

SAVINGS, INVESTMENT AND ECONOMIC GROWTH IN NAMIBIA

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ABSTRACT

This study examined the interaction between saving, investment and economic growth in Namibia. The relationship between these variables is central to Namibia's guiding macroeconomic framework. However, empirical evidence has shown that the relationship between saving, investment and economic growth depends on the country context. This makes it important to understand the policy implications of the interaction between these variables in Namibia. The specific objectives of the study were to investigate the causal relationship between saving and investment and the impact of the saving-investment relationship on economic growth in Namibia. The diagnostic testing using the Johansen cointegration test revealed a long-run relationship between the study variables with one cointegrating equation. The long run analysis was followed by Granger causality tests to understand short-run causal relationships between the variables. Impulse response functions and variance decompositions were also estimated to examine the interaction between the variables. The results from the Vector Error Correction Model showed that there was a positive long-run relationship between economic growth and investment, & savings and investment in Namibia. The Granger causality test revealed a causal relationship between saving and investment, consistent with the long-run analysis. The study implications are that a pro-saving policy can achieve increased investment. However, the long run relationship between investment and economic growth implies that investment should be made on a longer term for it to impact on economic growth. It is therefore recommended that Namibia implements policies to encourage long term investments. This can be achieved through waiving duty on capital goods and offering tax incentives to investors in strategic sectors of the economy.

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LIST OF ACRONYMS

GDP	Gross Domestic Product
GCF	Gross Capital Formation
GDS	Gross Domestic Saving
NSA	Namibia Statistics Agency
OECD	Organisation for Economic Cooperation and Development
RR	Real Interest Rate
TIPEEG	Targeted Intervention Programme for Employment and Economic Growth
VAR	Vector Autoregression
VECM	Vector Error Correction Model

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1. INTRODUCTION

1.1 Background of the Research

Since 1990, Namibia's economy has been characterised by low economic growth, high income inequality and unemployment (National Development Plan 4, 2012). Given these challenges, the government implemented the National Development Plan (NDP) as a guiding framework to achieve its macroeconomic objectives of high and sustained economic growth, lower income inequality and employment creation. However, economic growth remains below the desired level of 5% for the country to achieve its growth targets by 2030 (NDP4, 2012). According to the Organization for Economic Cooperation and Development (OECD) (2012) prior to 2012, economic growth averaged around 3.3%. Although economic growth increased to 3.8% in 2011, it has decreased to 1.2% in 2016 (World Bank, 2017). The statistics show that economic growth has continued to deteriorate despite the government's continued expansionary fiscal policies which have widened the government deficit (OECD, 2016). The Namibian macroeconomic framework is built on enhancing investment as the key to unlocking economic growth. The NDP4 (2012) highlights that mobilising domestic savings and creating a conducive environment for foreign direct investment are critical in increasing the investment levels in the economy.

To understand the interaction between saving, investment and economic growth, it is important to understand what constitutes the three variables and the underlying relationships between the three series. Parkin (2012) defines saving as the amount of income that is not spent in paying taxes or on the consumption of goods and services. He highlights that saving in the economy can be split into two categories - private and public. Private savings consists of income remaining after households and firms pay for expenditures in the current period, while public saving is the tax revenue that is left unspent after the government implements its fiscal initiatives.

These two forms of saving play a critical role in the achievement and maintenance of sustainable growth and development. This is particularly so for developing countries like Namibia, where domestic borrowing finances public sector expenditures. This is because external capital flows to the private sector continue to decline (Uanguta, Haiyambo, Kadhikwa, & Chimana, 2017). In 2017, Namibia's long-term senior unsecured bond rating was downgraded to junk status which will make it more expensive and difficult to access capital

from international credit markets. As such, further development initiatives may need to be financed from domestic savings.

Gross Domestic Saving (GDS) in Namibia mainly comprises private savings (Mwinga, 2012). This is because the government has maintained a consistent expansionary fiscal policy over time leading to a widening of the budget deficit (Mwinga, 2012). Households and firms in Namibia usually keep proceeds from economic activities at depository institutions. When depository institutions invest these proceeds in the domestic market, they produce a multiplier effect which results in the increase in national income. The Bank of Namibia (BON)'s (2004) occasional paper postulates that the effects of saving and investment on economic growth are two-fold: Firstly, demand for investment goods forms part of aggregate demand in the economy. Thus, a rise in investment demand will stimulate production of investment goods which in turn leads to high economic growth and development. Secondly, capital formation improves the productive capacity of the economy in a way that the economy can produce more output. Patrick (2017) highlights that GDS has fluctuated significantly over the past decade; from 2003 to 2006, it increased from 10.28% of GDP to 26.17% after which it followed a downward trajectory due to the global recession of 2007 and 2008. The latter has serious implications for Namibia's GDP where the growth rates have been consistently below the targeted levels. The Namibian government needs to implement policies aimed at encouraging national saving and ensure that this saving is invested into the domestic economy to enhance economic growth.

Uanguta and Shimi (2015) concur that Namibia has seen a reduction in private savings over the past decade while borrowing by individuals and firms has increased. This has resulted in an increase in the ratio of household debt to disposable income. In 2014, household debt was a staggering 86% of disposable income and this increased to 90% of disposable income in 2015. However, the increase in household debt can also be a result of people taking credit for investment purposes, as evidenced by the consistent growth of the property market over the past decade. Similarly, these statistics can be an indication that firms are borrowing more to expand their existing businesses. The use of credit to finance domestic investment can create employment opportunities which result in economic growth since some growth theories postulate that economic growth is a function of capital and labour (Stiglitz & Walsh, 2006). Technological progress from firms investing in better technologies can significantly improve labour productivity and consequently economic growth. It is therefore important to critically

analyse the interaction between macroeconomic fundamentals to inform policies which results in the optimal growth outcomes.

According to the neoclassical economic model, household saving is used to finance investment (Solow, 1956). This implies that capital accumulation is best enhanced through the implementation of policies that encourage household saving and capital flows from foreign markets. The neoclassical reasoning implies that, capital flows from rich countries to poor countries because of the higher returns provided in poorer countries. However, empirical studies have questioned this relationship. Flassbeck (2012) argues that in a complex economy, investment and saving decisions are made independently and hence a higher saving rate may result in a fall in investment. The mobility of capital also contributes to the fact that despite high domestic saving, investment rates may be low. Nikoforos (2015) further suggests that the household saving rates for households at the bottom of the pyramid vary over time and adjust endogenously to maintain a level of economic growth. He added that an increase in income inequality or government deficit in an economy results in a decrease in the saving rate.

Given the above argument, growing inequalities and excessive expenditures have characterized the Namibian economy for the past decade. The interaction between saving and investment is hence, very important at this juncture, given that a significantly large proportion of the population lives below the poverty datum line (NSA, 2012). The NSA reports that the poverty incidence level in Namibia is 30%. Parking (2012) highlights that the major determinant of saving is disposable income. Disposable income is defined as the portion of income that is left after tax has been deducted. If disposable income is high, people tend to save more. Policies aimed at encouraging saving across the population may not be effective since the majority of Namibians have relatively low levels of disposable income. From the Keynesian theory, consumers face liquidity constraints, thus it is difficult for them to interact with longer term saving products when their income is not enough to cover for their day to day needs.

Another important factor that determines saving in Namibia is inflation. Uanguta and Shimi (2015) highlight that the continuous erosion of household income by inflation reduces the purchasing power of the Namibian dollar and the incentive to save. A high inflation rate also reduces the return to saving because a dollar in the future will be worth less than a dollar today, even when the discount rate is zero. The ability of Namibia to mobilise savings for investment purposes is questionable given the income dynamics. For a developing country like Namibia to

finance the required investment, the economy needs to create adequate financial resources through saving to fuel economic development. If local saving is insufficient, the country has to rely on borrowing from external sources. However, borrowing from abroad may have adverse effects on the country's balance of payments in the long run.

Uangata and Shiimi (2015) point out that this increase in government expenditure in Namibia, is largely financed through borrowing from both domestic and international debt markets, hence the fiscal stance might have negative effects on the economy if maintained. Financing a deficit through external debt diverts public resources to loan repayments and debt service. This reduces public investment in areas that are relevant to private sector development such as infrastructure (Greene and Villanueva, 1991). The current deficit of 6% of GDP is higher than Sub-Saharan Africa's average deficit of 4% (World Bank, 2017). These statistics show that the fiscal stance in Namibia has been widely expansionary but the dividends in terms of growth have been low.

Namibia's economic growth rate is too low to achieve the macroeconomic objectives set in the vision 2030. Theory suggests that investment should spur economic growth. Investment is expected to be higher when saving is high. However, empirical evidence shows that this relationship does not hold all the time. The aim of this study is to determine the relationship of these variables in Namibia and the policy implications of the relationships.

1.2 Problem Statement

Since independence, Namibia has struggled with low levels of economic growth, high levels of inequality and unemployment. The guiding macroeconomic framework, the NDP4, has focused on these three areas as a means to improve the welfare of Namibians. However, current statistics show that Namibia's growth rates have been consistently below targeted levels hence the country is likely to miss the growth targets outlined in the vision 2030. The country has been exploring ways to stimulate domestic saving to enhance investment and economic growth. The relationship between saving, investment and economic growth in Namibia is not well understood; thus, there is a need to investigate whether a pro-saving policy is an effective cure for stunted growth as suggested by government policy.

Harbaugh (2004) highlights that when investment demand is high and capital flows are constrained, the returns to saving are usually high; hence saving and investment are positively correlated. He explained that the return to capital in most developing economies is usually high

because of scarce capital. However, contrasting evidence from Kaykci (2012) shows that there are possibilities of short run divergence in the saving and investment relationship when there is capital mobility. Due to the conflicting empirical evidence, understanding the relationship between saving and investment is key in implementing appropriate policies to achieve macroeconomic objectives.

Most developing economies focus on massive investment in infrastructure in pursuit of economic progress. The NDP4 (2012) outlines that the government aims to stimulate income growth through public investment programmes such as the Targeted Intervention for Employment and Economic growth (TIPEEG). This programme was implemented between 2011 and 2014. Central to this programme was a massive investment in the provision of public infrastructure. The National Planning Commission reported that the implementation of TIPEEG would resolve the challenges the nation was facing in terms of unemployment and low economic growth. Despite the implementation of TIPEEG, unemployment and low levels of economic growth are still major challenges in Namibia, hence this brings into doubt the linkages between investment and economic growth. Mwinga (2012) analysed secondary data from Namibia's Labour Force Surveys (NLFS for 1997, 2000, 2004 and 2008) and the 1993/94 & 2003/04 National Housing Income & Expenditure Surveys (NHIES), the results showed that investment in public infrastructure had not been able to deliver outcomes in terms of economic growth and improved welfare.

1.3 Purpose and Significance of the Research

International empirical studies on the relationship between saving, investment and economic growth have produced varied results, suggesting that the relationship between the three variables largely depends on the country context. Overall, there is a perception that high saving leads to increased investment and ultimately economic growth. Namibia has also formulated its guiding macroeconomic objectives based on this underlying relationship. However, there is a dearth of research in this area in Namibia, with only a few briefing papers on the historical trends of saving and investment rather than an econometric investigation of the relationship between saving, investment and economic growth. As such, it is critical to ascertain whether the government is indeed embarking on the correct path to achieve economic growth. This study will thus provide answers to policy questions on the effectiveness of mobilizing domestic saving to enhance investment and economic growth.

