It has therefore become critical to completely understand the drivers of private investment given the different macroeconomic contexts of different countries. Historically, much of the policies to stimulate private investment were based on investment theories established in the developed economies. However, performance of the investment theories in developing countries yielded mixed results. That led to studies focussed on developing countries with a view to develop relevant neoclassical investment theories for developing countries. Initially, such studies were based on a group of developing countries such as Sub-Saharan African countries. The heterogeneity of developing countries within the group impacted on the validity of the results, necessitating the need for a focus on specific individual countries.

This study follows this latter approach and is an attempt to estimate the private investment function for South African economy using the multiple regression model. This study is relevant because recently, private investment in South Africa has declined from the peak of 74% of total investment in 2005 to the current level of 63%. This study contributes to the debate on how to reverse this declining trend of private investment. To this end, the relevant data was collected and analysed. The results of the study revealed that private investment in South Africa is positively influenced by an increase in public investment, in savings rate, and the narrowing of the output gap while negatively influenced by increasing uncertainty, interest rates and to a limited extent real exchange rate appreciation.

These empirical results suggest that public investment in core infrastructure—though declining—does ‘crowd in’ private investment. Reduction of uncertainty, together with improved quality and policy certainty, will enhance South Africa’s international standing as an attractive investor destination. This way, South Africa will be able to attract some of the huge global savings for domestic investment- one of the benefit of being an open economy. This is despite South Africa’s relatively low domestic savings rate. The significance of economic growth cannot be overemphasised in terms of creating investment opportunities. Economic growth creates investment opportunities. Further, managing inflation and inflation expectations should be conducted with due consideration for impact of monetary policy on private investment.

Key words: Private investment, South Africa.

DECLARATION

I declare that the research report is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Nkhangweni Robert Matsila

11 November 2013

DEDICATION

This research report is dedicated to two people who made a profound impact on my life: my late father, Mr Khakhathi Edson Matsila, whose life was sadly cut short due to cancer in November 2009 and my late grandmother, Mrs. Tshililo Matsila who passed on due to old age.

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ABBREVIATIONS

ANC	African National Congress
APDP	Automotive Production and Development Plan
BS	Bond Spread
DTI	Department of Trade and Industry
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEAR	Growth Employment and Redistribution
IDC	Industrial Development Corporation
MCEP	Manufacturing Competitiveness Enhancement Programme
NDP	National Development Plan
NSAV	National Saving
OG	Output Gap
PRI	Private Investment
PU	Public Investment
REER	Real Effective Exchange Rate
SA	South Africa
SADUMM	South African Dummy Variable
TFP	Total factor productivity
UIF	Unemployment Insurance Fund
TVBC	Transkei, Venda, Bophuthatswana and Ciskei

CHAPTER 1: RESEARCH PROBLEM

1.1 INTRODUCTION

Gross investment is a critical contributor to economic growth, which in turn contribute to the attainment of socio-economic and political objectives (Sarkar, 2012, Bayraktar & Fofack, 2007; Gittell & Kaen, 2003). Investment is one of the four pillars—along with government spending, private consumption and trade—of the aggregate macroeconomic expenditure model of the modern economy (Parkin, Kohler, Lakay & Goodwin, 2010, p. 47). Stampini, Leung, Diarra and Pla (2013) noted that investment is the nucleus of an economy and any fluctuations in investments have considerable effects on economic activity and long-term economic growth. It has further been revealed empirically that countries with high investment levels have higher economic growth (Guma, 2013).

Gross investment is composed of public and private investment. Public investment refers to investment by the government sector primarily, but not exclusively, on social and core economic infrastructure. Private investment refers to investment by private businesses for the purpose of profit generation (Kumo, 2006).

Public investment is a function of policy priorities of governments while the latter is influenced by different factors (Greene & Villanueva, 1991). As governments around the world are either facing recession-induced fiscal constraints or reaching the limits of fiscal and monetary stimulus packages, private investment has become the only hope for economic revival. Consequently, governments have increased efforts to attract private investment through partnerships and various incentive policies (O Elumelu, 2012, p. 65 and Fukuda, 2011).

South Africa is not immune to the pressures of attracting private investment. Following the success of the Automotive Production and Development Programme (APDP) in attracting R16 billion worth of private investment since 1995, the National Development Plan (NDP) is currently targeting an increase in public investment to 10% of the GDP by 2030 from the current level of three percent with a hope to ‘crowd-in’ private investment of approximately 20%, thus bringing the total investment to 30% of the GDP over the same period (National Planning Commission, 2011).

1.2 RESEARCH OBJECTIVE

Research objectives define the scope of the study and provide a guiding framework regarding the information to be collected in order to answer the research problem (Zikmund, 2003). The objective of the study is to estimate private investment functions for the South African economy.

While literature on determinants of investment in the developed countries is vast, relatively little work has been done on developing countries (Jongwanich & Kohpaiboon, 2008). The existing literature on developing countries is also broad and largely grounded on aggregate investment (Acosta & Loza, 2005; Fielding, 1999). The following are some of the studies on the investment function for developing countries: Salahuddin and Islam (2008) investigated gross investment behaviour across a panel of 97 developing countries and found that investment decisions appeared to be significantly affected by traditional determinants such as growth, domestic savings, trade openness and others as espoused by investment theories. Earlier empirical work by Khan and Reinhart (1990) based on 24 developing countries to estimate the impact of private investment on economic growth found that private investment has a larger direct impact on growth than does public investment.

Further, using three groups of Sub-Saharan African (SSA) countries (that is low income, middle income and high income countries) in the attempt to specify investment functions for SSA, Bayraktar and Fofack (2007) found that investment in SSA is driven by profitability shock, cost of finance and public capital stock. Misati and Nyamongo (2011) and Ndikumana (2000) appropriated a different approach by focussing on the financial determinants of domestic investment for SSA countries and still yielded different results. Specifically, Misati and Nyamongo (2011) analysed the relationships between financial sector development and private investment and found the existence of a negative relationship between interest rate and private investment. Accordingly, high interest rates in SSA countries partly explain the relatively meagre size of the private sector and consequently limited private investment. Further, the study found that both credit to the private sector and turnover ratios have significant impacts on the private investment. Conversely, Ndikumana (2000) found the existence of a positive relationship between domestic aggregate investment and various indicators of financial development.

Essentially, higher financial development leads to higher future levels of investment and thus implies a potent long-term effect of financial development on domestic aggregate investment (Ndikumana, 2000). This is emphasising the role of financial intermediation and by extension the role of credit in domestic investment.

It is therefore evident that different studies have been conducted on different groupings of developing countries but the results have been varied. This is partly due to either of the two fundamental limitations: The first principal limitation is that these and other grouped-country studies are based on the implicit assumption of 'homogeneity' in the observed relationships across countries. This homogeneity assumption is particularly restrictive in that considerable differences exist across countries regarding, for example, the process and stage of capital accumulation (Bayraktar and Fofack, 2007), various structural features of different countries, the stage of economic development and institutional aspects that all have a direct impact on the private investment behaviour (Jongwanich & Kohpaiboon, 2008).

Secondly, the lack of homogeneity implies that the opposite is true. There is heterogeneity among countries with respect to the nature and quality of data available, which makes any cross country comparison a precarious exercise. There is also heterogeneity in the process of capital accumulation across countries (Bayraktar & Fofack, 2007). Data limitations often denote that the empirical macroeconomic models differ in structure from the theoretical investment models or omit variables which theory suggest might be important (Fielding, 1999). Moreover, because of different market structures and information gaps, proxies are sometimes used. The results based on proxies may diminish the validity of the theory.

In an attempt to address the above limitations, researchers have commenced conducting investigations of determinants of private investment focusing on the specific, individual countries that included Argentina, Egypt, Thailand and South Africa (Jongwanich & Kohpaiboon, 2008; Acosta & Loza, 2005 and Du Toit & Moolman, 2004). For instance, Shafik and Shafik (1992) modelled private investment function for Egypt and concluded that private investment in that country was determined by mark-ups, internal financing, demand and cost of capital. Du Toit and Moolman (2004) modelled a neoclassical investment function for South Africa based on the domestic gross fixed investment and found that external and domestic financial constraints played a large role in determinning South Africa's gross domestic fixed investment.

Despite differing results, most of the studies, including that of Du Toit and Moolman (2004) on South Africa's investment model, were based on aggregate gross domestic fixed investment data. These studies did not disaggregate investment into public and private investments during the analyses (Salahuddin & Islam, 2008). Yet, such a disaggregation is important for two reasons:

Firstly, public investment is a function of policy rather than of market forces. Governments have direct control over public investment and this makes public investment effectively a policy variable (Greene & Villanueva, 1991). The disaggregation emphasises the presence of signifcant public-private capital accumulation gaps across different countries (Bayraktar & Fofack, 2007). Disaggregation further allows for separete investigation of the crowding-in or crowding-out phenomenon of public investment on private investment (Pereira, 2001). Such disaggregated analyses is cirtical in the identification of appropriate policy mixes targeted at stimulating private investment. Therefore, theory and existing evidence suggest that both public and private investments are influenced by different factors (Aizenman & Marion, 1999).

Secondly, there are also complex relationships between public and private investments such as the possible existence of complementary relationship between the two forms of investments, wherein private investment is 'crowded-in' by public investment in core or economic infrastructure. The crowding-in characteristic of public investment also explains the possible existence of multicolinearity with aggregated data analyses, particularly wherein complementarity exists. The presence of multicolinearity in data impacts on the validity of the results and makes the interpretation difficult (Weiers, 2008, p. 633).

The above limitations of prior studies together with a passage of time with respect to South Africa necessitate the need for a new study that seeks to estimate the country's private investment functions. Further reasons for a new study are delineated by Du Toit and Moolman (2004) who noted the significance of internal and external financial constraints on investment in South Africa. This study focussed on the period between 1970 and 2000. External constraints, in particular, are no longer as limiting as during the period of international sanctions against South Africa. The country now boasts an open and globally integrated capital market that is complemented by a fully functioning and a vibrant secondary market. The existance of these markets opened up alternative sources of funding for both government and private sector (Guma, 2013).

This study attempts to analyse other determinants of private investment, in addition to the planned public investment, with a view to specify South Africa's private investment functions. This provides a sound empirical foundation for informing the policy debate regarding other policy measures beyond the planned public investment to stimulate private investment (Jongwanich & Kohpaiboon, 2008).

1.3 DEFINITION OF INVESTMENT

Investment is defined as the purchase of productive assets with the outlook of creating future revenue or income (Truu, 1987, p. 131). Gross investment is composed of public and private investments. Public investment is referred to as an investment by government, including state own enterprises. Private investment is referred to as an investment by private businesses for the purpose of future profit generation (Kumo, 2006). This study is based on private investment. Acquisition of income yielding paper assets like bank deposits, bonds and company shares is viewed as savings (that is, a source of investible funds) and not investment (Truu, 1987, p. 131). Foreign direct investment (FDI), which is direct investments in productive assets by a company incorporated in a foreign country, is outside the scope of this study.

1.4 THE RATIONALE OF THE STUDY

The importance of the study rests with its potential to illuminate the appropriate policy mixes that can be implemented to stimulate private investment in South Africa. While government announced the size of planned public investment through to 2030, it remains unclear how much of the private investment will eventually be realised, if at all. Currently, the growth of private investment in South Africa has decelerated to under three percent in the first quarter of 2013 on the back of rising gross corporate savings that increased to 14,2 percent of GDP over the same period (SA Reserve Bank, 2013). Indeed, corporate South Africa recently received criticism for hoarding enormous cash piles (City Press, 2013). This study therefore provides quantitative indication of the size of the private investment that is likely to be realised as a consequence of targeted public investment as well as other policy measures that have be take to stimulate private investment.

Crucially, Jongwanich (2007) found that private investment had the lowest speed of adjustment compared to other macroeconomic variables while at the same time being one of the greatest determiners of job creation and poverty reduction (Stampini *et al*., 2013 and Murty & Soumya, 2007). This mixture of powerful influence and slow reaction times points to the need for optimal policy mix that accelerates private investment (Jongwanich & Kohpaiboon, 2008).

1.5 RESEARCH STRUCTURE

This research contains seven chapters that comprehensively explain specific subject areas. Chapter one informs the research problem, motivation for the study and finally provides boundaries of the study as per the definition of private investment. Chapter two presents a comprehensive review of theory and existing literature on the determinants of private investment. Chapter three provides research hypotheses, while chapter four provides a description of the research methodology. Chapter five presents the research results, which are further analysed in Chapter six. The final chapter, Chapter seven, presents the conclusion and recommendations.

CHAPTER 2: THEORY AND LITERATURE REVIEW

2.1 INTRODUCTION

Investment plays a critical role in any economy for many reasons, including the following (Akanbi, 2012; Du Toit & Moolman, 2004; Ghura & Goodwin, 2000): First, investment increases a country's productive capacity and lays the foundation for increased future income, provided that investment outlays are on durable goods with relatively long-life spans and also that they embody the most recent technical advances. Second, investment expenditure induces shift in the aggregate levels of employment and personal income by affecting the demand for capital goods (Anyanwu, 2006). Third, investment is a vital contributor to, and a volatile component of, the GDP, which in turn nurtures investment in a symbiotic-styled cycle.

Public investment is relatively stable as it is driven by policy priorities, which are relatively, but not completely, stable. This means that investment volatility largely emanates from unstable private investment. Given this volatility and the fact that investment fluctuations impact on the productive capacity, demand for labour, personal income, balance of payments and eventually GDP, it is important to understand the fundamental causes of fluctuations in private investment (Du Toit & Moolman, 2004).

There is a large body of literature that has modelled the investment behaviour for the developed and to a limited extent developing economies. These studies have either focused on an individual or on groups of countries and have further adopted various investment models in an attempt to model investment behaviour. These investment models in turn differ according to the assumptions on which the model rests (Akanbi, 2012). Most studies have also focused on gross investment without deconstructing it to its components parts, which are public investment and private investment.

2.2 INVESTMENT MODELS

The review of the literature points to different models of investment with each model focusing on different variables that impact on investments. The core literature on investment models is reviewed below.

2.2.1 Keynesian Model

According to this theory, investment depends on the prospective marginal efficiency of capital relative to some interest rates measuring the opportunity cost of invested funds (Serven & Solimano, 1992). Accordingly, higher investment is realised as long as the return on invested capital is greater than opportunity cost of invested funds. This model has relation to the complementarity theory of public investment that argues that public investment in core infrastructure helps raise productivity of invested private capital (Erden & Holcombe, 2006). Such a complementary relationship between public and private investment is however subjected to the Law of Diminishing Returns. As the country attains high income status, the marginal productivity of private investment increases at a decreasing rate as the country move along the economic growth curve to a higher income status (Bayraktar & Fofack, 2007). This means that increasing private investment will be realised as long as opportunity costs from alternative investments are also decreasing.

According to this model, current declining level of private investment in South Africa should be due to low returns of invested capital relative to the cost of capital. This is despite the current historic low interest rates.

2.2.2 Accelerator Model

The accelerator model is based on the assumption of a fixed capital to out-put ratio, implying that prices, wages, taxes and interest rates have no direct impact on capital spending but may only have indirect impacts (Du Toit & Moolman, 2004). Thus the model makes investment a linear proportion of changes in output. This model focuses on the productivity of investment. Increasing productivity therefore leads to increasing investment. One of the limitations with this model is that capital intensity can be varied, depending on the relative prices of other production factors (Serven & Solimano, 1992).

2.2.3 Neoclassical Investment Model

The limitations with the accelerator model led to the development of the neoclassical approach to investment modelling. The distinguishing feature of the neoclassical investment model from the accelerator model is that it is based on an explicit optimisation behaviour of firms, which relates the desired capital stock to interest rate, output, capital prices and tax policies. In this model, the desired capital stock depends on the costs of capital, which in turn depends on the price of capital goods, real interest rates, currency depreciation and others (Serven & Solimano, 1992).

2.2.4 McKinnon and Shaw Model

The McKinnon and Shaw model is based on work of McKinnon (1973) and Shaw (1973) who emphasised the complementary nature of savings and investment as well as the significance of financial deepening in stimulating high investment and economic growth (Salahuddin & Islam, 2008). Accordingly, saving is a precondition for investment (Odhiambo, 2003). As such, a rise in interest rates increases the volume of savings and thereby raises the availability of investment funds. According to this model, money and physical capital are essentially complementary. The realised investment increases because of greater availability of investible funds in a phenomenon called 'conduit effect' (Salahuddin & Islam, 2008 and Odhiambo, 2005).