1.4 Research Questions and Scope

This study will attempt to answer the following questions:

- Is there a causal relationship between saving and investment in Namibia?
- What is the impact of saving and investment on economic growth in Namibia?

1.5 Objectives of the Study

The objectives of the study will be to:

- investigate whether there is a causal relationship between saving and investment in Namibia and
- to determine the impact of saving and investment on economic growth in Namibia.

1.6 Layout of the Study

This study consists of five chapters. Chapter one provided the background to the study and elaborated on the problem statement. This chapter also presented the research questions and the guiding objectives of this study. Chapter two contains the literature review including both the theoretical framework of the relationship between saving and investment and economic growth as well as the results of empirical studies that have investigated the determinants of these variables and their relationship in various countries. The methodology employed in this study to answer the research questions is described in chapter three, and chapter four presents the findings from the empirical analysis. The conclusion of the study is presented in chapter five, along with recommendations from the findings of the study.

2. LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature relevant to this study, including the theoretical framework and empirical studies on the determinants of saving and investment, the relationship between saving and investment and the link to economic growth. The relationship between public and private investment is also discussed as this relationship has strong implications for growth.

2.2 Theoretical Review

2.2.1 Determinants of Saving

As previously defined, saving is the amount of income that is not spent in paying taxes or on the consumption of goods and services. The determinants of saving can thus be understood from the determinants of consumption. Keynes argued that saving is an increasing function of income (Keynes, 1936). The Keynesian consumption function has two components - an autonomous component, which is the minimum consumption level an individual consumes that is independent of their economic status, and a component that increases marginally as income increases.

Following the Keynesian approach to consumption, Duesenberry (1949) argued that the relationship between consumption and income is not as simple as Keynes had postulated. Duesenberry (1949) argued that consumption depends on an individual's percentile position in an income distribution. The second hypothesis is that consumption is not merely a function of absolute income but is affected by relative income measures attained in the past. The implication of this theory is that consumption does not decrease as income decreases. According to Duesenberry (1949), the utility obtained from any given consumption level depends on the magnitude of the level of consumption relative to what the rest of the society is consuming rather than the absolute consumption level. As such Duesenberry (1949) argued that the saving rate does not increase proportionately with the rate of income growth but rather that the propensity to save increases proportionately with increases in an individual's percentile position in the income distribution.

Friedman (1957) departs from both Keynes and Duesenberry's approach to consumption. In his theory of permanent income, he proposes that saving does not depend on long-term current income but permanent income. He argues that short-term windfalls or capital gains do not influence the consumption decisions of individuals as they wish to smooth consumption over

their lifetime. Instead temporary windfalls will affect an individual's saving behavior (Friedman, 1957). In his theory, he attempts to explain how consumption smoothing is the main motivation of individuals spreading their incomes almost uniformly over their life cycle. He stated that a person's current consumption is affected by changes in permanent income rather than temporary changes in income. He highlights that people spread out transitory changes in income over time to derive uniform consumption. This theory departs from the traditional Keynesian marginal propensity to consume approach to consumer behaviour.

An extension of the permanent income hypothesis is the life cycle hypothesis which assumes that the objective of saving is to smooth consumption levels over an individual's lifetime. Ando and Modigliani (1963), in their 'life cycle hypothesis of saving', consider that economic agents save money depending on the stage of the life cycle they are in. That is, they borrow when they are young, save during working years and spend during retirement. Kohl and O'Brien (1998) highlighted that the life cycle model assumes that an individual's utility depends solely on their given level of consumption and their time horizons. The extended life cycle model postulates that the primary effect of income on consumption is offset by secondary factors such as induced labour supply. This argument is based on the assumption that labour supply changes in response to income and other substitutes such as leisure. When the income effect dominates, individuals will increase their supply for labour and retire early. This results in them saving more to cater for longer retirement periods. When the income effect is low, individuals consume more leisure and supply less labour. This results in lower saving levels as individuals anticipate longer working periods (Kohl & O'Brien, 1998).

Income, however, is not the only contributing factor to saving within a country. Interest rates, economic expectations and government taxes are among the factors that have an impact on saving decisions. From the liquidity preference theory of Keynes (1936), the quantity of money people desire to hold is inversely proportional to the prevailing interest rates. Keynes argues that when interest rates are high, people prefer to hold their wealth in interest-bearing assets.

Higher interest rates induce people to save more since interest rates are the opportunity cost of holding money. This is also similar to the Mackinon and Shaw hypothesis which argues against interest rate ceilings after establishing a positive relationship between interest rates and saving. However, some counter arguments on the relationship between saving and interest rates have been proposed in the literature. For example, Schmidt-Hebbel and Servén (1999) argued that due to behavioral factors such as hyperbolic discounting and loss aversion, the relationship

between saving and interest rates becomes very weak. Keynes, in his liquidity preference theory, also documented that high interest rates may not result in high saving levels because economic agents face liquidity constraints resulting in a tradeoff between short-term gratification and long-term goals.

Economic expectations also play a major role in influencing consumption and saving decisions. One of the main reasons for saving is the precautionary motive. Households save in anticipation of uncertain and difficult times where there is a risk of decreasing income. These uncertainties may come from macroeconomic instability and inflation, exchange rate volatility or the financial system. Inflation anticipation by economic agents may lead them to discourage saving because inflation reduces the purchasing power of the amounts they hold in savings (Fischer, 1993).

The size of the fiscal deficit or surplus is another factor that could affect national saving. A low fiscal deficit or surplus promotes public saving and hence national saving. This effect is greater in developing countries with subsistence consumption and liquidity constraints (Corbo and Schmidt-Hebbel, 1991). The level of taxes and government spending can also influence saving (Blanchard & Johnson, 2013). Increased government spending is usually followed by an increase in taxes or government borrowing. The increase in taxes lowers the disposable income in the economy thus economic agents will save less, according to Keynesian theory. However, Barro (1974) presents an alternative theory, the Ricardian equivalence theory, that increasing public deficits leads to an anticipation of future tax increases by economic agents, leading to an increase of saving.

2.2.2 Determinants of Investment

Early theories of investment, were based on the work of Clark (1917) in what was referred to as the accelerator theory. The accelerator theory is based on the basis that an increase in national income leads to an increase in investment. Under this theory, an increase in national income causes an increase in investment by a multiple amount. The larger increase in investment spending from a smaller increase in national income is known as the multiplier process (Clark, 1917).

This was further developed by Jorgensen and Hall (1967) under the neoclassical school of thought. The neoclassical school views the stock of capital (i.e. investment) as a positive function of income (Bernomi, 1945). The neoclassical theory highlights that investment at equilibrium is determined by price factors of production which is represented by the interest

rate (Schmidt-Hebbel, Corbo, Vittorio & Klaus, 1999). Neoclassical theory highlights that there is a negative relationship between real interest rates and investment; high interest rates imply that the cost of borrowing is high and thus the return on investment is eroded by the cost of servicing debt (Benoni, 1945).

According to Kopcke (1985) the main distinguishing factor between the accelerator model and the neoclassical model is that the neoclassical models moves away from the bivariate specification of the investment function by including prices, interest rates and proxies of tax laws. The neoclassical models postulate that factor prices especially the cost of capital should be accounted for when explaining investment behavior.

Following the neoclassical school of thought, many governments used interest rate ceilings to ensure that capital is affordable to investors. This resulted in interest rates being pegged at low rates which were at times lower than the rate of inflation. This eroded the incentive to save and the result was a lack of funds in the formal financial system. The result was a phenomenon termed by MacKinnon and Shaw (1973) as financial repression. MacKinnon and Shaw (1973) argued against the neoclassical reasoning which postulated that lower interest rates resulted in higher levels of investment. According to MacKinnon and Shaw (1973), low interest rates in economies result in capital shortages as money moves to countries where capital returns are higher. McKinnon and Shaw (1973) argued that high interest rates, by encouraging saving, increase the volume of available domestic credit, which increases investment. The McKinnon and Shaw hypothesis highlights that it is not the cost of financial resources that hinder investment, but rather the lack of available financial resources for investment. McKinnon and Shaw (1973) suggest that financial development can foster investment and thus economic growth through the reduction of credit constraints for investment. That is, low financial development creates credit constraints which may negatively affect private investment. In countries with poorly developed financial systems and equity markets, bank loans are the only sources of credit available to people. Consistent with this view, in the traditional endogenous growth models, Greenwood and Jovanovic (1990), Saint-Paul (1992) and Pagano (1993) highlight the importance of increased financial intermediation through opening up the financial sector to increase competition. Competition in the financial sector will result in lower costs of borrowing therefore affording entrepreneurs greater access to credit to finance private investment.

The institutional environment is widely recognized as a key factor that influences investment especially in developing countries (Stiglitz & Walsh, 2006). North and Thomas (1973) argue that the fundamental explanation of the differences in paths of long-term growth lies in the institutional differences between countries. It is the institutions, defined by North (1990) as the set of rules in a society that allow greater appropriation of the gains from individual activity, which determines investment, innovation and ultimately economic growth.

Another factor that has a strong impact on investment and that is closely linked to the institutional environment is uncertainty and instability. Weak institutional structures lead to lack of predictability of the macroeconomic environment and policy inconsistencies (Barro, 1974). The lack of continuity and stability in long-term economic policies leads to permanent instability in the economic environment and hence to less incentives to invest. Instabilities and uncertainties can also affect investment (Brue, McConnell, & Fynn, 2014). If investors expect good economic conditions, then investment is likely to increase. If, however, they expect harsh economic conditions, then investment may fall. Lack of institutional structures, instabilities and uncertainties increase the risk of losing invested capital. In addition, the risk of war and the absence of institutions protecting property rights discourage investment.

Risk is widely recognised as an important determinant of investment (Stiglitz & Walsh, 2006). Investors usually want investments that will guarantee them of a profit. They only invest in risky projects if the returns are high. Firms with lower credit ratings find it very difficult to finance their investments through borrowing. The uncertainty and instability in the macroeconomic environment described above can also be seen as a component of risk.

Another factor that impacts investment is government spending; however, it is unclear whether the effect is positive or negative. Proponents of government spending, particularly the Keynesian school of thought, argue that an increase in government spending leads to an increase in investment spending. This increases the aggregate demand in an economy thus increasing national income (Keynes, 1936). A common argument against persistent government spending is the crowding-out phenomenon. According to Blanchard and Johnson (2013), crowding-out occurs when government spending in the economy results in lower private investment in an economy. The impact of spending intervention can be either at the supply or demand side. Crowding-out occurs when government implements an expansionary fiscal policy by increasing its spending or reducing taxes. The government has to finance the increase in expenditure through borrowing and hence it will compete with the private sector for available funds in the

market. The increase in demand for loanable funds results in an increase in interest rates and thus it becomes more expensive for the private sector to implement investment projects due to the high cost of borrowing. Another form of crowding-out is resource crowding-out (Sloman, Wride, & Garratt, 2015). This occurs when the government competes with the private sector for labour and raw materials. If the economy is operating near full employment, resources used by the government become unavailable to the private sector.

On the other hand, Crowding-in refers to the increase in private sector investment which is caused by government activities. This arises from a reduction in government spending or an increase in taxes which leads to the reduction in interest rates in the loanable funds market and thus an increase in investments. This is so because a fall in interest rates makes it favourable for borrowing which will in turn increase investment. Within the framework of restrictive fiscal policy, a government can reduce its deficit by increasing taxes or reducing government spending (O'Brien, 2013)

The degree of trade openness is another important determinant of investment. This is typically measured by trade flows (exports minus imports), which may have a positive effect on investment (Levine and Renelt, 1992), as it can expand the opportunities for firms to achieve greater economies of scale and efficiency in investment (Krueger, 1978). Trade liberalization also allows ideas and technology transfers with the import of high value added products, which promotes the adoption of these technologies and new working methods and standards in domestic production (Edwards, 1992). However, openness to trade may, in certain situations, adversely affect domestic investment. Indeed, poor countries would not have all the prerequisites to withstand international competition with multinational companies from rich countries. Openness could result in flooding these countries with imported products that predominantly consist of consumer goods, while they have all the difficulties in exporting their manufactured goods (Ndikumana, 2000). This can cause a collapse of their domestic sector.

The exchange rate may also affect the investment decisions of firms. In theory, there may be two opposing effects. When the domestic currency depreciates, exports are likely to increase because the goods become cheaper, which encourages investment due to greater demand. But this effect may be offset by the rising cost of imported goods. The currency appreciation produces the opposite effect (Campa and Goldberg, 1999).

2.2.3 The Impact of Saving and Investment on Economic Growth

The flagship Keynesian approach to economic progress is the Domar (1946) model which assumes that aggregate demand grows at the same rate as national income (Gardner, 2005). Investment is one of the components in the aggregate demand function and the investment-output ratio is defined as the rate of capital accumulation. Domar (1946) explains that there is a linear relationship between capital and output and economic growth is achieved when the saving rate increases, increasing the level of productivity of capital or decreasing the depreciation of capital stock. Commendatore, Panico and Pinto (2011) highlighted that the fundamental Keynesian approach to growth is based on three distinguishing principles. Firstly, the economy may not operate at full employment; secondly, saving and investment decisions are independent of each other and as such, there is no causal link between saving and investment; and thirdly, the presence of autonomous demand in the economy may affect the rate of income growth.

The neoclassical school of thought on economic growth assumes that consumers always save a fixed amount of income and allocate this towards investment. This school of thought gave prominence to the Solow (1956) growth model which states that output is a function of labour and the level of capital stock. The Solow model assumes that the level of capital stock depends on the discounted levels of capital stock and investment in the previous year (Solow, 1956). An increase in saving implies an increase in investment hence this results in national income growth in the short-run. However, Solow (1956) argues that in the long-run, higher saving and investment have no effect on economic growth. That is, in the long-run there is a tradeoff between capital accumulation and capital depreciation. The result is that the economy maintains equilibrium at a steady state when the rate of capital accumulation is equal to the depreciation of capital, hence there is no contribution of investment to national income. The income at this steady state is called the natural rate of income (Guo, Dall'erba, & Gallo, 2013).

2.2.4 Public Investment Spending and Economic Growth

The government stance on taxes has a significant impact on consumption levels and ultimately saving (Barnheim, 1989). There are three theoretical explanations as to how taxation affects consumption and saving (Manuel, 2004). The first is the neoclassical theory which postulates that economic agents forecast future economic conditions and make decisions based on their perception of the future. The link between government investment spending and economic

growth can be explained by the tax smoothing theory. This school of thought is known as the Ricardian view which assumes that the government is a responsible social planner. The ultimate objective of the government is to increase social welfare by maximizing the utility of the public. The government achieves this by financing its initiatives through taxes. The welfare in the economy improves through private consumption and leisure consumption.

The tax smoothing theory assumes that social welfare is improved when expenditure is increased on leisure and private goods. However, the public will experience welfare losses when investment spending on public goods increases. Spending on public goods is characterized under defense spending. When the government increases its spending from borrowing, the public anticipates higher future taxes hence will save more to finance higher taxes in the future. Government expenditure under this model will have no effect on national income since the public does not adjust their consumption behaviors in response to fiscal policy initiatives. Under this view, the main motivation to save is consumption smoothing which means individuals want to maintain their consumption levels over their lifetime. A tax policy which results in tax cuts will result in no change in consumption but increase saving behavior among individuals. This is because economic agents understand that a tax cut today simply means that government must raise taxes in future to close the deficit resulting from the expansionary fiscal policy. The implication is that fiscal policy in the form of reduced taxes does not have an effect on consumption, aggregate demand and income in the economy.

The second school of thought is the model of opportunistic behavior. Under this model, economic agents are myopic hence they overestimate the benefits from an expansionary fiscal policy while underestimating the burden of increased taxes in the future (Manuel, 2004). He added that under models of opportunistic behavior, expansionary fiscal policies can be used to artificially alter economic progress during election periods to gather political support. Once a government is elected, it will have to deal with servicing the debt and hence government investment expenditure will have to be aligned to economic objectives.

Models of opportunistic behavior are consistent with the Ricardian view. Barneim (1989) explains that deficits merely shift the payment of taxes to future generations hence they leave dynastic resources unaffected. Thus, deficit policy is a matter of indifference. This follows the Keynesian view which assumes that individuals face liquidity constraints which result in a high propensity to consume from their incomes. This assumption provides a distinct deviation from neoclassical reasoning because temporary tax reduction in this case will cause an immediate

increase in consumption and ultimately aggregate demand. From the Keynesian theory, government investment expenditure has been seen as a critical tool to achieve national growth.

The adoption of Keynesian reasoning led to most countries implementing expansionary policies to stimulate aggregate demand. This resulted in increases in inflation levels without real change in output (Friedman, 1956). This view was also supported by Mitchell (2005) who argued that previous studies which concluded that persistent expansionary policies can be used to pursue growth objectives were often characterized by methodological flaws in their analysis. Mitchell (2005) highlighted that correcting for these errors would often show that government spending does not stimulate economic growth. Mitchell (2005) juxtaposes the Keynesian view by presenting an alternative argument that government can only implement expansionary fiscal policies through withdrawing money from the economy through taxes. He highlighted that often the government withdraws money from more productive sectors to channel it towards unproductive social objectives. Mitchell (2005) argues that in the 1970s government investment expenditure to stimulate economic growth was associated with economic stagnation while higher growth in the 1980s was achieved by lowering taxes and reducing government expenditure.

Similar to models of opportunistic behavior, Manuel (2004) proposes the third model which seeks to explain the effect of taxes on consumption and investment, which he terms ideological behavior. He argues that this model can be used to distinguish governments into two categories: capitalist or socialist. A government's approach to investment expenditure and economic growth entails a tradeoff between efficiency and equity; predominantly capitalist governments tend to channel investment towards the most productive sectors of the economy leading to economic growth while socialist governments channel resources towards the greater good. The main challenge is that capitalist governments tend to achieve economic growth without economic development while socialist governments tend to achieve equality at the cost of economic stagnation (Manuel, 2004).

Theory has produced divergent views on the role of the government in the economy. Proponents of the classical school of thought often argue that government should not intervene in the economy. This is based on the views of Smith (1776) who brought forward the concept of the invisible hand in the market. Smith argues that markets can efficiently allocate resources on their own to the most productive sectors and that government cannot use policy instruments to maintain macroeconomic variables above their natural rate. This reasoning is challenged by

Keynes (1936) who argued that government must intervene in the economy to cure market failures and pursue growth objectives.

2.3 Empirical Literature

Several studies have estimated the saving and investment function in developing countries, particularly in sub-Saharan Africa (Schmidt-Hebbel, Corbo, Vittorio & Klaus, 1999). Many of these studies have used national saving and investment figures while only a few have focused on private saving and investment. However, it is of great importance to determine factors that influence changes in private saving and investment, as these are the main components of aggregate saving and investment in many countries. This is particularly true in Namibia where aggregate saving consists of only private saving due to the fact that the government has consistently maintained a budget deficit since independence. Further, policies that are geared to raise the level of saving and investment generally focus on these two aggregates. Typically, a number of macroeconomic variables have been included in the saving and investment models to account for the effects of monetary, fiscal and exchange rate policies. The inclusion of macroeconomic stability factors in the saving and investment models is done on recognition that these factors have significant influences on saving and investment. This section provides an overview of the empirical approaches used by researchers in trying to understand the relationship between saving, investment and economic growth.

2.3.1 Empirical Studies on Saving and Investment

Studies on the investment and saving relationship have yielded different results even when researchers used the same methodological approaches. Furthermore, the results vary even when the study samples consider countries that are similar in terms of their development progress.

The genesis of the study of the saving-investment relationship in the empirical economics literature is typically attributed to the seminal study by Feldstein and Horioka (1980). Following their findings, the relationship between saving and investment has been the subject of intense research over the past three decades. Feldstein and Horioka (1980) interrogated the question about whether saving remains in the country of origination to finance domestic investment. In addition, they analysed the optimal tax and saving rates by drawing in elements of capital mobility. Using data for 21 OECD countries for the period 1960 to 1974, they found that nearly all incremental saving remains in its country of origin. Incremental saving is the increase in GDS from an increase in saving rate. The countries under consideration were industrialised

countries and the researchers point out that under perfect capital mobility, there should be no relationship between domestic saving and private investment. The results of the study revealed that the differences between private investment in the countries under study was proportionate to the differences in saving rates between countries. This contrasts the view that capital should flow to countries with the highest return. The study findings are consistent with the view that portfolio preference and institutional rigidities often result in additional saving being channeled towards domestic investment.

The implementation of capital liberalisation in Turkey in 1989 provided a strong basis for testing the findings of Feldstein and Horioka (1980) that under capital mobility there would be no relationship between saving and investment. For this purpose, Kaya (2010) used private investment and national quarterly data on saving for the period 1984Q1 to 2007Q3. The analytical technique used in this study was the Autoregressive Distributed Lag (ARDL) bounds testing. The study found that there was a strong long-run relationship between national saving and private investment. These results are inconsistent with Feldstein and Horioka's (1980) views that under capital liberalization there is no relationship between saving and investment. However, this does not invalidate Feldstein and Horioka's (1980) claim because even under a liberalized capital market, investors may still prefer to hold domestic portfolios compared to foreign ones resulting in a positive relationship between domestic saving and investment.

Dritsaki (2015) investigated the saving and investment relationship in Greece. He used data on saving and investment rates from 1980 to 2012. The empirical analysis involved unit testing using the Augmented Dickey Fuller (ADF) tests while cointegration tests were conducted using ARDL bounds testing. The analysis revealed that there was a short- and long-run relationship between saving and investment. The cointegration tests were complemented by Granger causality tests which revealed that saving Granger-causes investment and this relationship is unidirectional. Further to this, variance decompositions revealed that domestic saving is the main determinant of investment in the long-run. This is consistent with the Keynesian theory which assumes that investment is financed from investment thus an increase in saving implies an increase in investment.

2.3.2 Public Investment and Private Investment

The relationship between public and private investment is also important to illustrate the theoretical arguments explored in this study. A study conducted in Zimbabwe by Ndovorwi (1997) investigated the impact of public policy on private capital formation. Ndovorwi (1997) used annual data for the years 1980 to 1990, which is decomposed into quarterly observations using interpolation. Private investment is regressed on public investment, bank credit to the private sector, the inflation rate, output growth rate and lagged private investment. In the short run, Ndovorwi (1997) revealed that public investment, whether infrastructural or non-infrastructural, crowds out private investment. However, in the long-run Ndovorwi (1997) concluded that public infrastructure investment is positively related to private investment.