However, this model also has limitations: the first limitation stems from the dual nature of the impact of interest rates on private investment. Increasing interest rates have been found to increase the cost of funding and the associated debt servicing costs, which impact on profitability and discouraging private investments (Claeys, Moreno & Suriñach, 2012). Conversely, higher interest rates also raise the hurdle rate mostly used for projects' evaluations before implementation. Therefore high interest rates may lead to lower private investment. Moreover, increasing the money supply can also create inflationary pressures. Secondly and according to the US Federal Reserve chairman, Mr. Ben Bernanke, domestic savings need not be a precondition for domestic investment in an open and global integrated economy like South Africa. Neither should domestic savings equal domestic investment because savings can cross countries' borders (Bernanke, 2005).

2.2.5 Tobin's q-Model

According to the Tobin's q-model, net investment depends on the ratio of the market value of business capital assets to their replacement value-a ratio known as Tobin's *q* (Du Toit & Moolman, 2004). In line with this model, a higher market value of assets relative to replacement costs would provide investment incentive. In other words, when the increase in market value of the additional unit exceeds (or is less than) the replacement costs, firms will want to increase (decrease) their existing capital stock (Serven & Solimano, 1992). It can be argued that there exists a positive correlation between asset prices and investment. This model, however, ignores the limited investment impact of portfolio inflows, which may inflate business assets with no impact on the underlying productivity of the assets. Stock markets around the world are currently trading at elevated levels and yet private investment is declining in most of the world economies.

2.2.6 Disequilibrium model

This model views investment as a function of firm or industry profitability and demands for outputs. In this model, investment decisions have two stages. First is the decision to expand the level of productive capacity or capital expenditure. This decision depends on the expected degree of capacity utilisation in the economy and thus provides an indication of demand conditions (Serven & Solimano, 1992). Higher demand relative to the productive capacity creates a disequilibrium, which can be corrected through increased capital investment. The second decision relates to the capital intensity of the additional capital, which in turn depends on the relative prices of factors of production, such as capital and labour (Serven & Solimano, 1992).

It is evident from the above, that different models place emphasis on different determinants of investments and offer different explanations for the current status of private investment in South Africa. For instance, the Keynesian model would argue that low returns on invested capital as the cause of declining private investment while he accelerator model would argue for past overinvestment.

2.3 DETERMINANTS OF PRIVATE INVESTMENT

2.2.1 Interest Rate

The reviewed literature is inconclusive regarding the relationship between interest rates and private investment. As a start, theory of interest rates argues for the inverse relationships between interest rates and investment. According to this theory, tight money reduces profitability and in turn limits the ability to self-finance investments through higher debt servicing costs. In support of this theory, Akanbi (2012) and Claeys *et al*. (2012) noted that the rising bond yields increase the difficulty for the private sector to seek investment finance in the capital markets. In other words, increasing interest rates and associated debt servicing costs reduce debt affordability. Prior studies by Misati and Nyamongo (2011), Ahmed and Islam (2004) Ramlogan (1998), Cardoso (1993), Greene and Villanueva (1991) and Fry (1980) also found similar evidence of the inverse relationship between real interest rates and investment. These findings are also consistent with both the Keynesian and neo-classical models where the interest rate constitutes part of cost of capital (Agrawal, 2004).

The theory of interest rate is firmly held by the current South African government. In 2011, President Jacob Zuma announced that the Industrial Development Corporation (IDC) would make R10 billion available to companies at three percent below the prime interest rate (Business Day, 2012). On this note, the IDC administers the Unemployment Insurance Fund (UIF) and Manufacturing Competitiveness Enhancement Competitiveness Programme, (MCEP) both of which are concessionary finance schemes of government.

The 'crowding-out' phenomenon associated with the deficit financed-public spending observed in less developed, less globally integrated economies with less globally integrated financial markets is also supportive of the above theory (Ghura & Goodwin, 2000).

Contrary to the theory of interest rate, however, Schnabel (2010) observed that rising interest rates induced entrepreneurs to initiate highly profitable start-up companies sooner while less profitable ventures are postponed or even rejected. According to Schnabel (2010), investments in general that reflect timing options are less interest rate sensitive than other investments where timing options are absent. The findings of Schnabel (2010) were consistent with earlier findings by Agrawal (2004) who found that increasing real interest rate was associated with increasing investment in four East Asian countries but only up to a certain level beyond which the relationship turns negative.

Krishnamurthy and Vissing-Jorgensen (2011) countered both the theory of interest rates and Schnabel's finding by arguing that credit risk rather than the interest rates level is a critical decision marking variable to debt-funded investments. Krishnamurthy and Vissing-Jorgensen had supporters. For instance, Salahuddin and Islam (2008) and Erden and Holcombe (2006) found that (real) interest rate had no statistically significant impact on the level of private investment but that credit availability to the private sector does have an impact. Brazil has a long and established history of concessionary finance through the Brazilian Development Bank (BNDES) and even in Brazil, investment failed to respond to increasing disbursement of concessionary funding. This led to the conclusion that the overall level of investment in Brazil is largely unaffected by concessionary programmes (Pinheiro, 2012). Interest rates in South Africa and the developed world are at historic low levels and yet private investment is not responding favourably. This means that other factors or variable may have becomes a constraints to stimulating private investment.

It is clear from the above that there are differing empirical views on the impact of interest rates on investment. This study attempts to provide a clear answer for the South African economy.

2.2.2 Savings Rate

There are three sources of savings and these are the households, corporate enterprises and government savings (du Toit & Moolman, 2004). An increase in the savings rate from either sources increase the availability of investible funds. According to the McKinnon and Shaw model, increasing investment follows increasing saving rate. South Africa's gross savings fell during the 1980s and 1990s as a percentage of GDP (Perkins, Fedderke & Luiz, 2005) and is yet to recover despite efforts by government to stimulate domestic saving, particularly by the South Africa households through the establishment of the retail savings bond.

Gross saving by the corporate sector as a percentage of the GDP increased slightly from 13,8 percent in the fourth quarter of 2012 to 14,2 percent in the first quarter of 2013 (SA Reserve Bank, 2013). This prompted widespread criticism of the corporate South Africa for not investing enough in the economy at a time when the economy needs private investment the most (City Press, 2013).

However, it should be noted that South Africa is an open economy with a well-developed capital market that is also well integrated to the global financial system. Global financial integration enhances domestic investment by providing a larger pool of funds for domestic investment (Frey & Volz, 2013) Therefore, access to domestic savings should have a limited impact on the domestic private investment level. Many companies listed on the Johannesburg Stock Exchange are able to issue foreign currency bonds for investment in any geography, including South Africa. As stated earlier, domestic savings should not be a prerequisite for domestic investment in an open economy. By 2011, the global economy had amassed a total gross saving amounting to US$ 15 trillion (Bernanke, 2005). This savings pool is available to any country deemed investor friendly and with investment opportunities. However, this does not mean that stimulation of domestic investment is not important. The painful experience following the loss of investor confidence during the emerging markets crises between the late 1990 and the early 2000 clearly demonstrated the importance of domestic savings pool to cushion the domestic economy from sudden capital outflow.

2.2.3 Uncertainty

The modern theory of investment accepts that investment decision is affected by a future demand that is unknown and uncertain (Fedderke & Luiz, 2008). Investment further represents a sunken cost because capital, once installed, cannot be used in a different activity without incurring substantial adjustment costs. Therefore changes in uncertainty can have a significant effect on private investment (Serven & Solimano, 1992). Further, uncertainty can hinder the creation of certain economic activities and ultimately impacts on economic growth (Aizenman & Marion, 1999). The increasing interest around uncertainty impact on private investment is due to the existence of the irreversibility of most investment decisions and timing options or the possibility of deferring investment until more favourable information has been revealed (Wong, 2010, Bond and Van Reenen, 2007 and Kumo, 2006).

Uncertainty can take on different forms from macroeconomic, political, governance, policy, market or technical uncertainty (Wong, 2010; Bayraktar & Fofack, 2007; Kumo, 2006). Macroeconomic uncertainty manifests in large external deficits, high and unstable inflation, foreign account deficits and budget deficits while political uncertainty manifests in frequent and unpredictable policy changes (Anyanwu, 2006).

Uncertainty is therefore becoming important with the neoclassical theory of investment because of the reasons advance above (Wong, 2010; Anyanwu, 2006). The growing significance of uncertainty within the field of investment can be further attributed to the current nature of the international arena characterised by extreme, unknown and improbable events that make the future increasingly less predictable (Taleb, 2010, p. xxxii).

Using political instability as a measure of uncertainty in South Africa, Fedderke and Luiz (2008) and Kumo (2006) found political and macroeconomic uncertainty to be a significant determinant of SA's private investment function while Tsai and Wu (2009) and Aizenman and Marion (1999) found market volatility or demand uncertainty to be negatively related to private investment and positively related to public investment largely due to counter-cyclical policies of government. According to Bayraktar and Fofack (2007), political instability and macroeconomic volatility have a tendency to magnify uncertainty and risks perceived by investors, which in turn unduly affect private investment decisions.

As further testimony to the significance of uncertainty in its many forms, Tsai and Wu (2009) further found that a brand-producer adopting the integrated production mode (vertically integrated), for instance, reduces not only capital investment but also investment in research and development in response to any increase in uncertainty. Akanbi (2012) and Ghura and Goodwin (2000) further argued that the promotion of a more secure and stable socio-economic environment will attract higher levels of private investment in any economy.

As with earlier discussed variables, however, there are also contradicting empirical findings on the impact of uncertainty on private investment. However, the different findings could be because different authors used different proxies as measures for uncertainty.

2.2.4 Public Investment

The challenges of the effects of public investment on private investment was first conveyed by Aschauer (1989) and has since received great attention in the literature. There are currently three theories that expound on the effect of public investment on private investment (Hatano, 2010; Jongwanich & Kohpaiboon, 2008; Laopodis, 2001):

First is the crowding-out theory supported by classical economists according to which a higher public investment appears to depress private investment in a phenomenon called ‘crowding-out’. This is because increased public investment through domestic borrowing has been found to displace private investment via a reduction of the pool of loanable funds available to private investors (Guma, 2013 and Saeed, Hyder, Ali, and Ahmad, 2006). Similarly, in closed countries with limited physical and financial resources (financial repression), an increase in public investment can ‘crowd out’ private investment (Jongwanich & Kohpaiboon, 2008).

The second theory states that public investment has neutral effects on private investment since economic agents anticipate higher future taxes and start saving at that specific moment. This approximates the so-called ‘Ricardian Equivalence Theory’, mostly pertaining to the method of public financing for public investment and its effect on the macroeconomy (Jongwanich & Kohpaiboon, 2008).

The third theory states that the ‘crowding-in’ or ‘crowding-out’ of private investment depends on: 1) the extent of substitution or complementarity between public and private investments and 2) on the type of targeted infrastructure for public investment and the funding sources (Guma, 2013; Kraay, 2012; Pereira, 2001) .

To this end, public investment in core/economic infrastructure has been found to 'crowd in' private investment through multiplier effect (Fedderke, Perkins & Luiz, 2006; Pereira, 2001; Ghura & Goodwin, 2000) while military spending has been found to have no effect on private investment (Laopodis, 2001 and Aschauer, 1989). Similarly, increasing public investment within an economy with a small private sector can stimulate private investment. Erden and Holcombe (2006) found strong evidence that public investment complements private investment in both the long-run and short-run. The impact of public investment on social infrastructure is hard to quantify, even though it is well known that investment in education and health help improve the productivity of human capital (Guma, 2013).

The 'crowding-in' effect is caused by an increase in the marginal product of private capital through public capital accumulation as a result of public investment (Hatano, 2010). Crowding-out is normally a short-term flow effect resulting from restrictions on available resources while 'crowding-in' is a long-term stock effect resulting from an increase in the productivity of the private capital (Hatano, 2010).

It is therefore clear that empirical studies from different countries produced mixed results of either neutrality, 'crowding-in' or 'crowding-out' (Saeed *et al.*, 2006). Guma (2013) noted that in South Africa, public investment on core or economic infrastructure has a 'crowding in' effect on private investment in the long-term while only having a limited 'crowding out' effect. This means that the same public investment can have a different impact on private investment over time. In support of Guma, Erden and Holcombe (2006) found that public investment is complementary to private investment over both the short and long-term period.

There is also the efficiency element of public investment and associated absorptive capacity that can limit the ability to crowd in private investment. Low public investment efficiency is pervasive among developing countries (Berg, Portillo, Yang, & Zanna, 2013). According to Hurlin and Arestoff (2010), in many poor countries, the problem is not that governments do not invest but that these investments do not create productive capital that can stimulate economic growth and private investment. So the cost of public investment does not correspond to the value of capital stock effectively available to the economy (Hurlin & Arestoff, 2010).

The opening up of South Africa's debt capital markets to foreign and domestic investors as well as its subsequent growth and development has opened up new alternative sources of funding for both government and private sector. This may serve to explain the observed limited short-run 'crowding-out' impact (Guma, 2013).

2.2.5 Real exchange rate

Real exchange rate also has an impact on private investment in that it can either promote or retard private investment (Jongwanich & Kohpaiboon, 2008). Real currency depreciation raises the cost of imported capital goods. Since a large component of investment goods in developing countries, including South Africa, is imported, depreciation depresses private investment in the non-tradable goods sector (Jongwanich & Kohpaiboon, 2008). However, the impact is different in the developed countries with well-developed manufacturing sectors with no need for imported capital goods. This alone serves to explain, albeit in part, the reason for different investment functions between developed and developing countries.

Alternatively, depreciation in the real exchange rate can, through raising profitability of the tradable goods sector, stimulate private investment in that sector (Jongwanich & Kohpaiboon, 2008; Bayraktar & Fofack, 2007; Ghura & Goodwin, 2000).

2.2.6 Output gap

The output gap has been defined as the difference between actual and potential output (Arora, 2005). Such a difference is a useful indicator of demand conditions in the market and can have a pervasive effect on private investment. When actual output approaches full potential output, this provides market signals of increasing demand and encourages firms to expand their productive capacity to capture the growing demand. By contrast, when a country has excess capacity as evidenced by the wider gap between actual and full potential output, firms are likely to postpone their investment projects until market conditions improve (Jongwanich & Kohpaiboon, 2008).

Arora and Bhundia (2003) estimated South Africa's potential growth rate to be around three percent while government has targeted a sustainable growth rate of at least five percent (National Planning Commission, 2011). For the purpose of this study, three percent has been used in the calculation of the output gap for the model.

2.4 PATTERN OF PRIVATE INVESTMENT IN SOUTH AFRICA

South Africa is a unique country characterised by a unique history of prolonged political instability and a high degree of government economic control until 1994 (Kumo, 2006). The country's history is also characterised by important policy regime breaks with significant impacts on private investment and growth (Aron and Muellbauer, 2002b).

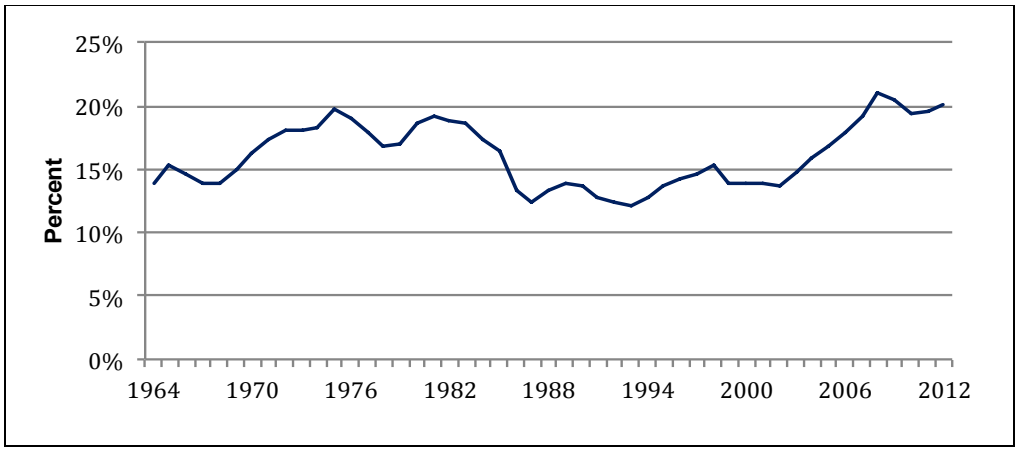
It can therefore be expected that the pattern of investment in South Africa is different from that observed in the developed and other developing countries. These differences and uniqueness necessitate the need for South Africa's specific study.