Ndovorwi's (1997) findings of a crowding in effect of public investment spending in the long-run are broadly consistent with the findings of most studies. For example, a study in Turkey by Chibber and Wijnbergen (1992) found that, with a three-year lag, an increase in the share of infrastructure investment in public investment has a positive impact on private investment. Furthermore, Mataya and Veeman (1996) analysed the investment behaviour in Malawi's private and public goods sectors between 1967 and 1988, considering partial liberalisation and contractionary fiscal and monetary policies associated with the International Monetary Fund supported Economic Structural Adjustment Programmes (ESAP). A Granger causality test was employed to assess whether one- or two-way causality exists between private and public investment. A two-way causality was found between the two types of investment. The effect of private investment on public investment and vice versa was established as a positive relationship. However, their results suggested that public investment is not influenced by expected output. Contractionary fiscal and monetary policies had a negative effect on public investment and a negative effect on private investment.

Another study by Pereira (2001) tested the effects of public investment on the evolution of private investment in the United States using the Vector Autoregression (VAR) model and impulse response functions. The empirical results showed that at the aggregate level public investment crowds in private investment.

2.3.3 Empirical Evidence on the Relationship between Investment and Economic Growth

An important study which depicts the Namibian macroeconomic context by Manner (2014) investigated whether infrastructure spending by governments, which is typical of developing

economies, can be used to accelerate economic growth. The study focused on big capital investments by government and how these explained economic growth. Manner (2014) focused on low income countries using data on expenditure and economic growth between 1992 and 2012. Panel regression analysis was conducted and the results revealed a weak positive relationship between public investment spending and national income growth. The findings showed that government spending in the previous year did not have a significant impact on growth realized in the current year. The weak positive relationship between investment spending and economic growth was only realized in the current year and was not sustained into the future, suggesting that investments should result in improved long-term productivity in order to improve a country's growth prospects. Improvements in long-term productivity are difficult to attain over a short period thus resulting in a weak link between investment and economic growth. Manner (2014) explains that public investment expenditure in most developing countries tends to be financed by borrowing and has often been ineffective in improving economic growth because of incentive problems, poor investment analysis and divergent personal and political interests. These findings are consistent with the results from Ndovorwi (1997) and Perreira (2001) who showed that public investment crowds out private investment resulting in a weak relationship between investment and economic growth.

Verma (2007) investigated the relationship between investment and economic growth in India over the period 1950 to 2003 using the ARDL approach. The results showed that there is no relationship between investment and economic growth in both the short and long-run which contrasts with the commonly accepted growth models. In a similar study, Watson, Ilegbinosa and Micheal (2015) explored the impact of domestic investment (both public and private) on economic growth in Nigeria. The sample consisted of data from 1970 to 2013. The econometric analysis included a multivariate regression and cointegration testing. The results showed firstly that government investment had a crowding out effect on private investment and secondly that public investment had no effect on economic growth.

It is worthwhile to note that some empirical studies show that investment has been a key driver of economic progress. For example, Mehanna (2003) conducted a study on the causality between investment and national income growth. He used a sample of 80 developing economies over the period 1982 to 1997. The methodology used in this study was simultaneous equation modelling based on the new growth model. The findings revealed a strong positive link between investment and national income growth suggesting that investment predetermines economic

growth. Moreover, trade openness was not significant in explaining economic growth once investment was included in the model. However, the results revealed that trade openness was a significant predictor of investment and thus affected economic growth through the investment channel.

Another study conducted in Arab states showed that in some countries, increases in investment levels have been coupled with increases in levels of economic growth (Roudet, Lahreche & Zaher, 2016). However, he notes that the relationship between national income growth and investment is weakening over time. This is evidenced by the decrease in total factor productivity's contribution to economic growth. Wong (2012) also looked at the association between economic growth and investment. He used panel regression using a sample of both advanced and less advanced economies. In his approach, they adopted the neoclassical growth theory as the framework which assumes a concave production function and positive returns to capital but they exhibit diminishing returns as the ratio of capital to output rises. This relationship implies as the level of capital increases, the effect of lagged investment on economic growth decreases and could turn negative. Wong (2012) documented a negative relationship between investment and economic growth in high income countries. This was consistent with Getty (2010) who argued that despite the fact that the United States managed to consistently increase its investment and saving rate, there was still no evidence to show that this resulted in improved economic growth. However, in low income countries the results showed a positive relationship between investment and economic growth consistent with Keynesian theory.

Aghion, Comin and Howitt (2009) explored the question of whether a country can grow faster by saving more from both a theoretical and empirical perspective. The theoretical model postulated that economic growth is attained through innovation that enables local sectors to advance so as to catch up with frontier technologies. Under this theoretical model, saving plays an important role in financing innovation and consequently economic growth. The empirical approach used a cross-country regression (including both advanced and developing economies) on saving, investment and economic growth for the period 1992 to 2005. The study concluded that national saving is positively associated with investment and economic growth in developing economies but not in advanced economies.

A study focusing on the dynamic interaction between domestic investment, foreign direct investment (FDI) and economic growth in Pakistan was conducted by Ullah, Shah and Khan (2011) over the period 1976 to 2010. The econometric analysis included Johansen cointegration test to examine the relationship between variables in both the short- and long-run. The Toda-Yamamoto methodology was used to test for causal linkages between variables. The econometric analysis revealed that there was a long-run relationship between domestic investment, FDI and economic growth while the causality analysis revealed that FDI and domestic investment have a two-way causal relationship.

Zafar (2011) investigated the relationship between domestic investment, export and economic growth in Saudi Arabia. The study used data from 1970 to 2007. Cointegration analysis was done to test for the existence of a long-run relationship between the study variables. The results revealed that there was a long-run relationship between the three variables. The findings also demonstrated that only domestic investment significantly contributed to economic growth in both the long- and short-run.

A study by Tien (2016) in Vietnam looked at the relationship between FDI, domestic investment and the exchange rate. The sample included data from 1985 to 2015. The Johansen cointegration test was used to examine the long-run relationships of the variables while Granger causality tests were undertaken and a VAR model estimated to investigate the interaction between the variables in the short-run. The study showed that domestic investment and export growth Granger caused FDI inflows and economic growth. The study revealed that FDI inflows did not increase economic growth in Vietnam.

The above empirical evidence produces contrasting views on the relationship between investment and economic growth. Studies conducted in low income countries tend to reveal a weak relationship between investment and economic growth. Evidence from Arab countries leans towards a positive relationship between investment and economic growth. The studies that split investment into domestic and FDI show that domestic investment is the main driver of economic growth compared to FDI.

2.4 Summary

In summary, the evidence learned from the past research and economic theories shows that the link between saving, investment and economic growth is still elusive. The empirical analysis showed that the link between saving and investment is strongly dependent on capital mobility

hence this relation differs across countries. The empirical literature review showed that in some cases, public investment crowds out private investment thus reducing the impact on economic growth. As such, this compromises the impact of investment on economic growth. In light of this uncertainty, this study seeks to investigate the interaction between saving, investment and economic growth in Namibia. The following chapter describes the research methodology used to answer this question.

3. RESEARCH METHODOLOGY

3.1 Introduction

This section describes the methodology that was followed to answer the research questions. An overview of the data sources, the model specification and justification for the choice of variables is provided.

3.2 Research Approach and Strategy

To achieve the objectives of this empirical study, secondary data was collected from the Namibian National Accounts published by the World Bank for the twenty-four-year period 1992-2015. Annual data was collected on GDS, Gross Capital Formation (GCF), GDP and the real interest rate (RR). Quarterly data would have been ideal given the time period but only annual data was available for the study variables. The E-Views software package was used to analyse the data because of its efficacy in examining time-series data.

3.3 Econometric Model

As indicated in chapter 2, all growth theories indicate that saving and investment play a critical role in economic growth (Dritsaki, 2015). As indicated previously, the goal of this research was to assess the impact of these two variables on economic growth in Namibia while also looking at the direct interaction between saving and investment in the country. Alongside saving and investment, the interest rate was also included as an explanatory variable following the MacKinnon and Shaw (1973) hypothesis that interest rates tie saving and investment together, as discussed in chapter 2. The equation which forms the basis of this analysis can thus be expressed as follows:

$$GDP_t = \alpha_0 + \alpha_1 GDS_t + \alpha_2 GCF_t + \alpha_3 RR_t + e_t \quad (4.1)$$

The variables used to estimate these equations are described in detail below.

3.3.1 GDP

The OECD (2016) defines GDP as the monetary value of the final goods and services produced/ rendered in a country for a given time period. The OECD (2016) adds that GDP can be defined

as the value added by all actors involved in production activities within a country. An increase in real GDP is a measure of economic growth and hence it is used for this purpose in this study to analyse the relationship between investment and economic growth in Namibia. The real GDP series for Namibia was obtained from the World Bank, expressed in constant local currency units. The natural logarithm of real GDP (LGDP) is used in the analysis.

3.3.2 GDS

GDS is defined as national income minus final consumption expenditure (Patrick, 2017). This represents the aggregate saving level in the economy. The nominal GDS series for Namibia, denominated in local currency units, which was obtained from the World Bank, was converted to real GDS using the GDP deflator series. The GDP deflator series, from the World Bank database, was used for this conversion because the Consumer Price Index (CPI) inflation series did not cover the full period of the study. The logarithm of real GDS (LGDS) was used as a measure of saving in the economy.

3.3.3 Gross Capital Formation

Yanovsky (1965) defined GCF as the addition to the physical capital stock of a country while the World Bank (2016) defines it as the share of investment in total production. In this study, the logarithm of real GCF (GCF), obtained from the World Bank in constant local currency units, was used as a proxy measure of investment in the Namibian economy.

3.3.4 Real Interest Rate

The RR is the return that an investor receives after adjusting for inflation; that is, the nominal interest rate less the inflation rate. The real interest rate is the accurate measure of return on capital (World Bank, 2016). From the literature, the real interest rate is one of the important variables which explains both saving and investment. The real interest rate was computed from the nominal interest rate and inflation rate from the world bank using the Fisher Equation: Real Interest Rate = Nominal Interest rate - Inflation Rate.

3.4 Data Analysis Methods

3.4.1 Tests for Stationarity

To use the appropriate model to investigate the causal relationship, it is necessary to determine the stochastic properties of the individual time series. Prior knowledge of the stochastic properties of time-series data is important because regressing non-stationary variables in level form will lead to non-standard distributions resulting in spurious regression results (Brooks, 2008). Unit root testing was conducted in order to determine the order of integration of the series. The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests were used to test for stationarity in this study. The ADF test is useful in detecting unit root processes which have growing means over time (Said & Dickey, 1984). To ensure the reliability of the conclusions drawn regarding the order of integration of the series, the ADF test was complemented with the PP test. The strength of the PP test is that it corrects for autocorrelations and heteroscedasticity in its estimation. Both the PP and ADF tests have a null hypothesis that the series has a unit root (integrated of order one) against an alternative hypothesis that the series is stationary. The tests were conducted using an intercept only and an intercept and trend to allow for cases where the mean in time-series may be increasing or decreasing over time but the means converge to the changing mean (trend stationarity) (Phillips & Perron, 1988). In the case that the series were found to contain a unit root in the levels, the unit root tests were repeated for the series in first difference to ensure that the series were stationary in first differences and that all the variables were integrated of the same order; a necessary requirement for the cointegration tests performed.

3.4.2 Optimal Lag Length Selection

According to Guterez, Souza and Guillèn (2007), inferences from simultaneous equation modelling approaches based on cointegration testing and Vector Auto Regression (VAR) modelling are sensitive to the correct selection of the optimal lag length. To correctly select the optimal lag length, information criteria are typically used. The Schwarz information criterion (SIC) is consistent, which means that asymptotically it will select the correct lag order while it also has the strictest penalty term for the inclusion of more parameters meaning that it tends to identify under-parameterized models (Guterez, Souza & Guillèn, 2007). However, it is not efficient reflecting that the average variation in the selected model orders from different samples within a given population will be high (Brooks, 2008). The Hannan-Quinn information criterion (HQIC), like SIC, is consistent but inefficient but it has a less strict penalty term than

SIC. AIC, in contrast, is efficient but is inconsistent (Brooks, 2008). It also has the least strict penalty term which means it tends to select over-parametrised models (Brooks, 2008).

Guterez, Souza and Guillèn (2007) highlighted that the SIC and HQIC are not suitable for lag length selection in small samples, where consistency is not applicable due to the small sample size, and instead recommend the use of AIC as it is efficient is therefore likely to select the correct lag length for the VAR model. This is because the AIC estimates the information lost when a model is used to represent the data generating process and thus provides a good comparison of the tradeoff between goodness of fit and model complexity (Burnham, Anderson & Huyvaert, 2011). Given the small sample size used in this study, AIC was considered appropriate.

3.4.3 Tests for Cointegration

The data series considered for this study were all found to be non-stationary at levels and stationary in first differences (as is discussed in more detail in chapter 4). It is therefore appropriate to test for cointegration to ascertain whether a long-run relationship exists between GDP, GDS, GCF, and RR. This study utilises the multivariate cointegration test of Johansen as all the variables are integrated of the same order which is the prerequisite for this test. This test is based on maximum likelihood estimation instead of relying on ordinary least estimation procedures (Brooks, 2008). The model is selected based on three studies reviewed in the empirical literature which sought to answer similar research questions. The study of Ndovorwi (1997), discussed in section 2.3.2, employed the Johansen Cointegration test on a sample which consisted of quarterly data between 1980 and 1990. The study focused on the short-run and long-run analysis of public spending on GCF and economic growth in Zimbabwe. Aghion, Comin and Howitt (2009) also used the Johansen cointegration testing procedure and VAR modelling to analyse the saving-investment relationship in Cameroon using annual data between 1980 to 2014. Another study by Tien (2016) in Vietnam looked at the relationship between foreign and domestic investment and the exchange rate using annual data from 1985 to 2015. The study used the ADF test for unit roots and the Johansen cointegration test to examine the long-run relationships of the variables included in this study. The Granger causality test was also conducted to investigate the short-run interaction between the variables.

Equation 4.2 forms the basis for understanding and testing for cointegration in time series data (Sjö, 2008):

$$X_t = \alpha_0 + \alpha_1 Y_t + \varepsilon_t \quad (4.2)$$

Variables X_t and Y_t which are non-stationary are cointegrated if the error term, ε_t , is stationary (Sjö, 2008). If the variables in a regression system are cointegrated, then an error correction model can be used to examine the relationship between variables (Sjö, 2008). This enables the short-run relationship between the variables to be examined while also accounting for the correction of the disequilibrium in the long-run relationship in each period. The variables in the model are in first difference to eliminate trends. The model takes the form of:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t + \beta_2 \varepsilon_{t-1} + u_t \quad (4.3)$$

where: ΔY_t is the differenced dependent variable, ΔX_t is the differenced explanatory variable and u_t is the error term. ε_{t-1} is the error correction mechanism estimated from the long-run analysis (Brooks, 2008).

The cointegration approach of Johansen extends this framework to account for multiple equation system with the VAR as the base. Both the trace and the maximum eigenvalue tests are used to test for the cointegration ranks of the VAR model. These tests are both likelihood ratio tests but they rely on different assumptions on the deterministic part of the data generation process. The trace test is a joint test where the null hypothesis is that a cointegration relationship exists with r cointegrating vectors or less. The alternative hypothesis is that there are more than r cointegrating vectors (Brooks, 2008). The maximum eigenvalue test, in contrast, uses separate tests on individual eigenvalues. The null hypothesis is that there is r cointegrating vectors against an alternative of $(r+1)$ cointegrating vectors (Brooks, 2008). The two statistics are computed as:

$$\lambda_{Trace}(r) = -T \sum_{i=r+1}^g \ln(1 - \hat{\lambda}_i) \quad (4.4)$$

$$\lambda_{Max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \quad (4.5)$$

where $\hat{\lambda}_i$ is the estimated value for the i^{th} ordered eigenvalue. These statistics, are compare to the appropriate critical values from MacKinnon (1999) to ascertain whether the null hypothesis can be rejected (Brooks, 2008).

Both tests are performed so as to ensure the robustness of the conclusions regarding the finding of any long-run relationship; however, according to Lütkepohl, Saikkonen and Trenkler (2001) Monte Carlo comparisons show that the maximum eigenvalue test is more superior to the trace test in small samples.

The main criticism of the Johansen approach is that it assumes that the cointegrating relationship is constant in the period under study. This might be a challenge when there are drastic changes in the policy environment that may affect the underlying relationships. The study uses the period after independence hence which has been characterised by a relatively stable macroeconomic environment and thus no structural breaks are expected in the data.

3.4.4 Model Specification

If the variables are found to be cointegrated, the Vector Error Correction Model (VECM) can be estimated to analyse the interaction between saving, investment and economic growth. The VECM is an econometric framework that is useful in capturing linear interdependencies in multivariate time-series models (Keating, 1992). This model is an extension of a basic VAR where each equation is an autoregression plus distributed lag, with p lags of each variable included in the model. The VECM is a restricted VAR model which includes an error correction specification to the general VAR model. This captures the short run and long dynamics in a system of equations. The VECM methodology also provides structural analysis that is useful in depicting causal linkages between variables (Keating, 1992). An error correction model is estimated as part of the VECM to account for short-run dynamics which are influenced by the long-run equilibrium (Keating, 1992). The error correction model estimates the speed of convergence to equilibrium after an exposure to an exogenous shock. A basic VECM is represented below (Keating, 1992)

$$\Delta Y_t = \gamma \Delta X_{t-1} - \lambda(Y_{t-1} - \theta X_{t-1}) + u_t \quad (4.6)$$

where: variables in bold denote a vector (Keating, 1992).

3.4.5 Granger Causality Test

The Granger causality test was used to establish the causal relationships between GDS and GCF in Namibia. Causality testing is done to gain insights on the response of GCF to GDS to examine if saving is channelled towards investment in Namibia. In addition, the response of GDP to GCF is important to understand the link between investment and economic growth.

The Granger causality test is conducted by examining the lagged coefficients of the explanatory variables in the causal analysis (Engle & Granger, 1987). The Ordinary Least Squares technique is used as an estimation procedure in the Granger Causality test. This procedure is conducted in first difference given that the series under this study are non-stationary in first levels but stationary in first difference.

The following system of equations is estimated in first difference to conduct causal analysis using Granger's approach (Chen, 2009):

$$Y_t = \sum_{n=1}^p A_n X_{(t-p)} + \sum_{n=1}^p B_n Y_{(t-p)} + CZ_t + E_t \quad (4.6)$$

$$X_t = \sum_{n=1}^p A'_n Y_{(t-p)} + \sum_{n=1}^p B'_n X_{(t-p)} + C'Z_t + E'_t \quad (4.7)$$

Variables X_t and Y_t are the two variables considered for causal analysis at time t . B_n and B'_n are autoregression coefficients. If the coefficients are zero it implies there is no causal relationship between variables X and Y (Chen, 2009). The null hypothesis for the Granger test assumes the coefficients are equal to zero (no causal relationship). An F test is then conducted to test this hypothesis against the alternative of causality.

3.4.6 Impulse Response Functions

Following the Granger causality test, the causal linkages between variables was also examined using impulse response functions which trace out the effect on a variable of a one standard deviation shock to another variable in the system (Stock and Watson, 2001). They provide additional information as to whether the causal relationship identified under the Granger causality test is positive or negative as well as providing an indication of the magnitude of the relationship.

In computing the impulse response functions, two approaches can be used - the Cholesky technique or the generalised impulse response function (GIRF) technique. The Cholesky technique is sensitive to the ordering of variables in the VECM (Keating, 1992). The GIRF, on the other hand, does not require orthogonalisation of shocks and hence is not sensitive to the ordering of variables in the VECM (Mousa, 2010). As such, in this study, the GIRF approach

is used to avoid the ordering restrictions posed by the Cholesky approach (Pesaran & Shin, 1998).

3.4.7 Variance Decomposition

Along with the Granger causality tests and impulse response functions, variance decomposition was also conducted. These measure the contribution of a shock to each of the independent variables to the forecast error variance of the dependent variable (Brooks, 2008). Like impulse responses, variance decompositions are useful in assessing how shocks to economic variables reverberate through a system.

3.4 Summary

This chapter outlined the data that was used in the study, including the time period, frequency and source of the data on GDP, GDS, GCF and RR. Following this, the econometric method that was applied was described, with justifications provided for the choice of approaches implemented. In light of the similarity in the research objectives and sample frequency of available data to the studies of Aghion, Comin and Howitt (2009), Tien (2016) and Ndovorwi (1997), this study employs the VECM model as an analytical framework after preliminary checks revealed a long-run equilibrium. The results of the model are analysed and interpreted in the next chapter.

4. RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

4.1 Introduction

The previous chapter presented the methodology employed in this study to determine the relationship between saving, investment and economic growth in Namibia. This chapter presents the empirical analysis and findings. Firstly, the unit root tests for each of the series are examined and thereafter the cointegration tests presented to assess the existence of a long-run relationship between GDP, GDS, GCF and the RR. Considering these findings, the econometric model is presented. The results from the model are discussed, including the Granger causality tests, the impulse response functions and the variance decompositions. Finally, the inferences drawn from these tests are compared to the results from previous studies.

4.2 Graphical Analysis

The preliminary graphical inspection was conducted on the four series to ensure that they exhibited sufficient variability to be used in a regression analysis. In addition, the graphical inspection was done to gain greater insight on the data such as whether they are stationary or not. The graphs show that GDS, RR, GDP and GCF showed enough variability for regression analysis.