2.4.1 Total Investment as a Percentage of the GDP

South Africa's total investment as a percentage of GDP fluctuated between the truncated 12% during the mid- to late-1990s to the current rate of 20%. Though unstable, total investment has increased during the decade of the 1960s increasing through to the first half of the 1970s, peaking at 20% in 1975. Close to four decades later, total investment is where it was in 1975. The period before 1975 was the high growth period in South Africa and provided further evidence that a country with high investment rates is rewarded with high economic growth rates (Guma, 2013). Although total investment is currently where it was back then, current economic growth rates are failing to recover to the growth rates that were achieved during that period. This is an indication that as an economy grows and transforms, other factors become important for economic growth. Similarly, investment functions differ at each stage of the economic growth cycle.

Since 1975, aggregate investment started declining due to intensifying political isolation following the 1976 Soweto Uprising, pressure from anti-apartheid movements and the Sullivan Code. What followed was disinvestment by multinational corporations (Weinstein, Alam, and Blose, 1991). The decline in total investment continued until the mid-1990s, coinciding with or due to the inception of the new democratic dispensation in South Africa. Figure 2.1 provides a trend of total investment in South Africa since 1964.

Figure 2.1 Total investment as percentage of the GDP



Source: South African Reserve Bank, May 2013

2.4.2 Public and private investment trend relative to total investment

Aggregate investment is composed of public investment and private investment (Kumo, 2006). The disaggregation of the two enables clear assessment of the contribution or the size of each component to the total investment. At a disaggregated level, it becomes evident that public investment was the driver of increasing total investment during the high growth period of the 1960s and the early 1970s, as evidenced by the increasing public investment (see Figure 2.2). Since the mid-1970s, the proportion of private investment versus public investment changed and commenced on a divergent path.

Figure 2.2 Private and public investment trend

Source: South African Reserve Bank, May 2013

During the turn of the 21st century, Stampini *et al*. (2013) noted that South Africa's private investment accounted for an average of 71% of the total investment while public investment accounted for the balance. However, the latest available data from the South African Reserve Bank indicated that private investment's contribution to total investment has declined to 63% of the total investment (SA Reserve Bank, 2013). It has been noted earlier that corporate savings have been increasing recently and that could explain, in part, the declining size of private investment relative to total investment. Although the proportion of private investment has also been volatile, proportion of public investment relative to the total investment has been in decline since the mid-1970s. It is only during the decade of the 1960s and recently during the period following the 2008 global recession that the proportion of private investment has declined. While government has announced plans to increase public investment, it remains to be seen whether current declining trend of private investment can be reversed.

To better understand the above historical trends, it is important to reflect on the history of South Africa's monetary and fiscal policies. The decade of 1960s was characterised by quantitative controls on interest rates and credit. These controls limited the role of interest rates as a corrective monetary tool (Aron and Muellbauer, 2002b). Because the main instrument of credit control was direct limits on the banking system, this period was also associated with the large degree of financial disintermediation (Aron and Muellbauer, 2002a). The heavy hand of government suppressed economic activity, entrepreneurialism (Games, 2012, p. 1) and limited the growth of private investment. The continued decline in private investment into the early part of the 1970s was further compounded by reasons already cited (Weinstein *et al*., 1991).

The year 1985 deserve a special mention as it constituted a watershed moment in the history of South Africa, known as the year of the 'debt standstill', triggered by Citibank's refusal to roll-over South Africa's short-term debt. Despite its low international debt level, South Africa responded with a strict fiscal discipline that led to further steep declines in public investment (Hentz, 2000). These events affected the rate of public capital accumulation, which fell dramatically during this period (Bayraktar and Fofack, 2007). The continuous decline in public investment was also due to the privatisation programme of government that discharged government of any replacement and maintenance investments in the divested assets. Privatisation can be viewed as the transfer of state assets to the private sector (Narsiah, 2002). It is during this period that the Iron and Steel Corporation (Iscor, now ArcelorMittal S.A.) and National Sorghum were privatized (Hentz, 2000).

Private investment rebounded in the late 1970s because of rising prices of commodities (Fedderke & Luiz, 2008; Kumo, 2006; Rodrik, 1991) and the aforesaid privatisation efforts. It can therefore be argued that rising private investment during this period largely related to the purchase of state assets through the government's divestment programme. The 1996 Growth Employment and Redistribution (GEAR) strategy of the ANC government provided policy continuity with the privatisation programme of the prior government (Narsiah, 2002). The loosening of direct control by government following the De Kock Commission (de Kock, 1985) also contributed to rising level of private investment (Hentz, 2000).

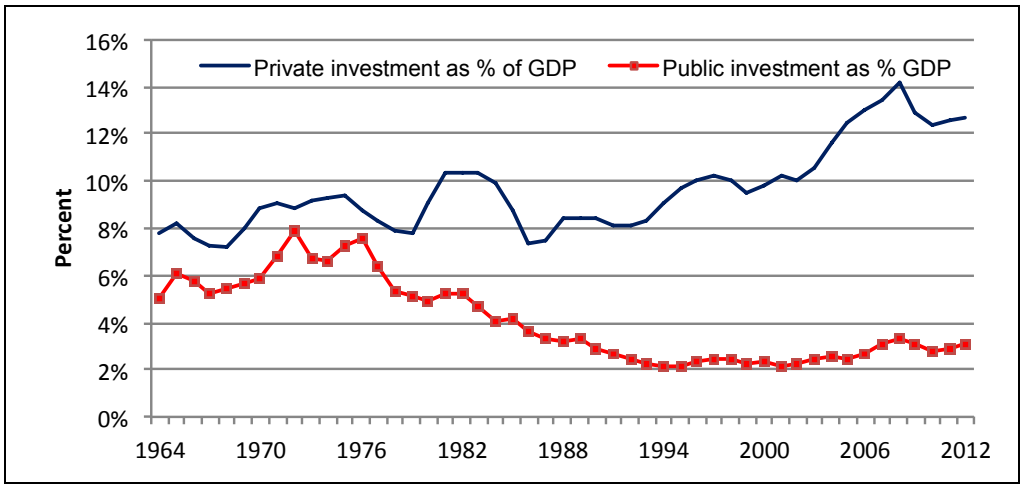
In short, South Africa went through two periods of self-imposed fiscal consolidation that impacted on both public and private investment: firstly, from the mid- to late-1980s (Hentz, 2000) in response to political and economic isolation and secondly, through GEAR a decade later. The latter even became known as a 'home-grown structural adjustment programme' similar to the expenditure reducing policies under the

Structural Adjustment Programme of the Bretton Woods Institutions that were largely responsible for the declining public investment elsewhere in developing countries. Although the two adjustments occurred over different political time periods in South Africa, they both share two things in common, namely fiscal austerity and privatisation (Narsiah, 2002). As a consequence, the widening gap between public and private investment as a percentage of the GDP emerged and continue to widen (Bayraktar & Fofack, 2007).

2.4.3 Public and Private Investment Trend Relative to the GDP

The public investment as a percentage of GDP stabilised at around three percent since 1994 with a modest increase since 2000 due to the expansion programmes of Telkom and Eskom that extended telephone lines and electricity to areas that were previously underserved by the National Party government (see Figure 2.3). The general decline in public investment in the period between the mid-1970s and 2002 was part of an overall decline in gross fixed investment over the same period (Perkins *et al.*, 2005). Three percent is the minimum international investment benchmark required for sustained economic growth, below which bottlenecks or capacity constraints begin to appear that can impact on private sector business activities. Such capacity constraints could lead to missed opportunities for promoting economic growth and could further lead to inflationary pressures (SA Reserve Bank, 2013; Perkins *et al*., 2005).

Figure 2.3 Disaggregated investment trend



Source: South African Reserve Bank, May 2013

With reduced government involvement in business following the privatisation programme and the fall in the level of public employment in public enterprises, the results were the softening of budget while assigning new priority areas for spending (Laopodis, 2001).

This explained the stabilization and modest increase in public investment since 1994. This modest increase could also have been because of enlarged South Africa following the accession of Transkei, Bophuthatswana, Venda and Ciskei (TVBC) into South Africa (Calitz, Du Plessis, and Siebritz, 2011). In more recent years, however, there has been a gradual increase in public investment as a ratio of GDP as government switch from consumption spending towards investment spending (National Planning Commission, 2011).

2.5 CONCLUSION

Private investors make investments with an objective of making a good return on their investment. Because of the irreversible nature of investment and the presence of the timing options, private investors take into account many different factors before making an investment decision. There are different investment models that can be used to model the impact of different determinants of investment on either aggregate investment or private investment. Different models are also based on different assumptions leading to none-uniform results or explanations of investment behaviour.

Despite the above, the knowledge of the direction of influence and magnitude of the impact of different determinants of investment will help policy makers make the right policy decisions and formulate appropriate policies that stimulate private investment. While the South African government plan on increasing public investment as a mechanism to ‘crowd in’ private investment, it is important to realise that private investment can also be stimulated through different policy measures. Therefore, there are other areas that should equally receive attention to reverse and increase private investment in South Africa.

CHAPTER 3: RESEARCH METHOD

3.1 INTRODUCTION

This chapter discusses the research questions used in order to achieve the research objective outlined in Chapter 1. According to Zikmund (2003), formulating research questions enhances the understanding of the research problem and helps the researcher translate the research problems into a more precise need for inquiry. The general research question for this study is: "What is the form of the private investment functions for the South African economy?

Further to the above general question, there are five specific questions that will help estimate the private investment functions for South Africa. Each research question is provided with the corresponding null and alternative hypotheses. According to Albright, Winston, and Zappe (2010, p. 489), the null hypothesis is the '*status quo'* or the current thinking and the alternative or research hypothesis is usually the hypothesis a researcher desires to prove.

3.2 RESEARCH QUESTION 1

Does domestic public investment crowd in or crowd out domestic private investments?

Realising private sector's reticence on investment, the South African government announced a shift in government expenditure from consumption spending to investment spending. The objective is to begin to 'crowd in' private investment (National Planning Commission, 2011). As clear from Chapter two, 'crowding in' or 'crowding out' is dependent on the nature of public investment, the financing sources for such public investment, trade openness of the economy and other factors (Guma, 2013 and Jongwanich and Kohpaiboon, 2008). It is for this reason that the research seeks to ascertain whether government investment is indeed crowding-in or crowding out private investment in South Africa.

The following null and alternative hypotheses have been formulated:

Hypothesis 1

Null hypothesis (H_{01}) : *Domestic private investment is crowded out by public investment.*

Alternative hypothesis (H_{A1}) : *Domestic private investment is crowded in by public investment.*

H_{01}: $\mu_{pi} - \mu_{pu} = < 0$

H_{A1}: $\mu_{pi} - \mu_{pu} = > 0$

3.3 RESEARCH QUESTION 2

What kind of impact does interest rate have on private investment?

In determining the impact of interest rate on private investment, it is important to understand that there are different kinds of interest rates from short-term rates through to medium and long-term rates. It is therefore important to use the appropriate interest rate for the nature of private investment under investigation. To this end, this study uses long-term bond rates (10-year government bond) to appropriately match the long-term nature of the private investment with correct interest rates. The following are the hypotheses that have been formulated:

Hypothesis 2

Null hypothesis (H_{02}) : *Domestic private investment is inversely related to interest rates.*

Alternative hypothesis (H_{A2}) : *Domestic private investment is positively related to interest rates.*

H_{02}: $\mu_{pi} - \mu_{i} < 0$

H_{A2}: $\mu_{pi} - \mu_{i} > 0$

3.4 RESEARCH QUESTION 3

Is the savings rate positively correlated with private investment?

According to the reviewed literature, it is argued that domestic savings in important to stimulate domestic investment. However, this view has been refuted due to the mobility of savings across borders of open economies. To discover an answer for the South African economy, the following hypotheses have been formulated:

Hypothesis 3

Null hypothesis (H_{03}) : *Domestic private investment is at least positively related to domestic savings rate.*

Alternative hypothesis (H_{A3}) : *Domestic private investment is independent of the domestic savings rate.*

H_{03}: $\mu_{pi} - \mu_s \geq 0$

H_{A3}: $\mu_{pi} - \mu_s \neq 0$

3.5 RESEARCH QUESTION 4

Does uncertainty have a negative impact on private investment?

Uncertainty comes in many different forms and the importance of each uncertainty measure varies for different countries. South Africa is a democratic country with strong institutions to entrench democratic principles but it is still subjected to all forms of certainty. There are different indicators that can be used to measure uncertainty. For this study, the bond spread that is calculated as the difference between three-months treasury rate and 10-year government bond, is used as a proxy for macroeconomic uncertainty. The following are the hypotheses:

Hypothesis 4

Null hypothesis (H_{04}) : *Domestic private investment is inversely related to domestic levels of uncertainty.*

Alternative hypothesis (H_{A4}) : *Domestic private investment has no relation to domestic levels of uncertainty.*

H_{04}: $\mu_{pi} - \mu_u \leq 0$

H_{A4}: $\mu_{pi} - \mu_u \neq 0$

3.6 RESEARCH QUESTION 5

What impact does the real exchange rate has on domestic private investment?

As discussed in Chapter 2, real exchange rate depreciation is said to contribute to improved competitiveness of the tradable sector in an open economy. Improved competitiveness will leads to an increase in private investment in the tradable sector. South Africa is an open economy and it is important to discover if the above theory holds for this country. To test the above theory, the following are the hypotheses have been formulated:

Hypothesis 5

Null Hypothesis (H_{05}) : *Domestic private investment is at least positively related to real exchange rate depreciation.*

Alternative Hypothesis (H_{A5}): *Domestic private investment is unrelated by the real exchange rate depreciation.*

H_{05}: $\mu_{pi} - \mu_{re} \geq 0$

H_{A5}: $\mu_{pi} - \mu_{re} \neq 0$

3.7 RESEARCH QUESTION 6

Is domestic private investment inversely related to output gap?

Different countries have different output gaps based on the resource endowment of the country, potential growth rate given the total factor productivity (TFP) and actual realised growth rate. South Africa's potential growth rate has been estimated at between two and half percent and three percent. For this study, the maximum three percent of the potential growth rate has been used in the calculation of the output gap using the actual growth rate for each year.

Hypothesis 6

Null Hypothesis (H_{06}) : *Domestic private investment is at least inversely related to the output gap.*

Alternative Hypothesis (H_{A6}) : *Domestic private investment is independent of the output gap.*

H_{06}: $\mu_{pi} - \mu_{O\_gap} \leq 0$

H_{A6}: $\mu_{pi} - \mu_{O\_gap} \neq 0$

CHAPTER 4: RESEARCH DESIGN

4.1 INTRODUCTION

According to Yin (2009), research design is a logical plan that links the beginning (i.e. the search research question(s)) to the end or conclusion. Yin (2009) further noted that the research design guides the researcher in the process of collecting, analysing and interpreting the data. The previous chapters therefore serve as a beginning and this chapter outlines the methodology that was undertaken to answer the research questions and hypotheses identified in Chapter 3. This chapter includes the research design, population of reference, the sampling method, data collection, data analysis and the limitations of this study.

4.2 RESEARCH DESIGN

This study adopts a quantitative, causal and descriptive research design based on the neoclassical theory of investment in an effort to produce accurate representation (Saunders & Lewis, 2012) of the private investment functions for the South African economy. Both the dependent variable- private investment- and independent/explanatory variables are all measured quantitatively. This study is also a longitudinal study involving secondary time series data for all variables under consideration.

4.3 POPULATION

A population includes all of the entities of interest in a study (Albright *et al*., 2010, p. 34). As developing countries endure increased fiscal constraints due to the global recession and reduced aid flow to developing countries (Moyo, 2011 and Dang, Knack, and Rogers, 2009), developing countries' governments seek ways to stimulate private investment. For this study, the population reference is all developing countries that aim to stimulate private investment.

4.4 SAMPLE METHOD

According to Saunders and Lewis (2012, p. 133) researchers usually collect data from a sample rather than the whole population because of the difficulty in terms of both cost and time to collect data from the whole population. In order to infer from the sample to the population, the sample has to be representative of the population (Zikmund, 2003). As this study is specifically on examining South Africa, purposive sampling was used. A purposive sampling method is defined as a type of non-probability sampling in which a researcher's judgement is used to select the sample members based on a range of possible reasons and premises (Saunders and Lewis, 2012, p. 138). In this study, all data was South African in origin as the country is the focus of the study.