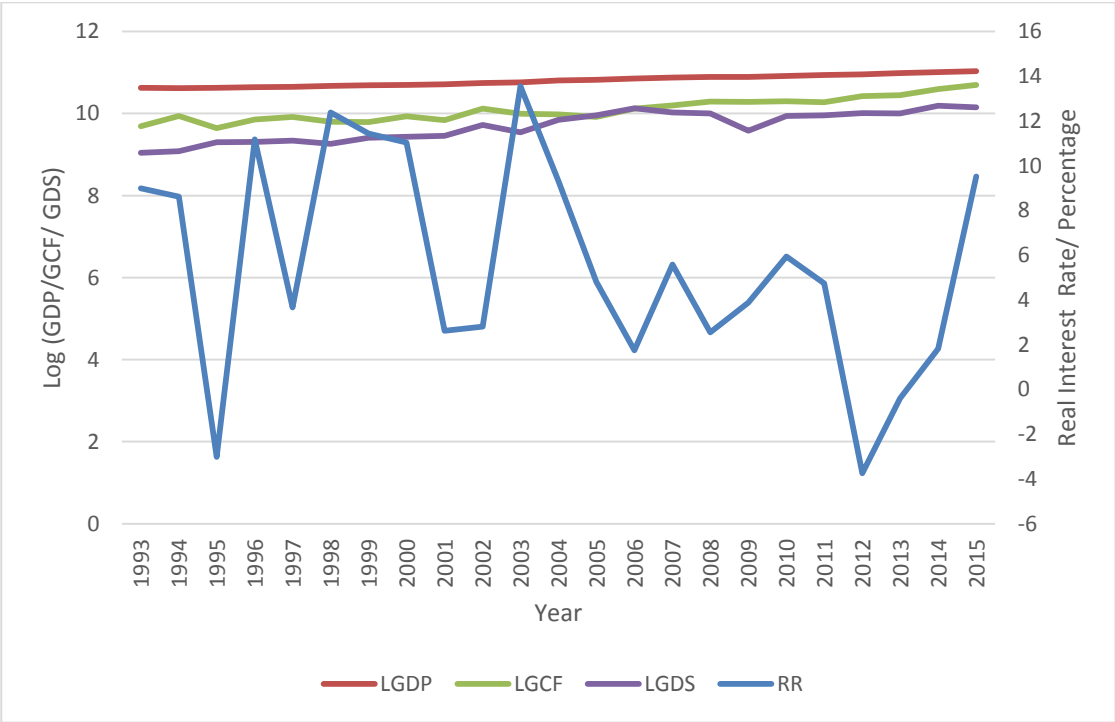
As evidenced in the graph, since 1992 there has been a consistent increase in national income as represented by the LGDP series. This growth is consistent with a relatively stable macroeconomic environment that has characterized the Namibian economy since independence. From 1990 to 1995, the GCF series showed a sharp decrease which may be attributed to investors responding to uncertainty brought about by the change in government after independence in 1990, by reducing investment. The chart shows that there was a sharp increase in GCF as the macroeconomic environment stabilized between 1995 and 1996. As highlighted in chapter 1, from 2004 to 2008, Namibia pursued a growth-oriented macroeconomic policy framework under the NDP 2 which resulted in higher investment levels due to economic and political stability (NDP4, 2012). From 2008 onwards, Namibia was reclassified into an upper-level-medium income country. This development resulted in a decrease in donor support in the government's fiscal expenditures thus the GCF series is relatively flat during this period as the government reduced its investment expenditure. The GCF series shows a great degree of fluctuation compared to the other three series suggesting

that it is more sensitive to business cycles and developments in the global economic environment.

The chart shows that the RR, reflecting the return to capital, has fluctuated substantially over the past two decades. It is interesting to note that from theory, interest rates are the incentive to save, yet the LDGS series does not move consistently with the RR. The trend in the LGDS series is similar to both the LGDS and LGCF series suggesting a close relationship between these three variables.

For GDP, GDS and GCF, the graphical inspection reveals that there is evidence that the series are non-stationary as they did not revert to a constant mean over time. With the RR, there is less evidence of the series wandering far from the mean, but the mean value appears to vary over time. Thus, in all cases there appears to be evidence of non-stationarity and as such the series were tested for the presence of a unit root; the results of which are presented in the next section.

Figure 4.1 Graphical illustration of the study series



Note: LGDP refers to the natural log of gross domestic product, LGCF refers to the natural log of GCF, LGDS refers to the natural log of gross domestic saving and RR refers to the real interest rate.

4.3 Unit Root Tests

As indicated in the preceding chapter, the ADF and PP tests were used to formally test for stationarity. The study employed both tests because the two tests at times yield conflicting results for the same data sets due to differences in approach to estimation. If the tests yield conflicting results, this warrants further investigation into the asymptotic properties of the time series using alternative unit root tests. The stationarity tests are conducted using a constant variable and then a trend variable is added to the tests to ensure robustness of results since the data in this series can exhibit a trend.

The decision rule for both the ADF and PP tests is that we reject the null hypothesis of a unit root if the tau statistic is more negative than the critical value. The results from the unit root tests are presented in table 4.1. The results show that in all cases, the calculated tau values are less negative than the critical values. Thus, as shown in the last column of table 4.1, both the ADF and PP tests indicate that all the series considered in this study are non-stationary in levels and contain at least one unit root. As explained in the previous chapter, given this finding, the first differences of the series were then examined to test for the presence of a unit root.

The unit root tests were conducted on the study variables in first difference. The results of the unit root tests are shown in table 4.2. The results show that all the calculated tau statistics are more negative than the critical values at the 5% level of significance. The conclusion is that the null hypothesis is rejected for all the series in first difference and thus it can be concluded that all the series in this study are stationary in first difference and hence are integrated of order one.

Table 4.1 Unit Root Tests in Levels

Variable in Levels	Test		Tau-Test	Tau-Critical Value (5%)	Conclusion
LGDS	PP	Intercept	-1.367	-3.005	Non-stationary
		Trend and Intercept	-3.075	-3.633	
	ADF	Intercept	-1.475	-3.005	
		Trend and Intercept	-3.038	-3.633	
LGCF	PP	Intercept	0.081	-3.005	Non-stationary
		Trend and Intercept	-3.487	-3.633	
	ADF	Intercept	1.104	-3.005	
		Trend and Intercept	-3.527	-3.633	
LGDP	PP	Intercept	1.657	-3.005	Non-stationary
		Trend and Intercept	-3.551	-3.633	
	ADF	Intercept	1.608	-3.005	
		Trend and Intercept	-3.543	-3.633	
RR	PP	Intercept	-2.765	-3.005	Non-stationary
		Trend and Intercept	1.234	-3.633	
	ADF	Intercept	0.097	-3.005	
		Trend and Intercept	-2.789	-3.633	

Table 4.2 Unit Root Tests in First Differences

Variable in First Difference	Test		Tau-Test	Tau-Critical (5%)	Conclusion
DLGDS	PP	Intercept	-6.763	-3.012	Stationary
		Trend and Intercept	-6.650	-3.645	
	ADF	Intercept	-6.796	-3.012	
		Trend and Intercept	-6.688	-3.645	
DLGCF	PP	Intercept	-8.981	-3.012	Stationary
		Trend and Intercept	-18.472	-3.645	
	ADF	Intercept	-8.330	-3.012	
		Trend and Intercept	-6.013	-3.645	
DLGDP	PP	Intercept	-4.841	-3.012	Stationary
		Trend and Intercept	-4.959	-3.645	
	ADF	Intercept	-4.758	-3.012	
		Trend and Intercept	-4.915	-3.645	
DRR	PP	Intercept	-10.693	-3.012	Stationary
		Trend and Intercept	-8.957	-3.645	
	ADF	Intercept	-4.458	-3.012	
		Trend and Intercept	-4.117	-3.645	

4.4 Lag Length Selection

The next step is to test for the existence of a long-run relationship using the Johansen cointegration approach. However, before carrying out this test, which uses a VAR system of equations, the correct lag specification of the VAR is required. The results from this test are shown in Table 4.3.

Table 4.3 Appropriate lag selection

Lag	LR	FPE	AIC	SIC	HQIC
0	NA	4.57E-05	1.358	1.558	1.397
1	104.422*	2.24e-07*	-4.003*	-3.007*	-3.809*
2	16.156	3.23E-07	-3.872	-2.080	-3.522
3	7.466	1.14E-06	-3.338	-0.749	-2.833

*indicates lag order selected by the criterion Likelihood Ratio (LR): sequential modified LR test statistic (each test at 5%); FPE: Final prediction error, AIC: Akaike information criterion, SIC: Schwarz information criterion, HQIC: Hannan-Quinn information criterion.

The results show that the AIC selects an optimal lag length of one; the information criterion which was deemed most appropriate for this study based on the sample size. However, it is of value to note that this lag length was confirmed by the other two information criteria – HQIC and SIC, while two other measures, the final prediction error (FPE) and the log-likelihood ratio test (LR) also indicate the same lag length. This lag length was applied in the cointegration test and VAR analysis in the next section.

4.5 Cointegration Tests

Time series may have a long-run equilibrium relationship even if they exhibit a stochastic trend over time. Given that the unit root tests revealed that the data used in this study is non-stationary, the Johansen cointegration test was used to test for the existence of a long-run relationship. A lag length of one, as informed by the information criterion, was specified in the Johansen cointegration test. The results of both the trace and maximum eigenvalue tests are used to ensure that the inferences drawn about the existence of a long-run relationship are robust.

Table 4.4: Trace Test and Maximum Eigenvalue Test at the 5% Significance Level

Cointegrating Equations	Trace Test				Maximum Eigenvalue Test			
	Eigenvalue	Statistic	Critical Value	Prob.	Eigenvalue	Statistic	Critical Value	Prob.
None *	0.787	71.013	47.856	0.000	0.787	34.074	27.584	0.006
At most 1 *	0.704	36.939	29.797	0.006	0.704	26.771	21.132	0.007
At most 2	0.329	10.168	15.495	0.268	0.329	8.780	14.265	0.305
At most 3	0.061	1.388	3.8415	0.239	0.061	1.388	3.841	0.239

For both the trace and maximum-eigenvalue tests, the first test has a null hypothesis that there are no cointegrating relationships, with the alternative hypothesis for the trace test being that there are more than zero relationships while that for the maximum-eigenvalue test is that there is at least one cointegrating equation. The test statistics are compared with the critical values and if the calculated statistics are higher than the test critical values, the null hypothesis is rejected. As shown in the table, the maximum eigenvalue test statistic of 34.074 is greater than the critical value of 27.584 thus revealing that the null hypothesis of no cointegration is rejected and there is at least one cointegrating equation. This conclusion is further supported by the trace test where the calculated statistic of 71.013 is also greater than the critical value (47.856). The conclusion is that there is evidence of cointegration in the series.

A second test was then performed with the null hypothesis of one cointegrating relationship against the alternative of more than one relationship (trace) or at least two (maximum-eigenvalue). The results for these tests show that the test statistics for the maximum eigen value test of 26.771 was greater than the critical value of 21.132. The results of the trace test were also consistent with those from the maximum eigenvalue test as the statistic (36.939) is greater than the critical value (29.797). The conclusion is that the null hypothesis of at most one cointegrating equation is rejected.

Given that the first two hypotheses were rejected, a third test was performed with the null hypothesis of two cointegrating vectors. The results above show that the maximum eigenvalue test statistic (8.78) is less than the critical value (14.265). The results of the trace test confirm the maximum eigenvalue test. The conclusion is that the null hypothesis of at most two cointegrating equations cannot be rejected.

The results from the cointegration test show that the VECM is suitable for analysing the relationship between GDS, GCF, RR and GDP rather than a VAR because the series are cointegrated.