4.5 UNIT OF ANALYSIS

According to Yin (2009), a unit of analysis is determined by the way the research questions have been framed. Collis and Hussey (2009, p. 122) defined a unit of analysis as the kind of case to which the variables or phenomena under study and research problem refer, and about which data is collected and analysed. For this study, the unit of analysis is the private investment in South Africa by South African companies.

4.6 DATA COLLECTION

The data for this study was obtained from the South African Reserve Bank and Statistics South Africa. Thus this study used secondary time series data. Secondary data is defined as the data used for a research project that were originally collected for some other purpose while time series data is defined as data recorded over time, usually at regular intervals (Saunders and Lewis, 2012, p. 84 and 90). All the data are annual data, expressed in constant 2005 prices.

4.7 SAMPLE SIZE

The period chosen for econometric analysis, was between 1980 and 2012. This period encompasses two different periods in South Africa's political and economic history.

Prior to 1994, South Africa was not integrated with the world economies while 1994 marked the start of South Africa's integration with the global economies.

The data collected for the study includes private investment as a percentage of the GDP, the savings rate as a percentage of the GDP, public investment, real exchange rate, interest rates, real exchange rate and inflation rates. All this data is generally available for the common public and can easily be retrieved from the websites of the South African Reserve Bank and Statistics South Africa.

4.8 DATA ANALYSIS

This study adopts a *positivist paradigm* in data analysis and the study is descriptive in nature. The analysis of data is critical as it ensures objectivity in the interpretation of the resulting data output.

The study used annual private investment data (dependent variable) net of government investment spending and was regressed against determinants of private investment as explained in the literature review.

4.8.1 Model Specification

According to Du Toit and Moolman (2004), the neoclassical approach is the most suitable out of the six investment models reviewed in Chapter 2 because it is consistent with a supply-side model for the South African economy. This supply-side model incorporates all cost-minimising and profit maximising decision making processes by private firms. This study seeks to answers to the drivers of private investment by the private firms. In applying the neoclassical model for the South African economy, framework employed in the estimation of the private investment functions involves the regression of the ratios of private investment to the GDP to all hypothesised explanatory variables. Defining X_{it} to be observable variables that have influence on private investment in South Africa in year t, the empirical relation can be expressed as:

$$Y_{it} = \alpha + \beta X_{ti} + \varepsilon_{ti} \qquad (1)$$

Where Y_{it} is the ratio of private investment to GDP, α and β are parameters to be estimated and ε_{it} is the random error term with a mean of zero, representing

measurement error, unmeasured and immeasurable factors influencing private investment.

Extending equation 1 by specifically including the relevant independent variables, it is provided that:

$$PRI = \alpha + \beta_1 PU - \beta_2 I + \beta_3 NSAV_{t-4} - \beta_4 BS - \beta_5 REER + \beta_6 OG_{t-1} + SADUMM + \varepsilon_{ti} \quad (2)$$

Where PRI is the ratio of private investment to the GDP, PU is the ratio of public investment to the GDP, NSAV is the ratio of gross national saving to the GDP lagged by two years, OG is the output gap, REER is the real effective exchange rate, BS is the bond spread and SADUMM is the dummy variable introduced to capture the effect of the period of political and economic sanctions and their subsequent removal.

This equation was used to estimate the private investment functions for the South African economy. The table below provides a list of variables to be used in the analysis.

Table 4.1 List of variables for the multiple regression

PRI_INV	Private investment as percent of GDP
PUB_INV	Public investment as percent of GDP
N_SAV_{t-4}	Gross saving as percent of GDP
B_Spread	Bond spread
REER	Real effective exchange rate
O-GAP	Output gap
SADUMM	Dummy variable capturing the effect of years of South Africa's political and economic isolation (1980-1992)

While the other variables are self-explanatory, bond spread is introduced as the proxy for macroeconomic uncertainty and is calculated as the difference between 10-year government bond and 91 days treasury bill. Regarding the output gap, which is measured as the difference between the level of actual and potential output, Arora and Bhundia (2003) estimated South Africa's maximum potential growth rate at three percent. Thus, three percent was used in the calculation of the output gap taking into account the actual historical economic growth rates. This approach is taken despite the government stated objective of targeting a sustainable long-term economic growth rate of at least five percent as initially indicated in the Accelerated and Shared Growth Initiative for South Africa (Hirsch, 2006) and more recently in the National Development Plan and New Growth Path (National Planning Commission, 2011).

4.9 POSSIBLE RESEARCH LIMITATIONS

Limitations identify potential weaknesses of the research (Collis and Hussey, 2009, p. 129) and the following are the identified limitations:

- The results obtained from the data analysis make it difficult to generalize for the entire population of developing countries. The sample only includes South Africa, which is not representative of the developing countries since South Africa is a unique country with unique history and at different stages of economic development.
- Different proxies were used for certain independent variables and this could lead to differing results to the theory.
- This study made no distinction between capital goods investment or replacement good investment but specifically excluded inventory investment.
- Foreign direct investment is outside the scope of this study and thus not analysed.
- This model assumes that a rand of public investment equates to a rand in public capital stock effectively available to the economy. Therefore, this model assumes no leakages during public investment and non-existence of associated costs of public investment. Thus, this model overvalues the production component of public investment. This is contrary to the empirical evidence that low public investment efficiency is pervasive in developing countries (Berg *et al*., 2013).

CHAPTER 5: RESEARCH RESULTS

5.1 INTRODUCTION

In the preceding chapter, a description of the research methodology approach to test the hypotheses was outlined. This chapter presents the results from the statistical analysis expressed earlier.

5.2 ESTIMATION RESULTS

5.2.1 Descriptive Statistics

Regression analysis was fitted using the private investment as a percentage of GDP as the dependent variable and the remainder of the variables as regressors. The results are shown below, starting with a summary of the descriptive statistics.

Table 5.1 Descriptive Statistics

Descriptive Statistics			
	Mean	**Std. Deviation**	**N**
Private Investment % of GDP	10.24 %	1.85%	33
Public Investment % of GDP	3.06%	0.09%	33
Real Effective Exchange Rate	113.91	15.467	33
Bond Spread	1.04%	2.60%	33
National Saving as % of GDP	19.72%	5.20%	33
Nominal Long-term Interest Rates	12.63%	3.43%	33
Output Gap	0.52%	2.42%	33
SADUMM	0.58	0.50	33

The 33 years that ranged from 1980 up to 2012 had complete data and were used for the multiple linear regression model. The descriptive statistics demonstrates that over the 33 years, private investment averaged 10.24% of GDP per year while public investment averaged 3.06% per year over the same period. Although volatile, bond spread averaged 1.04% while gross national saving averaged 19.72%. Still, long-term interest rate and output gap averaged 12.63% and 0.56%, respectively.

5.2.2 Normality Test

Multiple linear regressions were applied to assess the relationship between a number of independent variables and private investment as dependent variable for the period between 1980 and 2012. One of the major assumptions of linear regression is that both the dependent variable and the independent variables should be normally distributed. This assumption was tested beforehand using the Kolmogorov Simonov test. The results are shown in Table 5.2.

Table 5.2 One-Sample Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test							
	Private Investment % of GDP	**Public Investment % of GDP**	**National Saving**	**Bond Spread**	**Long-term Interest rates**	**Nominal Effective Exchange Rate**	**Output Gap**
N	33	33	33	33	33	33	33
Mean	12.23%	3.68%	19.72%	1.04%	12.63%	222.73	0.005
Skewness	.858	1.115	.998	.298	-.213	1.552	0.433
Kurtosis	-.214	.047	.238	.000	-1.446	1.205	-0.792
Kolmogorov-Smirnov Z	.826	1.129	1.309	.833	.852	1.240	.849
Asymp. Sig. (2-tailed)	.502	.156	.065	.492	.463	.092	.466
a. Test distribution is Normal.							
b. Calculated from data.							

The Kolmogorov-Smirnov measures of normality test the null hypothesis that the variable came from a normally distributed sample against the alternative hypothesis that the variable is from a population that is not normally distributed (Weiers, 2008, p. 537). A p-value of the Kolmogorov-Smirnov test results greater than 0.05 is an indication that the variable is normally distributed. A p-value less than 0.05 indicate that the variable is not normally distributed. The results express that all the variables came from normally distributed populations since all the Kolmogorov-Smirnov p-values for all the variables were greater than 0.05. There was therefore no need for data transformation by taking natural logs.

A dummy variable was introduced to capture the “Period of No sanctions”. The variable was coded as “0” for the period of sanctions (1980 to 1992 in the data set) and as “1” for the period of no sanctions (1993 to 2012).

5.2.3 Unit Root Test

Most economic time series variables are non-stationary, necessitating the test for the presence of unit roots using the Augmented Dickey-Fuller test (Awe, 2012). Noting that the data is normally distributed with no incidences of multicollinearity among regressors, a Unit Root Test for stationarity was conducted on each of the variables to ensure that the regression equation is estimated on stationary data. Running regression with non-stationary data produces questionable, invalid or spurious results (Seddighi *et al*., 2000, p. 246). As a consequence, it has become important when analysing economic time series data to conduct initial tests for non-stationarity before proceeding with estimation. It is commonly acknowledged among econometricians that differencing produces stationary data (Seddighi *et al*., 2000, p. 246).

All the variables were non-stationary as indicated in Appendix C. The data was then transformed or de-trended through differencing. Some variables only became stationary with second order differencing or were integrated into order two (i.e. I(2). After data transformation or de-trending, the Unit Root Test was done to ensure that the data was indeed stationary. The results of the Augmented Dickey-Fuller test statistic are presented on Appendix D.

According to the post-test results, all variables were now stationary (see Table 5.3). However, public investments as a percentage of the GDP, bond spread and the output gap were integrated into order one (I1). Private investment as a percentage of GDP, long-term interest rates, real effective exchange and national savings as a percentage of the GDP were all integrated into order two (I2).

Table 5.3 Unit root tests using Augmented Dickey-Fuller Test

Variables	***ADF Test Statistic***	***At 95% Critical Level***	***Order of integration***
Private Investment (%)	-3.79968	-2.963972	I(2)
Public Investment (%)	-3.16561	-2.963972	I(1)
Long-term Interest rate	-7.52997	-2.967767	I(2)
Real Effective Exchange Rate	-5.09989	-2.963972	I(2)
National Saving (%)	-5.77701	-2.963972	I(2)
Bond Spread	-4.96994	-2.967767	I(1)
Output Gap	-4.06029	-2.960411	I(1)

5.2.4 Correlation Analysis

The table below provides a correlation of results that demonstrates correlation among independent and stationary variables.

Table 5.3 Correlation analysis of all stationary variables

	D2LI_RATE	*D2REER*	*D2N_SAV*	*DB_SPREAD*	*DO_GAP*	*DPUB-INV*
D2LI_RATE	1					
D2REER	0,2617896	1				
D2N_SAV	0,5381443	0,7434692	1			
DB_SPREAD	0,1300028	-0,2012338	-0,0536501	1		
DO_GAP	0,4179234	0,1705508	0,4214517	-0,0966895	1	
DPUB-INV	-0,0076154	0,5912172	0,6373302	-0,1676502	0,20090354	1

Note: PUB_INV- Public Investment, N_SAV- National Saving, B-Spread- Bond Spread used as proxy for macroeconomic uncertainty, LI_Rate- Long-term Interest Rate, REER- Real Effective Exchange Rate and O_GAP- Output Gap.

Although a certain amount of multicollinearity will always exist in econometric models due to the nature of economic data as reflected in Table 5.4, the above correlation metric indicates that there are no independent variables with a correlation coefficient in excess of 80% between each other. This indicates the absence of perfect multicollinearity among independent variables. The lack of perfect multicollinearity implies that it is possible to measure the separate impact of each regressor on the dependent variable (Seddighi, Lawler & Katos, 2000, p. 22).

5.3 REGRESSION MODEL

With all data variables stationary, regression was conceded and the results are as follows:

Table 5.4 Multiple regression results
Dependent Variable: D2PRINV
Method: Least Squares
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.135146	0.020132	6.713038	0.0000
DPUB_INV	0.810205	0.368221	2.200322	0.0381
D2LI_RATE	-0.312420	0.069733	-4.480229	0.0002
$D2N\_SAV_{t-4}$	-0.227457	0.079448	-2.862959	0.0088
DB_SPREAD	-0.169378	0.061743	-2.743268	0.0116
D2REER	0.000225	0.000180	1.251483	0.2233
DO_GAP	0.096967	0.071132	1.363199	0.1860
SADUMM	0.002865	0.007954	0.360177	0.7220

R-squared	0.846837	Mean dependent var	0.100822
Adjusted R-squared	0.800223	S.D. dependent var	0.017962
S.E. of regression	0.008029	Akaike info criterion	-6.593993
Sum squared resid	0.001483	Schwarz criterion	-6.223932
Log likelihood	110.2069	Hannan-Quinn criter.	-6.473363
F-statistic	18.16673	Durbin-Watson stat	1.025462
Prob(F-statistic)	0.000000		

The model has an adjusted R^2 of 80%, which is an indication of the strength of the model that explains the variation of private investment within the South Africa. Further, the p-value is significant. Durbin-Watson statistic of 1.025462 is inconclusive regarding the presence of autocorrelation (Weiers, 2008, p. 719).

Based on the above strength of the model, private investment functions for the South African economy can be estimated as follows:

PRI	=	*0.135*	+	*0.8102PUB*	*- 0.3124LRATE*	*- 0.2275NSAV (t-4)*	*- 0.1694BS*	*+ 0.0002REER*	*+ 0.096970_GAP*	*+ 0.003SADUMM*
		6.713		*2.2003*	*-4.4802*	*-2.863*	*-2.7433*	*1.251*	*1.363*	*0.36*
		(0.000)		*(0.0381)*	*(0.0002)*	*(0.0088)*	*(0.0116)*	*(0.2233)*	*(0.1860)*	*(0.7220)*

Adjusted R^2= 0.8002, DW=1.02

Where PRI, PUB, LRATE, NSAV, BS, REER, O_GAP and SADUMM denote private investment ratio, public investment ratio, long-term interest rate, gross savings ratio, real effective exchange rate, output gap and dummy variable, respectively. The numbers below the coefficients are t-statistics while the numbers in parenthesis are the associated p-values.

5.4 GRANGER CAUSALITY

Although it is not the main focus on this research, Granger causality was performed as the final step to assess the causal direction between private and public investment to confirm the absence of any unidirectional granger causality from private to public investment or from public to private investment (Pereira, 2001). Private investment can granger cause public investment when, for instance, private sector put pressure on government to investment more on public infrastructure. This is mostly the case when available public infrastructure has become a bottleneck on private sector operations. Pairwise Granger Causality Test was conducted on private and public investment and the results are presented below:

Table 5.5 Granger Causality test results

Pairwise Granger Causality Tests
Sample: 1980 2012
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DPUB_INV does not Granger Cause D2PRI_INV	29	3.03286	0.0669
D2PRI_INV does not Granger Cause DPUB_INV		0.82905	0.4486

Granger causality test results leads to the conclusion that public investment appears to cause private investment, as the p-value of 0.0669 is smaller at the 10% significance level. It can therefore be concluded that the coefficients of public investment in the model with private investment as a dependent variable are not equal to zero and so public investment affects the future performance of private investment. On the other hand, it can be concluded that private investment does not Granger Cause public investment since the p-value of 0.4486 is significantly high at the 10% significance level.

This means that the coefficients of private investment in the model with public investment as a dependent variable are equal to zero and as such offers no explanation in predicting the future of public investment.

5.5 SUMMARY OF RESULTS

The table below provides a summary of the results of the econometric analysis conducted above.

Table 5.6 Summary of results

	Hypotheses	Reject	Fail to Reject
H_{01}	Domestic private investment in South Africa is crowded out by public investment.	✓	
H_{02}	Domestic private investment is inversely related to interest rate		✓
H_{03}	Domestic private investment is at least positively related to domestic savings rate	✓	
H_{04}	Domestic private investment is inversely related to domestic levels of uncertainty		✓
H_{05}	Domestic private investment is at least positively related to real exchange rate depreciation		✓
H_{06}	Private investmet is at least inversely related to the output gap		✓

5.6 CONCLUSION

This chapter presented the results from econometric analysis. The following chapter presents the analysis of the results, comparing the results to economic theory in order to answer the proposed research questions raised in Chapter 3.

CHAPTER 6: ANALYSIS OF RESULTS

6.1 INTRODUCTION

In this chapter, the results presented in Chapter 5 are analysed. In order to estimate the private investment functions for the South African economy, five hypotheses were proposed in Chapter 3. The sample data used for the regression analysis was on South Africa and a purposive sampling technique was used to collect the data.