4.6 Econometric Model

4.6.1 Long Run Analysis

The VECM is included in Appendix 1. The coefficients of the cointegrating equation represent the long-run relationship in the VECM. This can be written as follows:

$$LGDP = 14.023 + 0.5043LGCF + 0.0271RR \quad (5.1)$$

$$LGDS = 1.354 + 1.0796LGCF + 0.1659RR \quad (5.2)$$

Given that these variables are non-stationary, the equations are spurious so it is not possible to ascertain whether the relationships are significant, but the size and signs of the coefficients can be interpreted. The first cointegrating relationship, equation 5.1, shows a long-run positive relationship between GCF and GDP. Thus, for a 1% increase in investment, GDP increases by 0.5% and a 1% rise in the real interest rate will lead to a 0.03% increase in GDP. GDP is thus seen to be quite sensitive to investment in the long-run and the positive relationship is consistent with theory. Overall, the results show that investment does impact GDP over the long-run. The figure above shows a positive relationship between interest rates and national income in the long run. For every 1% increase in the RR, GDP increases by 0.02%.

The second cointegrating equation, shown in equation 5.2, shows that there is a positive relationship between investment and saving, with a 1% increase in GCF, GDS increases by 1.08%. In addition, the results show a positive relationship between saving and the interest rate; a 1% increase in the real interest rate increases saving by 0.17%. The results show that investment and saving affect each other in the long-run. These findings are discussed in further detail in section 4.7.

4.6.2 Short Run Analysis

The error correction components in the VECM represent the speed of adjustment to the equilibrium. Typically, the error correction term should lie between zero and one and should be negative in value (Brooks, 2008). The error correction equations in the VECM and 5.2 are denoted by EC1 and EC2 respectively.

The short run relationship is a follow:

$$DGDP_t = -0.12EC1_{t-1} - 0.19DGDP_{t-1} \quad (5.3)$$

$$GDS = -0.15 - 0.78EC2_{t-1} - 1.94DGDP_{t-1} - 0.09DGDS_{t-1} + 0.57DGCF_{t-1} \quad (5.4)$$

$$GCF = 0.15 - 0.13EC2_{t-1} - 2.18DGDP_{t-1} + 0.14DGDS_{t-1} + 0.11DGCF_{t-1} \quad (5.5)$$

The equations above only include significant terms from the VECM estimation at 0.05 level of significance. The error correction terms are only included when they are negative and have values between 0 and 1 which is the significance criteria (Brooks, 2008). The results above show the short-run relationships between the variables of interest. Equation 5.3 shows that GDP is only explained by lagged values of GDP short run. Equation 5.2 shows that an increase in 1% in GCF results in an increase of 0.57% in GDS. The results show that 78% of the disequilibrium in the long-run relationship between investment and saving is adjusted within one year. This shows that disequilibrium is corrected for quickly.

Equation 5.5 shows that there is a short-run relationship between GCF and GDS. The results show that an increase of 1% in saving results in an increase in investment of 0.14%. The VECM analysis shows that EC2 adjusts 13% of the disequilibrium between investment, saving and gross domestic product within one year which is relatively slow.

4.6.3 Granger Causality Tests

Table 4.5: Granger Causality Test

Independent Variable	Dependant Variable in the Regression			
	DRR	DLGCF	DLGDP	DLGDS
DRR	n/a	0.4419	0.4587	0.7962
DLGCF	0.0832	n/a	0.9894	0.0061*
DLGDP	0.0102*	0.781	n/a	0.0319*
DLGDS	0.1679	0.0065*	0.5869	n/a

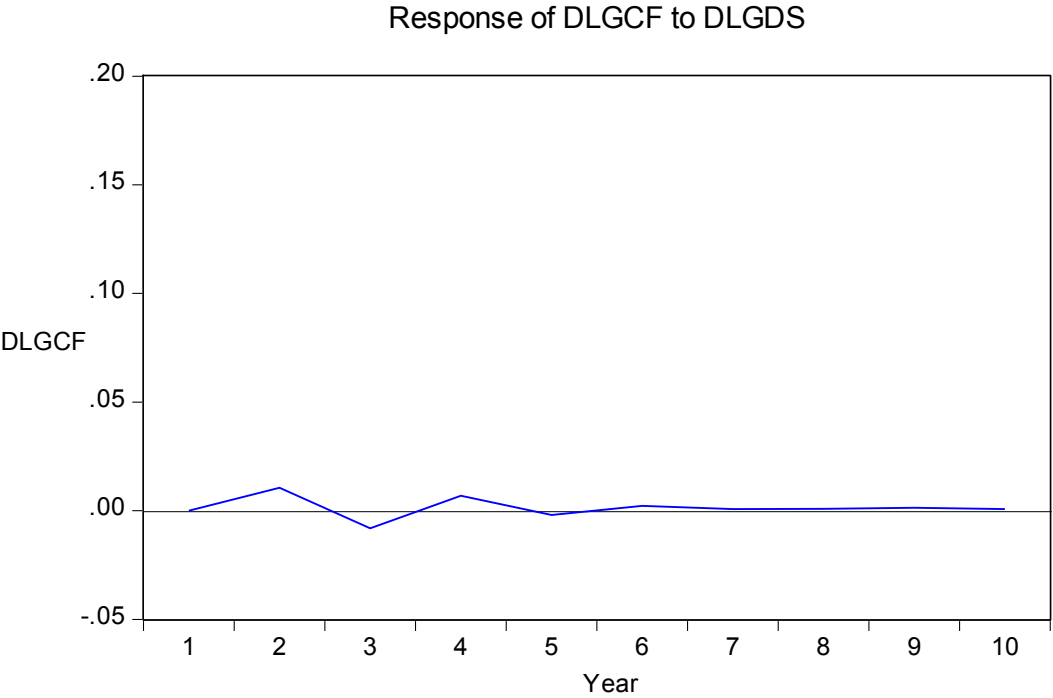
Values in the table represent corresponding p-values, * denotes significance at the 5% level.

Table 4.5 above shows the calculated p-values for the F-test of Granger causality. The results show that lagged values of GDP Granger-cause the real interest rate. Of particular interest to this study are the findings related to GDP and GCF. There is no evidence to suggest that lags of the differenced RR explain GCF or GDP which thus refutes the hypothesis of MacKinnon and Shaw (1973) that higher interest rates by encouraging saving, increase the volume of available domestic credit, which increases investment and ultimately economic growth. Similarly, no relationship is found between either GCF or GDS and GDP. Therefore, in contrast with Domar's (1946) model, saving and capital accumulation do not appear to be important variables in explaining economic growth in Namibia. A bi-directional relationship is found

between GCF and GDS suggesting that lags of saving Granger cause domestic investment while lags of domestic investment also Granger cause domestic saving. Lags of GDP are also identified to Granger cause GDS while the RR has no causal relationship with saving in Namibia. The impulse response functions discussed in the next subsection will establish whether the causal relationship between variables is positive or negative as well as the magnitude of these relationships.

4.6.4 Impulse Response Functions

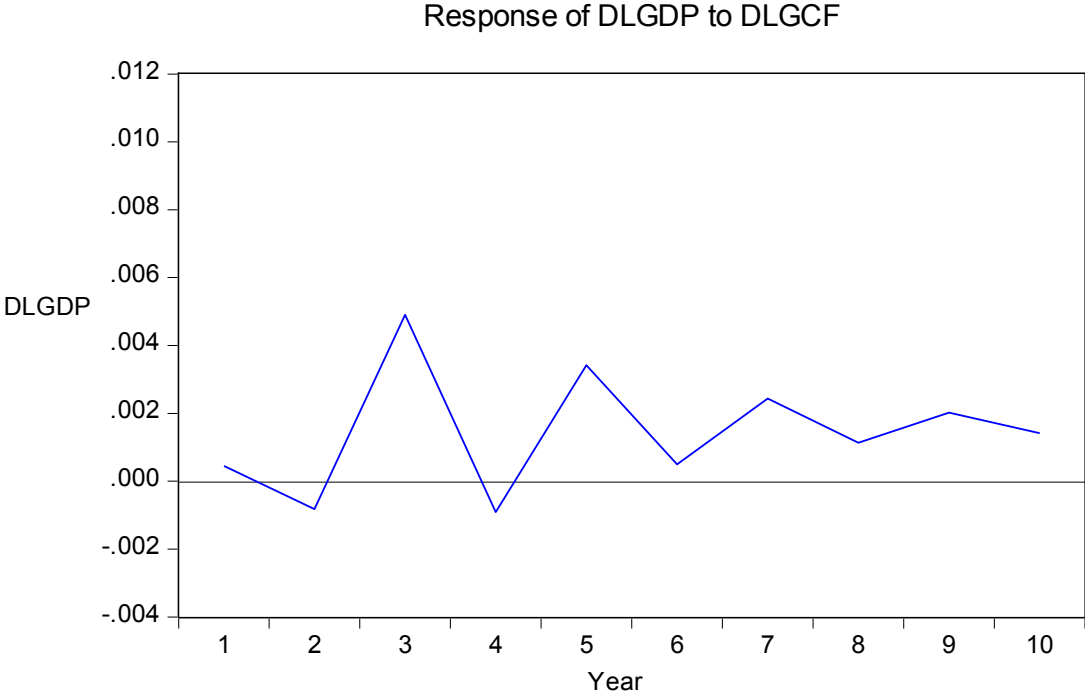
Figure 4.2 Response of GCF to GDS



The chart above depicts the relationship between saving and additions to capital stock in Namibia. The results show that there is no immediate response of GCF to a one standard deviation shock to GDS, with the impact only felt one year after the shock with this response positive. However, two periods after the shock, GCF declines with the effect tapering out thereafter. The increases in GCF wears off after five years suggesting that the increase in saving is completely absorbed in investment and consumption during that period. The above relationship is consistent with prior expectations as saving is expected to be translated to investment and also mirrors the finding observed in the Granger causality tests. The positive relationship between saving and investment above is consistent with the results of Aghion, Comin and Howitt (2009) who explored the question of whether a country can grow faster by

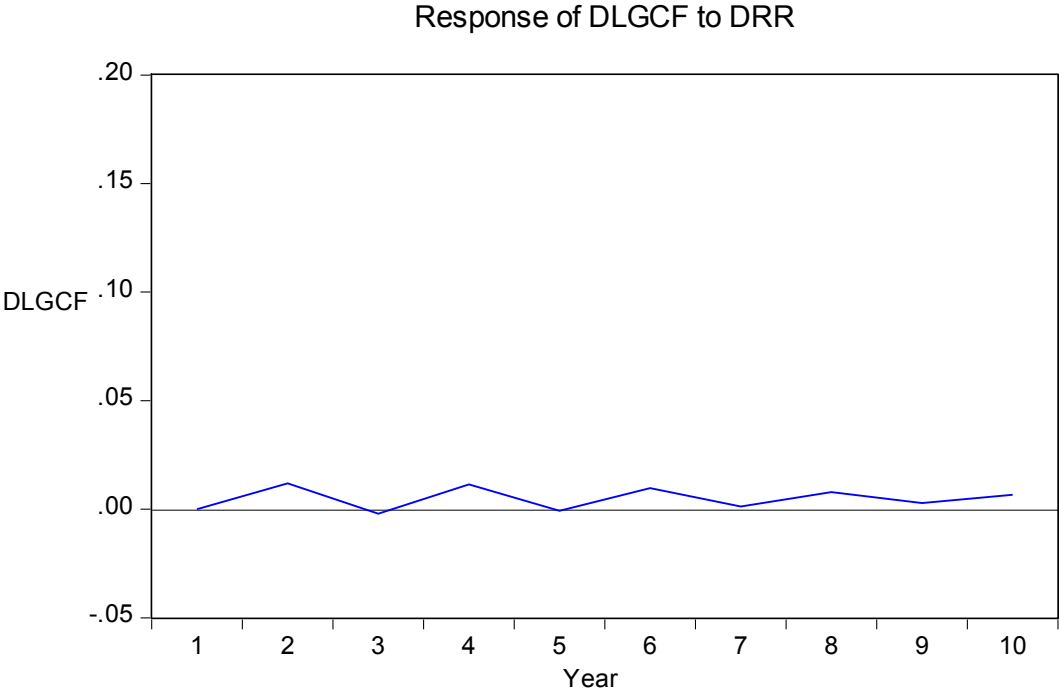
saving more. The results of the study revealed a positive relationship between saving and investment in developing countries.