6.2 SIGNIFICANT OBSERVATIONS

Identifying determinants of private investment is important to the South African economy as it is in any other country for the reasons already discussed in the introduction to the research problem, and expanded on in the literature review. Against this backdrop, the relevant data concerning South Africa's private investment and influencing variables since 1980 were collected and analysed. The resulting estimated regression equation is reproduced below. The numbers below are coefficients of the t-statistics while the numbers in parenthesis are the associated p-values.

PRI	=	*0.135*	+	*0.8102PUB*	*- 0.3124LRATE*	*- 0.2275NSAV*	*- 0.1694BS*	*+ 0.0002REER*	*+ 0.096970_GAP*	*+ 0.003SADUMM*
		6.713		*2.2003*	*-4.4802*	*-2.863*	*-2.7433*	*1.251*	*1.363*	*0.36*
		(0.000)		*(0.0381)*	*(0.0002)*	*(0.0088)*	*(0.0116)*	*(0.2233)*	*(0.1860)*	*(0.7220)*

Adjusted R^2= 0.8002, DW=1.02

The following sections discuss the results of the tests in order to accept or reject the null hypotheses proposed with an overall aim of estimating the private investment function for the South African economy.

6.3 HYPOTHESIS 1

Null hypothesis (H_{01}) : *Domestic private investment is crowded out by public investment.*

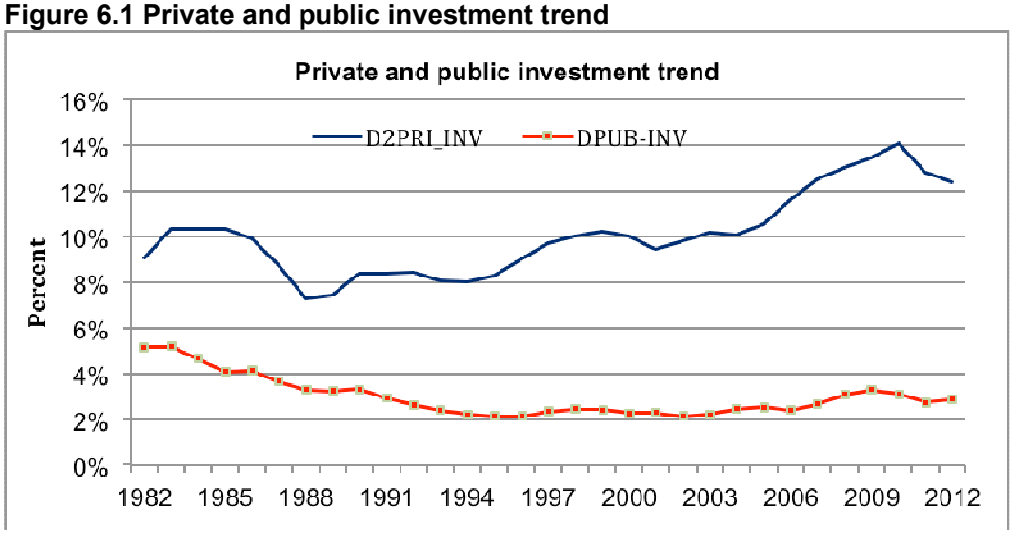
Alternative hypothesis (H_{A1}) : *Domestic private investment is crowded in by public investment.*

This hypothesis was tested using private and public investments as a percentage of the GDP at constant prices. While prior studies on the impact of public investment on private investment in South Africa found evidence of the 'crowding out' effect of public investment (Guma, 2013), this study found evidence to the contrary. The model resulted in a statistically significant positive coefficient of 0.810205 with a p-value of 0.0381, which is smaller than the 0.05 significance level. This suggests that public investment 'crowds-in' private investment. On this basis, the null hypothesis is rejected at a 95% confidence level. These numerical illustrations suggest that a 10% increase in public investment would 'crowd-in' eight percent worth of private investment.

The question of whether public investment 'crowd-out' or 'crowd-in' private investment is important from the policy perspective. South African government intends to deviate from consumption spending towards investment spending. To this end, government is targeting increasing public investment spending to 10% of the GDP by 2030 (National Planning Commission, 2011). It is hoped for that such an increase in public investment will 'crowd-in', specifically, 20% of private investment. The results confirms that such an increase in public investment will indeed stimulate an increase in private investment. However, for a 20% of private investment, public investment will have to increase by more than 10%.

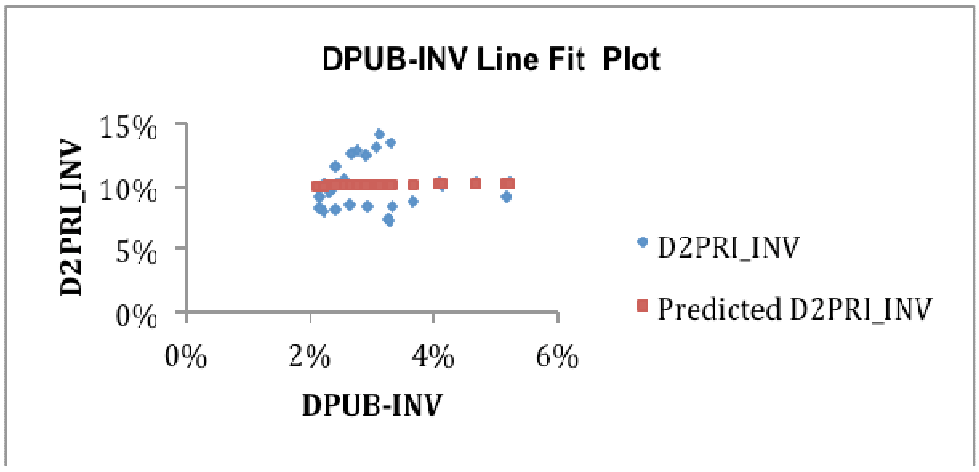
While South Africa has endured a long period of declining public investment (see Figure 6.1), the little public investment that has been invested appears to 'crowd-in' private investment. This implies that government invested on the core infrastructure. The 'crowding out' phenomenon that has been observed by prior studies could have been because crowding out is usually a short-term phenomenon due to restrictions on available financial resources. Crowding in is a long-term effect resulting from the increase in productivity of the private capital (Hatano, 2010).

Figure 6.1 Private and public investment trend



The observed crowding in effect could be explained by the presence of the strong financial market that is highly integrated to the world financial markets and the open nature of the South African economy to the rest of the world. South Africa's public and private sectors have access to international savings for domestic investment. Domestic constraints on the access to savings are easily overcome by accessing international savings. The line fit plot in Figure 6.2 below also confirms the positive relationship between public and private investment.

Figure 6.2 Private and public investment Line Fit Plot



6.4 HYPOTHESIS 2

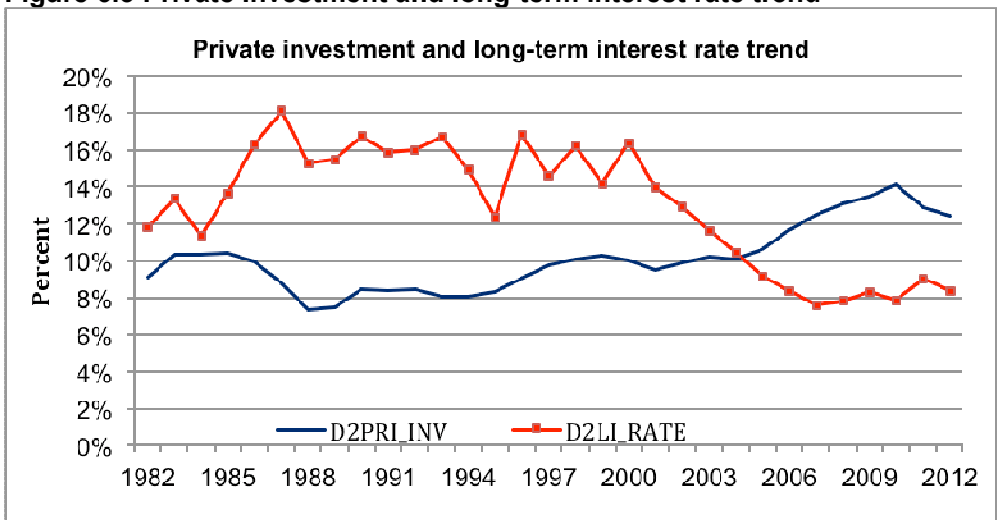
Null hypothesis (H_{02}) : *Domestic private investment is inversely related to interest rates.*

Alternative hypothesis (H_{A2}) : *Domestic private investment is positively related to interest rates.*

This hypothesis was tested using the 10-year government bond yields to match the long-term nature of investment with long-term interest rates. The multiple regression equation estimated earlier, yielded the results that are significantly negative at the 95 percent confidence level. On the basis of this result, the null hypothesis that private investment is inversely related to interest rate fails to be rejected. The review of literature had yielded inconclusive results regarding the relationship between private investment and interest rates. It would seem that the pattern of relationship in South Africa is consistent with the theory of investment.

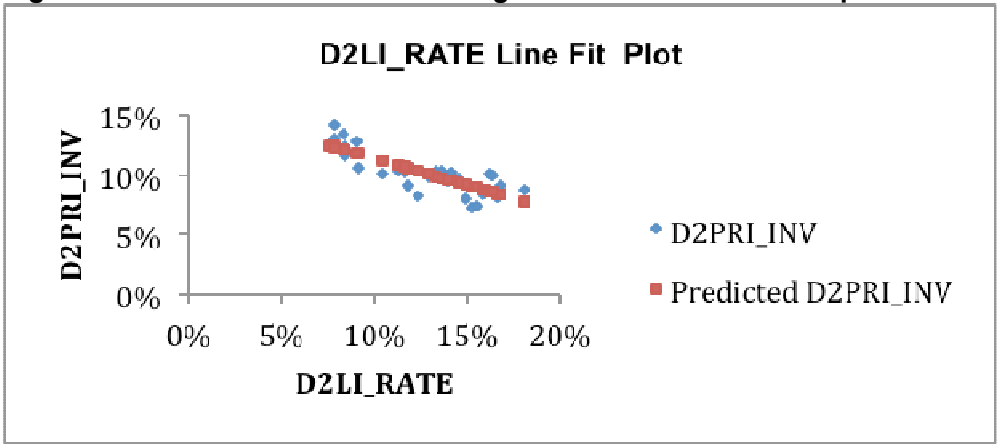
Figure 6.3 indicates that the period of high interest rates was also associated with low and stagnant private investment levels, which started increasing when interest started declining, thereby confirming the above finding.

Figure 6.3 Private investment and long-term interest rate trend



The negative relationship is also clearly depicted by the line fit plot in Figure 6.4. The line fit plot is generated from the residuals' outputs from the simple regression model involving a dependent variable, private investment, and one independent variable—in this case long-term bond / interest rate.

Figure 6.4 Private Investment and long-term interest rate line fit plot



From the policy perspective, this implies that concessionary funding schemes firmly supported and sponsored by government such as the Manufacturing Competitiveness Enhancement Program (MCEP) of the Department of Trade and Industry (dti), among others, have the potential to stimulate private investment within the South African economy. However, these schemes can represent a no-win situation, because although the schemes that provide cheap financing are still small in South Africa, with time and as these schemes grow in size, they have the potential to blunt the monetary policy. Further, interest rates are at historic low levels and yet private investment is declining as percent of the GDP or increasing at a decreasing rate. This indicates limits of interest rate in stimulating private investment.

In Brazil, concessionary finance by BNDEZ is said to have contributed little to promote private investment. In South Africa, the situation is different as demonstrated by the above results. This is a further proof that the same determinants of private investment can and do have different impacts on different countries based on factors such as trade openness, the state of a country's economic development and its institutions including market institutions, among others.

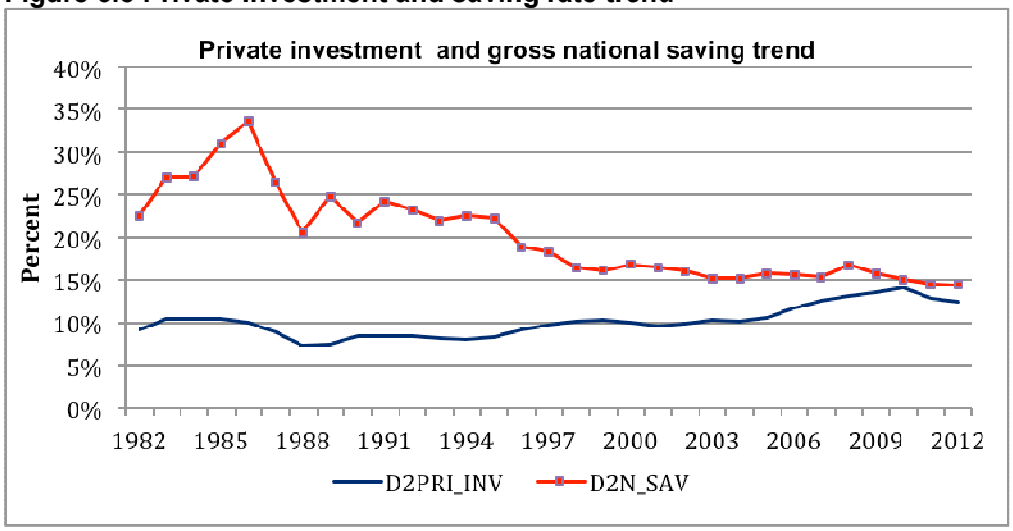
6.5 HYPOTHESIS 3

Null hypothesis (H_{03}) : *Domestic private investment is at least positively related to domestic savings rate.*

Alternative hypothesis (H_{A3}) : *Domestic private investment is independent of the domestic savings rate.*

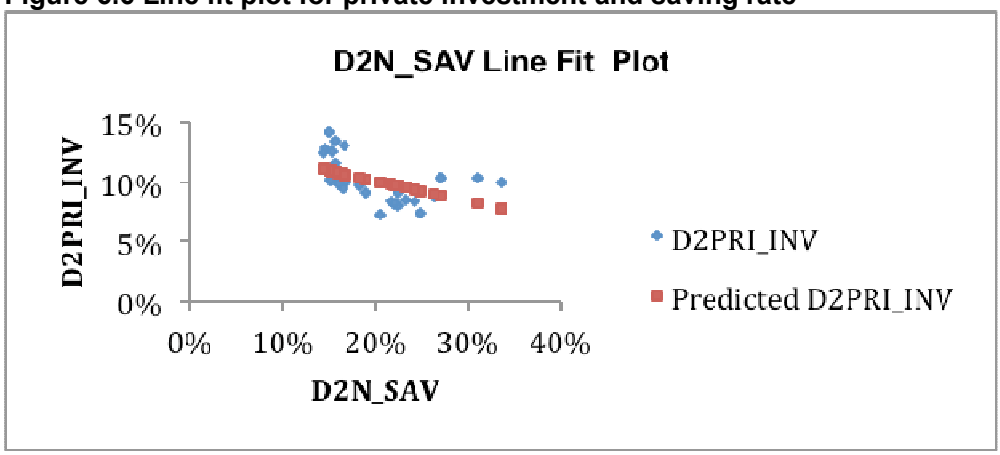
Before interpretation of the saving results, it is important to note that the saving rate entered the model as a positive number. Having said that, the model yielded a negative sign on gross national saving, which means that increasing gross national saving is associated with decreasing private investment. The p-value at 0.0088 is significant and as a consequence, the null hypothesis that private investment is positively related to savings rate is rejected. The observed negative relationship is due to the fact that the saving rate in South Africa has been in decline since peaking in the mid-1980s (see Figure 6.5) while private investment as been increasing. Currently South Africa has a low level of saving of about 14% of the GDP (SA Reserve Bank, 2013).

Figure 6.5 Private investment and saving rate trend



The line fit plot between the two variables in Figure 6.6 further confirms the above findings.

Figure 6.6 Line fit plot for private investment and saving rate



According to Bernanke (2005), savings and investment in an open economy need not be equal in each period. In a closed economy without trade or international capital flows, the funding for investment would have to be provided entirely by the country's national saving (Bernanke, 2005). In a closed economy, national savings becomes a prerequisite for domestic investment. South Africa is an open country with well-developed financial markets (Odhiambo, 2009) and is thus able to tap international savings for domestic investment; in as much foreign investors are able to tap into South Africa's savings for both domestic and foreign investment. This is because saving can cross open international borders. According to the World Development Indicators as published by the World Bank, global savings as at the end of 2011 is estimated at US$15 trillion- a 58% increase since 2005 (World Bank Group, 2013).

According to the DHL Global Connectedness Report, South Africa is Africa's highest ranked country on the global connectedness, having improved three notches relative to 2011 to number 48 on the scale (Ghemawat & Altman, 2012). In line with Guma's (2013) assertion, the opening up of South Africa's debt capital market to foreign and domestic investors has opened up new alternative sources of funding for both government and private investors. According to the Visa Africa Integration Index, which ranks South Africa as the most integrated country in Africa, international capital flows contribute towards the domestic savings pool (Saville & White, 2013). This is in line with earlier findings by Odhiambo (2005) who found that foreign savings complement domestic savings. However, reliance on foreign savings for domestic investment increases the risks of volatility in the domestic economy (National Planning Commission, 2011). For instance, if capital flows to South Africa are stopped or slowed down due to global economic down turn, South Africa will be left with no sufficient

alternative sources of investible funds. Therefore the importance of domestic savings as a source of investible funds should not be underestimated.

At a disaggregated level, South Africa's corporate savings have recently been increasing while private investment has been declining since peaking in 2009. Internationally, and even before the global financial crisis, the world according to Bernanke (2005) was facing 'global saving glut', then estimated at US$10 trillion (World Bank Group, 2013). Such a global saving glut was ascribed to the rapidly approaching retirement of the baby boomers, painful lessons from the loss of lender confidence following the Asian and Latin American crises of 1994 to 2002 and resource boom from rising commodities' prices. All these necessitated or facilitated increasing global saving. Corporate South Africa is thus reluctant to invest.

The increase in corporate saving has been observed elsewhere in the world and has been ascribed to either overinvestment in the past, dearth of investment opportunities (Bernanke, 2005) or a possible shortage of safe assets (The Economist, 2013b). In America, it has been found that listed companies are increasingly using retained earnings for share buy-backs instead of investing in the economy and thereby aid with economic recovery (The Economist, 2013a). Similarly, since share buy-back was allowed in in South Africa 1999, the share buy-back trend on the Johannesburg Stock Exchange (JSE) has been on the increase following overseas trends. The JSE-listed companies are increasingly engaging on share buy-back as a way to return surplus capital to shareholders and increase share price instead of investing on productive assets (Bester, Wesson & Hamman, 2010; Bhana, 2007; De Goede, 2007). Therefore, despite the recent increasing trend of corporate saving, more funds are being used for share buy-backs.

Access to international savings thus partly explains the increasing private investment amid declining gross national savings as a percentage of the GDP. However, the declining savings trend can also mean that South Africa's economic growth rate was higher than that of savings—leading to a declining saving rate trend. South Africa's policy makers should however still focus on the determinants of domestic savings that could serve as a source of investible funds as the world economy is in the midst of high economic turbulence. Bernanke (2005) spoke of the need to build "war chests" that can be used as a buffer against potential capital outflow or sudden loss of lender confidence.

6.6 HYPOTHESIS 4

Null hypothesis (H_{04}) : *Domestic private investment is inversely related to domestic levels of uncertainty.*

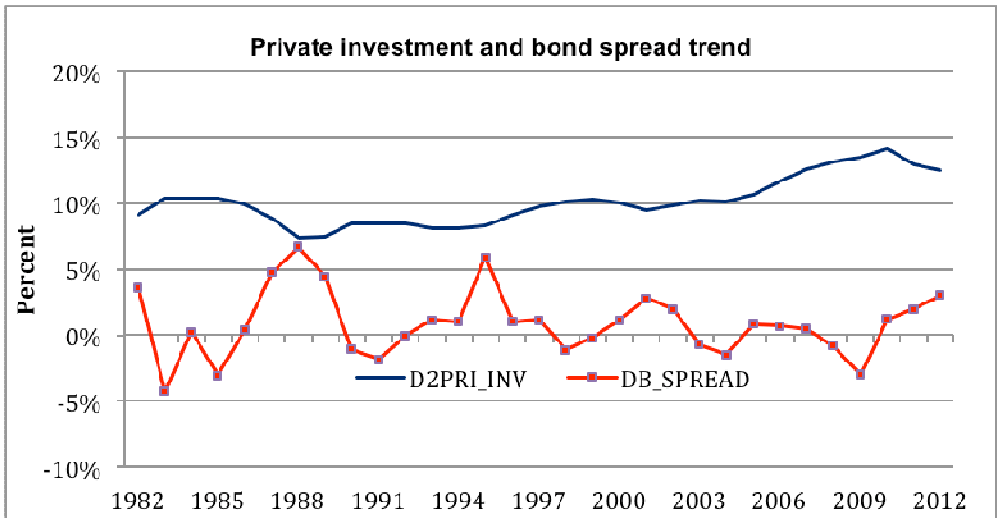
Alternative hypothesis (H_{A4}) : *Domestic private investment has no relation to domestic levels of uncertainty.*

This hypothesis was tested using the bond spread as a proxy for macroeconomic uncertainty. This means that the narrowing of the spread would be associated with declining levels of macroeconomic uncertainty while the widening of the spread would be associated with increasing levels of macroeconomic uncertainty. From the results of the estimated equation, it is clear that uncertainty matters in the South African economy. The model yielded a statistically significant negative coefficient. On this basis, the null hypothesis as stated above fails be rejected. Thus the model confirms that uncertainty is not good for private investment and the results are consistent with earlier findings by Kumo (2006). Therefore factors responsible for uncertainty should be addressed immediately with attention to create an investor-friendly climate (Salahuddin & Islam, 2008).

It was noted that savings glut gravitates towards countries deemed as attractive investment destinations (Aliber, 2009) with uncertainty as one of the determining criteria. In a globalised world, financial markets observe the optimal level of asset allocation and returns based on risks inherent in the economies (Fay & Kumar, 2013). Due to the cancellation and the replacement of bilateral investment treaties with Promotion and Protection of Investment Bill in South Africa, the country could miss the next wave of private investment as the global economy recovers.

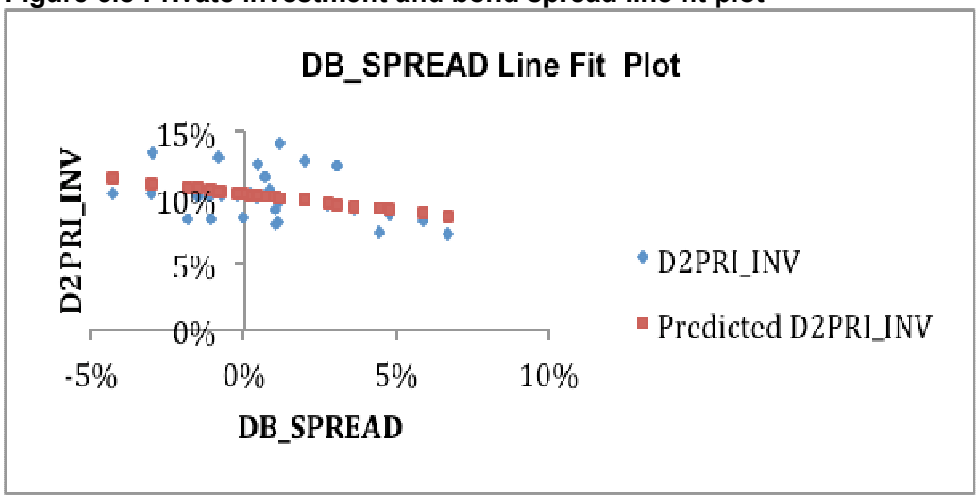
From Figure 6.7 below, it can be argued that South Africa has endured periods of significant macroeconomic uncertainty, particularly during the 1980s. However, since 1994, variability of the bond spread (on stationary data) as measured by standard deviation declined from 0.0335 for the period between 1982 and 1993 to 0.01987 for the subsequent period to 2012. Reduced volatility is also visible from Figure 6.7 and is associated with increasing private investment. This basis, it can be argued that the current decrease in private investment is in response to the heightened levels of uncertainty due to the global economic developments since 2008.

Figure 6.7 Private investment and uncertainty level



The line fit plot in Figure 6.8 further and clearly confirms the negative relationships between the private investment and uncertainty. Therefore, the quality of South Africa's macroeconomic policies had an impact on the private investment and other capital inflows such as foreign direct investment and equity inflows. Such inflows require investors' confidence in the macroeconomic stability of the country (Frey and Volz, 2013).

Figure 6.8 Private investment and bond spread line fit plot



6.7 HYPOTHESIS 5

Null Hypothesis (H_{05}) : *Domestic private investment is at least positively related to real exchange rate depreciation.*

Alternative Hypothesis (H_{A5}): *Domestic private investment is unrelated by the real exchange rate depreciation.*

This hypothesis was tested using the real effective exchange rate, which is the average for the 15 trading partners. The model yielded a positive coefficient of 0.0002 and a p-value of 0.2233. On this basis of this results, the null hypothesis fails to be rejected. However, the relationship is very weak, as evidenced from Figure 6.9 and further confirmed by the line fit plot in Figure 6.10.

Figure 6.9 Private investment and real effective exchange rate trend

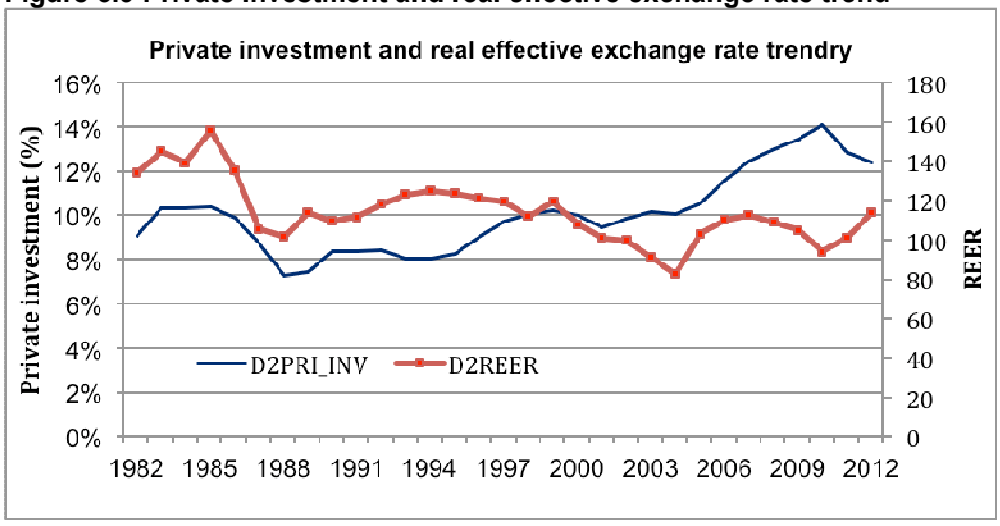
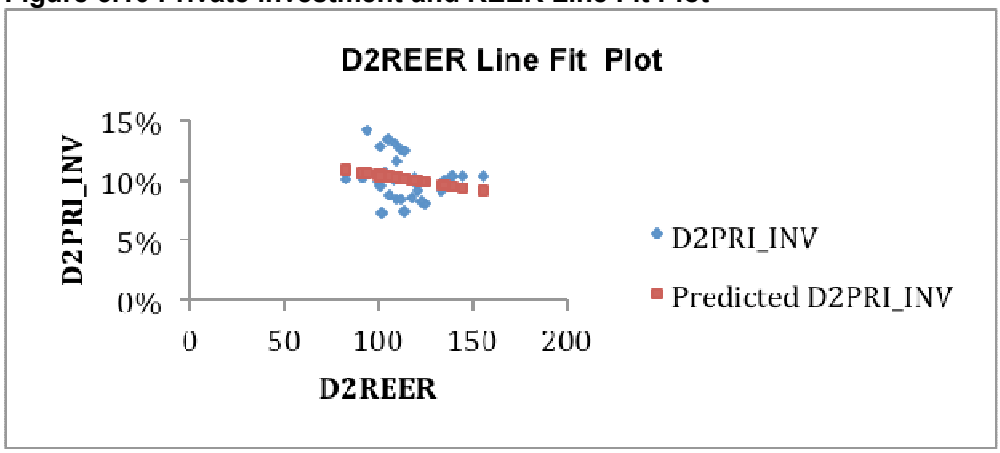
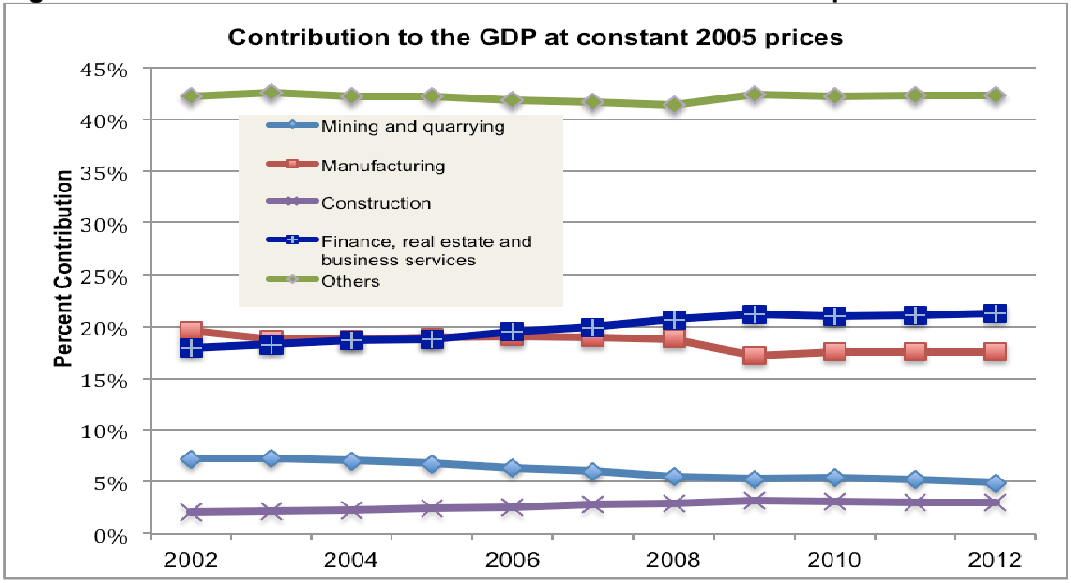


Figure 6.10 Private investment and REER Line Fit Plot



In real terms and over the long-term, exchange rate has been relatively flat while private investment has been on the increase over the same period. The weakness of the relationship also implies that much of private investment may have been directed to the non-tradable sector such as services. Figure 6.11 below clearly displays South Africa going through a gradual structural shift away from the tradable sectors- agriculture, mining and manufacturing- towards non-tradable services sector. This is what has been described as the de-industrialisation phase of South Africa (Slater, 2001). This therefore serves to explain, in part, the limited impact of the exchange rate fluctuation on private investment.

Figure 6.11 Sector's contributions to the GDP at constant 2005 prices



Source: Statistics South Africa, November 2013

This means that depreciation of the rand against the currencies of the 15 major trading partners has a positive but a limited impact on private investment. While weaker currency has been associated with improved competitiveness of the tradable sector (Ersoy, 2013), in South Africa, the model demonstrates a weak relationship between private investment and real exchange rate depreciation. Therefore, the weaker rand may be good for improved competitiveness, but has not been accompanied by significant improvement on private investment as a consequence.

6.7 HYPOTHESIS 6

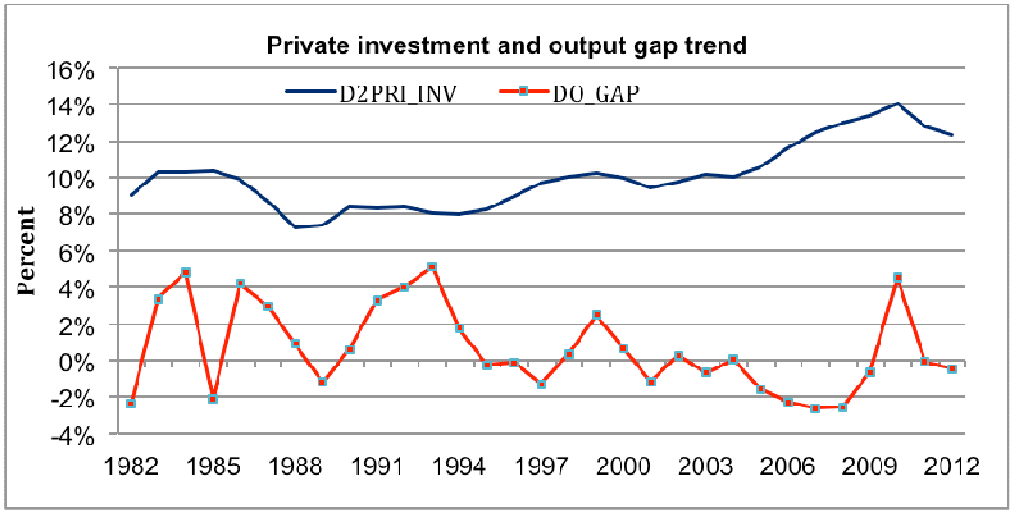
Null Hypothesis (H_{06}) : *Domestic private investment is at least inversely related to the output gap.*

Alternative Hypothesis (H_{A6}) : *Domestic private investment is independent of the output gap.*

This hypothesis was tested using the difference between the actual South Africa's growth rate and South Africa's potential growth rate of three percent as estimated by Arora and Bhundia (2003). An analysis of potential output in South Africa is useful for policy purposes in terms of strengthening the basis on which to gauge the intensity of resource utilisation and impending inflationary pressures (Arora and Bhundia, 2003). On this basis, the positive gap implies the South African economy operates below capacity and a negative gap would mean operating above capacity and signifies the commencement of inflationary pressures.

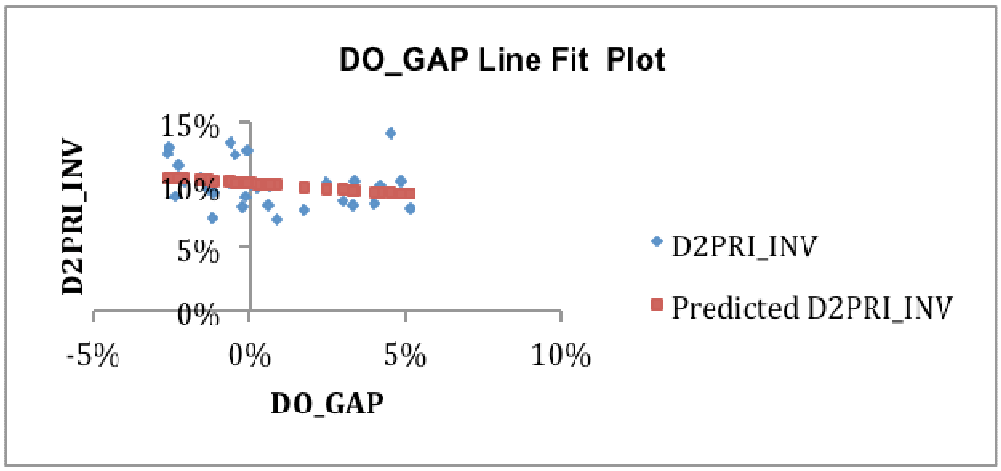
From the results, output gap has a significant negative coefficient. Therefore the null hypothesis as stated above cannot be rejected. This means that the private investors interpret the narrowing of the output gap as an indication of improving market conditions and invest accordingly in order to capture such opportunities. It is clear from Figure 6.12 that as the output gap approaches zero—an indication of the economy operating at full potential given the existing resource endowment—private investment responded positively.

Figure 6.12 Private investment and output gap trend



The line fit plot in Figure 6.13 further demonstrates that high private investment is concentration at the zero output gap. The negative output gap indicates an overheating economy that is operating beyond its capacity. For instance, the year 2007/08 is the period associated with high inflation in South Africa in particular and in other developing countries.

Figure 6.13 Private investment and output gap line fit plot



6.8 AREAS FOR FURTHER RESEARCH

Given the new evidence of the crowding in effect by public investment, another future research area could be the analysis of which type of private investment is crowded in by public investment or which type of public investment crowds in private investment.

Given South Africa's high unemployment rate and the recently established Jobs Fund, a study on the impact of public investment on private employment can also make significant and valuable contributions to the debate on job creation in the private sector.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

It has been recognised that countries are different at different state of economic development with different market structures, institutions and other facets. Such differences can be observed within both developed and developing countries. Form the literature review, it was concluded that these individual country differences have the potential to impact on the validity of the investment functions across countries. This necessitates the need for country specific investment function that takes into account a country's specific state of economic development, trade openness, market development and existing institutions.

It is for this reason that this research examined South Africa so that the country can have a relevant investment function that has increased probability for success in stimulating and in the process reverse the declining trend of private investment relative to total investment. South Africa's private investment peaked at 74% in 2005 and has since been on a downward trend. There is a need to reverse this trend and this study contributes towards a better understanding of the variables and their direction of influence through estimation of South Africa's private investment functions. The results of this study are therefore relevant to South Africa's policy makers.

To achieve the results of the study, relevant quantitative and annual data that ranged from 1980 to 2012 were collected from the South African Reserve Bank and Statistics South Africa. The collected data included private investment as a percentage of the GDP, public investment as a percentage of the GDP, domestic savings rate as a percentage of the GDP, bond spread that was used as proxy for uncertainty, output gap to measure market demand conditions together with investment opportunities and real effective exchange rate. Private investment was the dependent variable while all others were the regressors or independent variables. National saving ratio was lagged by four years. The range selected provided a total of 34 observations for each variable. However, differencing to produce stationary data reduced the number of observations to 32.

The collected data was primarily tested for normality and then for stationarity. While the data was found to be normal, stationarity test revealed that the data was trending. This necessitated the need for differencing to de-trend the data. Once differenced, regression model was run to estimate the private investment function.

The results proved that public investment in core infrastructure is important to attract private investment. This means that the planned public investments will certainly 'crowd in' private investment. The results further proved that uncertainty deters private investment as commonly reported in the media. The findings of this study with regards to uncertainty are in line with economic theory. To this end, policy certainty has a premium in as far as attracting investors is concerned. The world faces, according to Mr. Ben Bernanke, the Chairman of the US Federal Reserve, the 'global savings glut' (Bernanke, 2005). The test on the output gap revealed that economic growth is important for creating investment opportunities. Thus economic growth and policy certainty, among others, will profile South Africa as an investible destination, which in turn facilitates easy access to the mobile global savings pool for domestic investment. This latter point is important because South Africa is a low saving country by international standards.

Although the rand exchange rate is highly volatile, the study proved that real effective exchange rate depreciation has limited but positive impact on private investment. This implies that real exchange rate depreciation is not a direct driver of private investment. While this has not been tested, it is possible that the limited impact of the real effective exchange on private investment could be due to the economic structural shift as South Africa went through period of gradual de-industrialisation. However, stability of the real effective exchange rate is still important as it contributes to macroeconomic stability and by extension, improves the level of macroeconomic certainty in the country.

The results of this study are useful for South African policy makers, given the government stated objective of switching from consumption spending to investment spending with a view to 'crowd in' private investment, among others. It is therefore important to understand what the strategic target or focus areas of government are that will yield better results with regard to the above objective. Base on the results of the study, the following are recommendations:

It is commendable that government has already recognised the need to switch from consumption public spending to investment spending. Having decided to make a step change and the study results that proved the existence of the 'crowd in' phenomenon of public investment; government should ensure that such planned public investment is in core infrastructure. With population growth and continuous rural to urban migration, the need for new public infrastructure is continuously present and public investment need to keep pace. Otherwise, bottlenecks will begin to emerge with a negative impact on continued private investment and job creation.

While the possibility of leakages cannot be wholly overcome, it is important that government ensures efficiency in the implementation of the public infrastructure programmes.

It has already been noted that the world economy has amassed a significant pool of savings that seeks investment opportunities and safe assets around the globe. Countries that offer good investment opportunities together with investor friendly climates and conditions will attract a significant portion of this global savings pool. The South African government should therefore focus on creating an investor friendly climate. This way, South Africa will stand a better chance of benefit from the next wave of global investment as global economic conditions begin to improve. South Africa is competing with other emerging economies for this global savings pool. At the same time, government should also find ways to encourage domestic savings that can be deployed during the period of heightened emerging markets risk aversion. The emerging markets crises of the 1990s and the early 2000s clearly demonstrated the painful impact of such sudden loss of investor confidence. Policy measures that stimulate domestic savings are therefore critical in providing the 'war chest' for the proverbial 'rainy days'.

Interest rates are at historically low levels and have quite possibly reached the limit of stimulating private investment. According to the Keynesian Model, returns of invested capital are currently lower than the opportunity costs of capital and hence the current depressed state of private investment. The global recession and consequent consolidation of the banks' balance sheets have impacted the availability of credit, particularly to the small and medium enterprises. Given the current level of interest rates, focus should rather be directed at credit availability and creation of investment opportunities through economic growth. Crucially, however, the output gap seems to suggest a country operating a full potential. This means that the focus should be on shifting the economic growth curve higher than three percent.

REFERENCES

Acosta, P., & Loza, A. (2005). Short and long run determinants of private investment in Argentina. *Journal of Applied Economics*, *VIII*(2), 389–406.

Agrawal, P. (2004). Interest Rates and Investment in East Asia: An Empirical Evaluation of Various Financial Liberalisation Hypotheses. *Journal of Development Studies*, *40*(3), 142–173. doi:10.1080/0022038042000213238.

Ahmed, S., & Islam, M. E. (2004). Interest Rate Responsiveness of Investment Spending in Bangladesh. *The Bangladesh Development Studies*, *30*(1/2), pp. 65–109.

Aizenman, J., & Marion, N. (1999). Volatility and Investment: Interpreting Evidence from Developing Countries. *Economica*, *66*(262), 157–1179. doi:10.1111/1468-0335.00163.

Akanbi, O. A. (2012). Role of governance in explaining domestic investment in Nigeria. *South African Journal of Economics*, *80*(4), 473–489. doi:10.1111/j.1813-6982.2012.01320.x.

Albright, S. C., Winston, W. L., & Zappe, C. J. (2010). *Data analysis and decision making*. South-Western Publishers.

Aliber, R. Z. (2009). The global savings tsunamis. *The Wilson Quarterly (1976-)*, *33*(3), 56–58.

Anyanwu, J., C. (2006). Promoting Investment in Africa. *African Development Bank*, 42–71.

Aron, J., & Muellbauer, J. (2002a). Estimating Monetary Policy Rules for South Africa. In N. Loayza, K. Schmidt-Hebbel, N. L. (Series Editor), & K. S.-H. (Series (Eds.), *Monetary Policy: Rules and Transmission Mechanisms* (Vol. 4, pp. 427–476). Central Bank of Chile. Retrieved from http://0-ideas.repec.org.innopac.up.ac.za/h/chb/bcchsb/v04c15pp427-476.html

Aron, J., & Muellbauer, J. (2002b). Interest rate effects on output: evidence from a GDP forecasting model for South Africa. *CEPR Discussion Paper No. 3595*. Retrieved from http://ssrn.com/abstract=353743.

Arora, V. (2005). Economic growth in post-apartheid South Africa: A growth-accounting analysis. *IMF (Hrsg.)*, 13–22.

Arora, V., & Bhundia, A. (2003). Potential output and total factor productivity growth in post-apartheid South Africa. *IMF Working Paper*, (WP/03/178).

Aschauer, D. A. (1989). Does public capital crowd out private capital? *Journal of monetary economics*, *24*(2), 171–188.

Awe, O. O. (2012). On Pairwise Granger causality Modelling and Econometric Analysis of Selected Economic Indicators. *Interstat statjournals. net/YEAR/2012/articles/1208002. pdf*, 1–17.

Bayraktar, N., & Fofack, H. (2007). Specification of investment functions in Sub-Saharan Africa. *World Bank Policy Research Working Paper*, (4171).

Berg, A., Portillo, R., Yang, S.-C. S., & Zanna, L.-F. (2013). Public investment in resource-abundant developing countries. *IMF Economic Review*, *61*(1), 92–129.

Bernanke, B. (2005). Remarks by Governor Ben S. *Bernanke: the global saving glut and the US current account deficit. The Sandridge Lecture, Virginia Association of Economics. Richmond, VA (March 10)*.

Bester, P., Wesson, N., & Hamman, W. (2010). Share buy-backs for a selection of JSE listed companies: An exploratory study. *South African Journal of Business Management*, *41*(4), 47–58.

Bhana, N. (2007). The market reaction to open market share repurchases announcements: The South African experience. *Investment Analysts Journal*, *65*, 25–36.

Bond, S., & Van Reenen, J. (2007). Microeconometric models of investment and employment. *Handbook of econometrics*, *6*, 4417–4498.

Business Day. (2012, March 20). IDC plan to boost economy gets off to slow start. *Business Day*. Retrieved from http://www.bdlive.co.za/articles/2012/03/20/idc-plan-to-boost-economy-gets-off-to-slow-start;jsessionid=5C88A74DEFDD1F34D12BBFF1D411C0D5.present1.bdfm

Calitz, E., Du Plessis, S., & Siebritz, K. (2011). An alternative perspective on South Africa's public debt, 1962-1994. *South African Journal of Economics*, *79*(2), 161–172. doi:10.1111/j.1813-6982.2011.01261.x

Cardoso, E. (1993). Private Investment in Latin America. *Economic Development and Cultural Change*, *41*(4), pp. 833–848.

City Press. (2013, April 21). Will the private sector come to the party? *City Press*. South Africa. Retrieved from http://www.citypress.co.za/business/will-the-private-sector-come-to-the-party-20120421/

Claeys, P., Moreno, R., & Suriñach, J. (2012). Debt, interest rates, and integration of financial markets. *Economic Modelling*, *29*(1), 48 – 59. doi:10.1016/j.econmod.2011.05.009.

Collis, J., & Hussey, R. (2009). *Business research: A practical guide for undergraduate and postgraduate students*. Palgrave Macmillan.

Dang, H.-A., Knack, S., & Rogers, H. (2009). *International aid and financial crises in donor countries*. World Bank.

De Goede, A. (2007). *Investigating certain share buyback transactions by companies listed on the JSE for the period 2000 to 2005*. Stellenbosch: University of Stellenbosch, South Africa.

De Kock, G. (1985). Commission of Inquiry into the Monetary System and Monetary Policy in South Africa. *Final Report, Government Printer, Pretoria*.

Du Toit, C. du, & Moolman, E. (2004). A neoclassical investment function of the South African economy. *Economic Modelling*, *21*(4), 647 – 660. doi:10.1016/j.econmod.2003.09.004.

Erden, L., & Holcombe, R. G. (2006). The Linkage between Public and Private Investment: A Co-Integration Analysis of a Panel of Developing Countries. *Eastern Economic Journal*, *32*(3), pp. 479–492.

Ersoy, I. (2013). The Role Of Private Capital Inflows And The Exchange Market Pressure On Real Exchange Rate Appreciation: The Case Of Turkey. *South African Journal of Economics*, *81*(1), 35–51.

Fay, J., & Kumar, U. (2013). An Index-Based Model for Determining the Investment Benchmark of Renewable Energy Projects in South Africa. *South African Journal of Economics*, *81*(3), 416–426. doi:10.1111/saje.12003.

Fedderke, J. W., & Luiz, J. M. (2008). The Political Economy of Institutions, Stability and Investment: A Simultaneous Equation Approach in an Emerging Economy. The Case of South Africa. *Journal of Development Studies*, *44*(7), 1056–1079. doi:10.1080/00220380802150854.

Fedderke, J. W., Perkins, P., & Luiz, J. M. (2006). Infrastructural investment in long-run economic growth: South Africa 1875–2001. *World Development*, *34*(6), 1037 – 1059. doi:10.1016/j.worlddev.2005.11.004.

Fielding, D. (1999). Manufacturing investment in South Africa: a time-series model. *Journal of Development Economics*, *58*(2), 405 – 427. doi:10.1016/S0304-3878(98)00119-9.

Frey, L., & Volz, U. (2013). Regional financial integration in Sub-Saharan Africa- An empirical examination of its effects on financial market development. *South African Journal of Economics*, *81*(1), 79–117.

Fry, M. J. (1980). Saving, investment, growth and the cost of financial repression. *World Development*, *8*(4), 317 – 327. doi:10.1016/0305-750X(80)90030-3.

Fukuda, S. (2011). Nontraditional Financial Policies. *Japanese Economy*, *38*(2), 45–78.

Games, D. (2012). *Business in Africa-Corporate Insights*. Penguin UK.

Ghemawat, P., & Altman, S. (2012). DHL Global Connectedness Index 2012. *IESE Business School, Barcelona, Spain*.

Ghura, D., & Goodwin, B. (2000). Determinants of private investment: a cross-regional empirical investigation. *Applied Economics*, *32*(14), 1819–1829. doi:10.1080/000368400425044.

Gittell, R., & Kaen, F. R. (2003). A Framework for Evaluating State-Assisted Financing Programs (1). *Public Finance and Management*, *3*(3).

Greene, J., & Villanueva, D. (1991). Private Investment in Developing Countries: An Empirical Analysis. *Staff Papers - International Monetary Fund*, *38*(1), pp. 33–58.

Guma, N. (2013). Special Report - SA public sector investment: can it “crowd in”? Standard Bank. Retrieved from https://m.research.standardbank.com/Research?view=1671-4535203d91a54c2394646fa1ed627bf3-1

Hatano, T. (2010). Crowding-in Effect of Public Investment on Private Investment. *Public Policy Review*, *6*(1), 105–110.

Hentz, J. J. (2000). The two faces of privatisation: political and economic logics in transitional South Africa. *The Journal of Modern African Studies*, *38*(02), 203–223. doi:null.

Hirsch, A. (2006). Accelerated and Shared Growth Initiative–South Africa. *A strategic Perspective*. Retrieved from http://idc.co.za/access/images/download-files/conference-papers/AlanHirsch.pdf

Hurlin, C., & Arestoff, F. (2010). Are Public Investment Efficient in Creating Capital Stocks in Developing Countries? *Economics Bulletin*, *30*(4), 3177–3187.

Jongwanich, J. (2007). *Exchange rate regimes, capital account opening, and real exchange rates: Evidence from Thailand.* New York: Nova Science.

Jongwanich, J., & Kohpaiboon, A. (2008). Private Investment: Trends and Determinants in Thailand. *World Development*, *36*(10), 1709 – 1724. doi:10.1016/j.worlddev.2008.01.010.

Khan, M. S., & Reinhart, C. M. (1990). Private investment and economic growth in developing countries. *World Development*, *18*(1), 19 – 27. doi:10.1016/0305-750X(90)90100-C.

Kraay, A. (2012). How large is the government spending multiplier? evidence from World Bank lending. *The Quarterly Journal of Economics*, *127*(2), 829–887.

Krishnamurthy, A., & Vissing-Jorgensen, A. (2011). *The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy* (Working Paper No. 17555). National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w17555.

Kumo, W. L. (2006). Macroeconomic uncertainty and aggregate private investment in South Africa. *South African Journal of Economics*, *74*(2), 190–204. doi:10.1111/j.1813-6982.2006.00071.x

Laopodis, N. T. (2001). Effects of government spending on private investment. *Applied Economics*, *33*(12), 1563–1577. doi:10.1080/00036840010011934.

Misati, R. N., & Nyamongo, E. M. (2011). Financial development and private investment in Sub-Saharan Africa. *Journal of Economics and Business*, *63*(2), 139 – 151. doi:10.1016/j.jeconbus.2010.10.001.

Moyo, D. (2011). *How the West was Lost: Fifty Years of Economic Folly–and the Stark Choices Ahead*. Macmillan.

Murty, K. N., & Soumya, A. (2007). Effects of Public Investment on Growth and Poverty. *Economic and Political Weekly*, *42*(1), pp. 47–59.

Narsiah, S. (2002). Neoliberalism and privatisation in South Africa. *GeoJournal*, *57*(1-2), 3–13. doi:10.1023/A:1026022903276.

National Planning Commission. (2011). National Development Plan: Vision for 2030. *Pretoria: National Planning Commission*. Retrieved from http://www.npconline.co.za/medialib/downloads/home/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf

Ndikumana, L. (2000). Financial Determinants of Domestic Investment in Sub-Saharan Africa: Evidence from Panel Data. *World Development*, *28*(2), 381 – 400. doi:10.1016/S0305-750X(99)00129-1

Odhiambo, N. M. (2003). Interest rate reforms and investment efficiency: Evidence from two Sub-Saharan African (SSA) countries. *Savings and Development*, *27*(3), pp. 317–335.

Odhiambo, N. M. (2005). Money and capital investment in South Africa: A dynamic specification model. *Journal of Economics and Business*, *57*(3), 247 – 258. doi:10.1016/j.jeconbus.2005.02.003.

Odhiambo, N. M. (2009). Finance-growth-poverty nexus in South Africa: A dynamic causality linkage. *The Journal of Socio-Economics*, *38*(2), 320 – 325. doi:10.1016/j.socec.2008.12.006.

Parkin, M., Kohler, M., Lakay, L., & Goodwin, B. (2010). *Economics*. South Africa: Pearson Education.

Pereira, A. M. (2001). On the effects of public investment on private investment: what crowds in what? *Public Finance Review*, *29*(1), 3–25.

Perkins, P., Fedderke, J., & Luiz, J. (2005). An analysis of econommic insfrastructure investment in South Africa. *South African Journal of Economics*, *73*(2), 211–228. doi:10.1111/j.1813-6982.2005.00014.x.

Pinheiro, A., Castelar. (2012). The role of concessionary finance in Brazil. *CDE Insight*, *June 2012*(June 2012). Retrieved from http://www.cde.org.za/images/pdf/The_role_of_concessionary_finance_in_Brazil.pdf

Ramlogan, C. (1998). Investment and financial repression in Trinidad and Tobago. *Social and Economic Studies*, *47*(4), pp. 61–81.

Rodrik, D. (1991). Policy uncertainty and private investment in developing countries. *Journal of Development Economics*, *36*(2), 229 – 242. doi:10.1016/0304-3878(91)90034-S.

SA Reserve Bank, S. A. R. (2013). *Quarterly bulletin*. South African Reserve Bank Pretoria, South Africa.

Saeed, N., Hyder, K., Ali, A., & Ahmad, E. (2006). The Impact of Public Investment on Private Investment: A Disaggregated Analysis [with Comments]. *The Pakistan Development Review*, *45*(4), pp. 639–663.

Salahuddin, M., & Islam, M. R. (2008). Factors Affecting Investment in Developing Countries: A Panel Data Study. *The Journal of Developing Areas*, *42*(1), pp. 21–37.

Sarkar, S. (2012). Attracting private investment: Tax reduction, investment subsidy, or both? *Economic Modelling*, *29*(5), 1780 – 1785. doi:10.1016/j.econmod.2012.05.030.

Saunders, M., & Lewis, P. (2012). *Doing Research in Business and Management: An Essential Guide to Planning Your Project*. Financial Times Prentice Hall.

Saville, A., & White, L. (2013). Realising potential: Connecting Africa. A Report prepared for Visa (South Africa), *Working Paper*(June 2013).

Seddighi, H. R., Lawler, K. A., & Katos, A. V. (2000). *Econometrics: a practical approach*. Routledge.

Serven, L., & Solimano, A. (1992). Private investment and macroeconomic adjustment: A survey. *The World Bank Research Observer*, *7*(1), 95–114. doi:10.1093/wbro/7.1.95.

Shafik, N., & Shafik, N. (1992). Modeling private investment in Egypt. *Journal of Development Economics*, *39*(2), 263 – 277. doi:10.1016/0304-3878(92)90040-G.

Slater, R. (2001). De-industrialisation, multiple livelihoods and identity: tracking social change in Qwaqwa, South Africa. *Journal of Contemporary African Studies*, *19*(1), 81–92.

Stampini, M., Leung, R., Diarra, S. M., & Pla, L. (2013). How large is the private sector in Africa? Evidence from national accounts and labour markets. *South African Journal of Economics*, *81*(1), 140–165. doi:10.1111/saje.12000.

Taleb, N. N. (2010). *The Black Swan: The Impact of the Highly Improbable Fragility*. Random House Digital, Inc.

The Economist. (2013a). The profits prophet. *The Economist*, *October 5th*(October 5 - 11, 2013), 62. Retrieved from http://www.economist.com/news/finance-and-

economics/21587213-new-book-explains-why-business-investment-has-been-low-profits-prophet.

The Economist. (2013b, April 4). Interest rates: The bottleneck. *The Economist*. Retrieved from http://www.economist.com/blogs/freeexchange/2013/04/interest-rates.

Truu, M. L. (1987). *Macroeconomics*. South Africa: Maskew Millet Longman.

Tsai, Y., & Wu, C. (2009). Integrated production and the investment-uncertainty relationship. *South African Journal of Economics*, *77*(1), 102–112. doi:10.1111/j.1813-6982.2009.01197.x.

Weiers, R. (2008). *Introductory Business Statistics. International Edition, South-Western Cengage Learning*. ISBN.

Weinstein, G. P., Alam, P., & Blose, L. E. (1991). Portfolio divestment: The cost of doing business in South Africa. *Global Finance Journal*, *2*(3–4), 293 – 307. doi:10.1016/1044-0283(91)90008-U.

Wong, K. P. (2010). The effects of irreversibility on the timing and intensity of lumpy investment. *Economic Modelling*, *27*(1), 97 – 102. doi:10.1016/j.econmod.2009.07.028.

World Bank Group. (2013). Gross Savings (current LCU). Retrieved from http://data.worldbank.org/indicator/NY.GNS.ICTR.CN.

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Sage.

Zikmund, W. G. (2003). *Business Research Methods* (7th Edition.). USA: Thompson South Western.

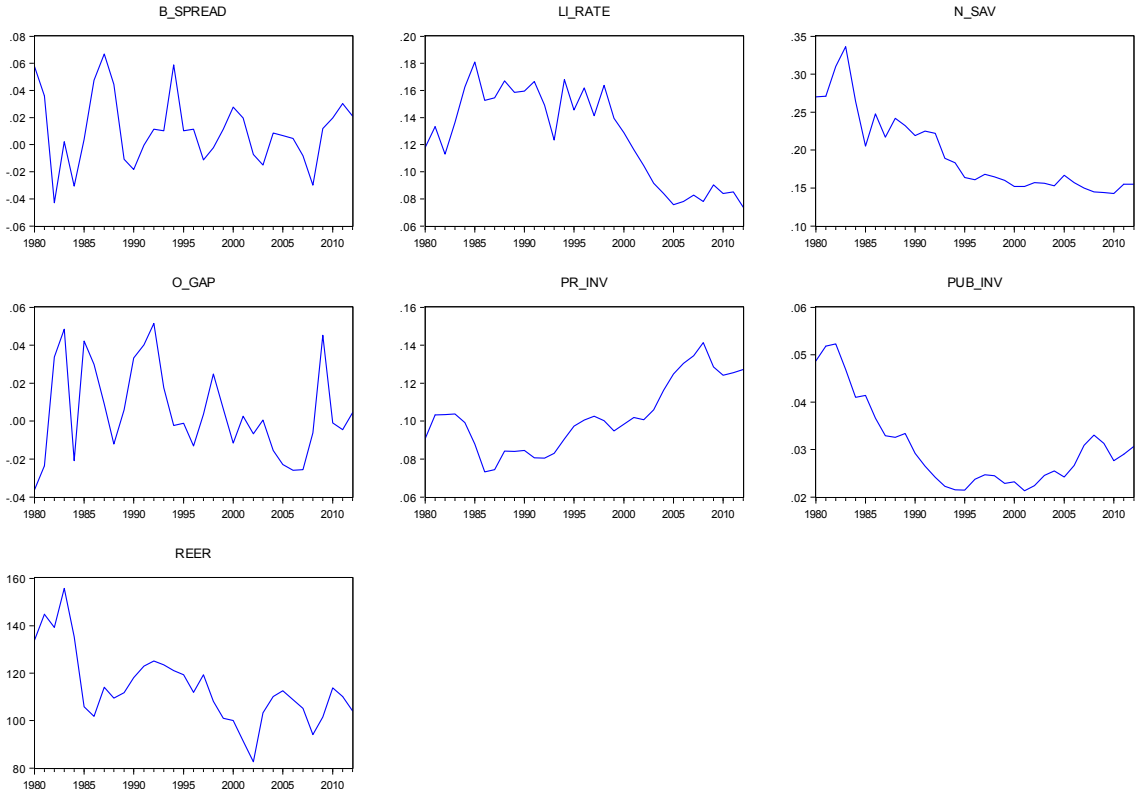
Appendix A: Research data (non-stationary)

	PR_INV	PUB_INV	N_SAV_{t-4}	B_Spread	LI_Rate	REER	O_GAP	SADUMM
1980	9%	5%	23%	6%	12%	134	-4%	0
1981	10%	5%	27%	4%	13%	145	-2%	0
1982	10%	5%	27%	-4%	11%	139	3%	0
1983	10%	5%	31%	0%	14%	156	5%	0
1984	10%	4%	34%	-3%	16%	135	-2%	0
1985	9%	4%	26%	0%	18%	106	4%	0
1986	7%	4%	21%	5%	15%	102	3%	0
1987	7%	3%	25%	7%	15%	114	1%	0
1988	8%	3%	22%	4%	17%	109	-1%	0
1989	8%	3%	24%	-1%	16%	112	1%	0
1990	8%	3%	23%	-2%	16%	118	3%	0
1991	8%	3%	22%	0%	17%	123	4%	0
1992	8%	2%	23%	1%	15%	125	5%	0
1993	8%	2%	22%	1%	12%	124	2%	1
1994	9%	2%	19%	6%	17%	121	0%	1
1995	10%	2%	18%	1%	15%	119	0%	1
1996	10%	2%	16%	1%	16%	112	-1%	1
1997	10%	2%	16%	-1%	14%	119	0%	1
1998	10%	2%	17%	0%	16%	108	2%	1
1999	9%	2%	17%	1%	14%	101	1%	1
2000	10%	2%	16%	3%	13%	100	-1%	1
2001	10%	2%	15%	2%	12%	91	0%	1
2002	10%	2%	15%	-1%	10%	83	-1%	1
2003	11%	2%	16%	-2%	9%	103	0%	1
2004	12%	3%	16%	1%	8%	110	-2%	1
2005	12%	2%	15%	1%	8%	113	-2%	1
2006	13%	3%	17%	0%	8%	109	-3%	1
2007	13%	3%	16%	-1%	8%	105	-3%	1
2008	14%	3%	15%	-3%	8%	94	-1%	1
2009	13%	3%	15%	1%	9%	101	5%	1
2010	12%	3%	14%	2%	8%	114	0%	1
2011	13%	3%	14%	3%	9%	110	0%	1
2012	13%	3%	16%	2%	7%	104	0%	1

Appendix B: Differenced or stationary research data

	D2LI_RATE	D2PRI_INV	D2REER	D2N_SAV	DB_SPREAD	DO_GAP
1982	12%	9%	133,9	23%	4%	-2%
1983	13%	10%	144,88	27%	-4%	3%
1984	11%	10%	139,27	27%	0%	5%
1985	14%	10%	155,73	31%	-3%	-2%
1986	16%	10%	135,25	34%	0%	4%
1987	18%	9%	105,7	26%	5%	3%
1988	15%	7%	101,75	21%	7%	1%
1989	15%	7%	114,03	25%	4%	-1%
1990	17%	8%	109,48	22%	-1%	1%
1991	16%	8%	111,76	24%	-2%	3%
1992	16%	8%	118,02	23%	0%	4%
1993	17%	8%	122,94	22%	1%	5%
1994	15%	8%	125,12	23%	1%	2%
1995	12%	8%	123,51	22%	6%	0%
1996	17%	9%	121,05	19%	1%	0%
1997	15%	10%	119,26	18%	1%	-1%
1998	16%	10%	111,86	16%	-1%	0%
1999	14%	10%	119,22	16%	0%	2%
2000	16%	10%	108,05	17%	1%	1%
2001	14%	9%	100,94	17%	3%	-1%
2002	13%	10%	100	16%	2%	0%
2003	12%	10%	91,39	15%	-1%	-1%
2004	10%	10%	82,55	15%	-2%	0%
2005	9%	11%	103,23	16%	1%	-2%
2006	8%	12%	110,13	16%	1%	-2%
2007	8%	12%	112,5	15%	0%	-3%
2008	8%	13%	108,88	17%	-1%	-3%
2009	8%	13%	105,05	16%	-3%	-1%
2010	8%	14%	94,09	15%	1%	5%
2011	9%	13%	101,41	15%	2%	0%
2012	8%	12%	113,85	14%	3%	0%

Appendix C: Summary of stationarity test



Appendix D: Augmented Dickey-Fuller test results

Null Hypothesis: D(D-PRI_INV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.799689	0.0073
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

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

Null Hypothesis: DPUB_INV has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.165615	0.0323
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

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

Null Hypothesis: D(D2Li_RATE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.529977	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

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

Null Hypothesis: D(DREER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.099893	0.0003
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

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

Null Hypothesis: D(DN_SAV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.777019	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

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

Null Hypothesis: DB_SPREAD has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.969947	0.0004
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

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

Null Hypothesis: DO_GAP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.060292	0.0037
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

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