Figure 4.3 Response of GDP to GCF



The figure above shows the response of GDP to a one standard deviation shock in GCF. While there is a small initial response in GDP to the shock in GCF, the first notable impact on the Namibian economy occurs one year after and results in a surprising decrease in GDP. However, two years after the shock, there is a substantial increase in GDP. This is consistent with Keynesian theory which argues that demand side policies in the form of expansionary fiscal policies may be used to pursue growth objectives. However, it is important to note that after two years, the shock’s contribution to GDP wears off resulting in a decrease in GDP in year 4. This might be evidence that financing of investment through external borrowing results in a debt burden which results in a decrease in income growth. The difference in the results observed from the impulse response functions and the Granger causality tests can possibly be attributed to the fact that the response of GDP to GCF is not immediate and the Granger causality tests only consider a one period lag; thus, the impulse response functions demonstrate that there is a relationship between economic growth and investment in Namibia. These results are consistent with Vemar’s (2007) findings which revealed that there is a positive relationship between investment and economic growth.

Figure 4.4 Response of GCF to RR



The chart above shows the response of GCF to an interest rate shock. The results show that a one standard deviation shock in interest rates will only cause changes in investment after one year and this response is very small. The results above show that an increase in interest rates causes a transient increase in GCF which wears off after about ten years. These results are consistent with the findings from the Granger causality test where no causality was found.

Figure 4.5 The Response of RR to GCF

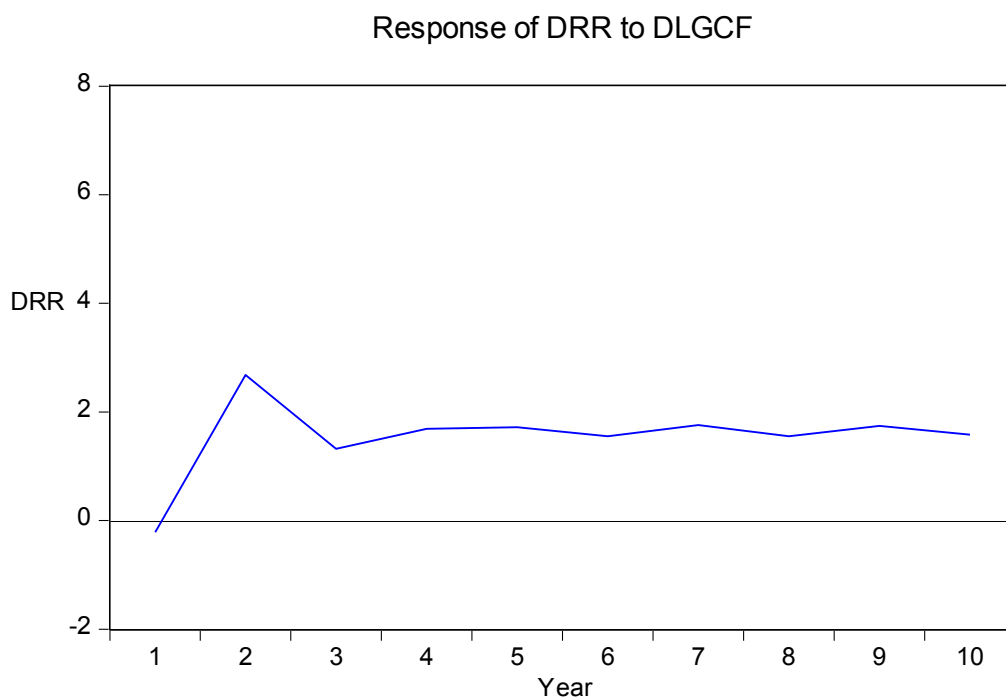
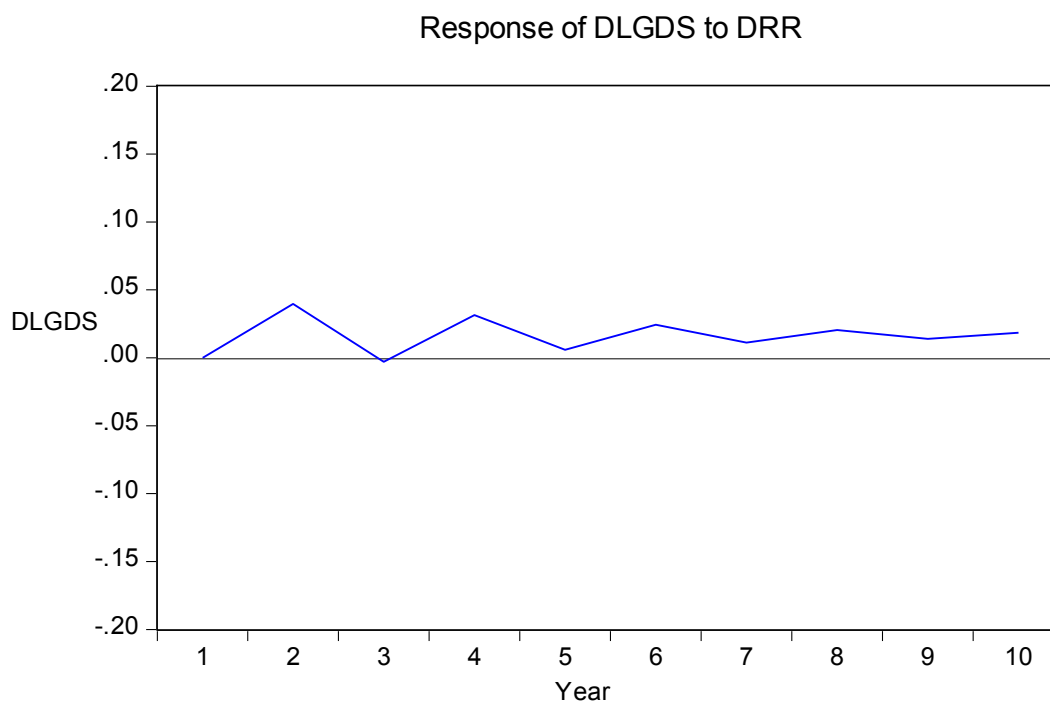


Figure 4.5 captures the relationship between the interest rate and GCF in Namibia. An increase in GCF results in an increase in the real interest rate. This is consistent with the views of McKinnon and Shaw (1973) who argued that high interest rates, by encouraging saving, increase the volume of available domestic credit, which increases investment. The McKinnon and Shaw hypothesis highlights that it is not the cost of financial resources that hinders investment, but rather the lack of available financial resources for investment. The increase in interest rates as a result of a one standard deviation shock on GCF is sustained over a long period of time. This suggests that interest rates are sticky downwards. Research has shown that markets are quick to increase interest rates in response to market forces (EPW Research Foundation, 2009). Markets are however slow in adjusting to market forces that result in decreases in interest rates. This might explain why increases in GCF cause a permanent increase in interest rates over time.

Figure 4.6 Response of GDS to RR



The line graph above tries to capture the impact of interest rates on saving in Namibia. The chart shows like other shocks discussed earlier, an interest rate shock only impacts on saving after one year. The results show that after the first year, there is an increase in saving. The increase in saving after an increase in the interest rate decreases after year two and wears off near the steady state after about 6 years. This is consistent with the Keynesian theory which highlights that economic agents face liquidity constraints which constrain long-term saving behaviour (Keynes, 1936). The small positive relationship between saving and interest rates documented here, along with the absence of a relationship identified in the Granger causality tests is consistent with empirical findings by Ogbokor (2014) who, using the VECM methodology, examined the determinants of saving in Namibia and found that the deposit rate has no effect on long term saving behaviour in Namibia.

4.6.5 Variance Decomposition

Variance decomposition was conducted on GCF first to reveal whether an increase in national saving would lead to an increase in investment. Furthermore, variance decomposition on GDP was also conducted to examine the relationship between investment and economic growth in Namibia.

Table 4.6: Variance Decomposition of GCF

Period	DGCF	DLGDS	DLGDP	DRR
1	48.203	22.060	29.737	0.000
2	41.021	24.191	24.381	0.408
3	38.270	23.376	26.944	11.410
4	36.528	25.901	27.091	10.481
5	34.759	26.814	26.957	11.470
6	34.778	27.185	26.395	11.642
7	34.778	27.223	26.152	11.847
8	34.774	27.223	26.150	11.853
9	34.738	27.227	26.128	11.907
10	34.741	27.227	26.126	11.906

Source: Author's Compilation

Table 4.6 indicates that the variability in current investment is predominantly a result of variability in itself. This is shown by the fact that 48% of variation in GCF in period 1 is explained by a shock to GCF. The results above show that GDP is the second largest contributor of variation to GCF (30%) suggesting that economic growth affects investment. The variance decomposition shows that the variation in saving does contribute a reasonably substantial component to the variation in investment (22%) and it increases over time to 27% in period 10. The findings above show that a pro-saving policy is a feasible way to drive investment in Namibia but the effects take time to be experienced. The results are also consistent with the assumptions of the Solow growth model which highlights that a large share of investment is financed through saving (Galor, 2005). Overall, the results above show that a pro-saving policy will increase investment in Namibia which is consistent with results from the Granger causality tests and impulse response functions.

Table 4.9 Variance Decomposition of GDP

Period	DLGCF	DLGDS	DGDP	DRR
1	2.060	9.737	88.203	0.000
2	4.191	14.381	81.021	0.408
3	3.376	16.944	68.270	11.410
4	5.901	17.091	66.528	10.481
5	6.814	16.957	64.759	11.470
6	7.185	16.395	64.778	11.642
7	7.223	16.152	64.778	11.847
8	7.223	16.150	64.774	11.853
9	7.227	16.128	64.738	11.907
10	7.227	16.126	64.741	11.906

Source: Author's Compilation

Following the impulse response functions, variance decomposition was conducted on GDP to determine significant variables explaining variation in economic growth. The table above shows that one year after the shock, lagged values of GDP account for 88% of the variation in current income. The results reveal that GDS consists of the second largest contribution to GDP (10%) while investment accounts for the remaining two percent. The table above shows that in the long-run the contribution of RR to GDP increase over time from 0% to 11% in ten years. Overall, the results show that, investment has a relatively small contribution to economic growth in Namibia in the short run. The results above are consistent with the previous findings of the short-run analysis in the VECM which showed that there is no relationship between investment and economic growth in the short-run.

4.7 Discussion of Results

The study aimed to examine the relationship between saving and investment and investment and economic growth. The VECM showed that there was a positive relationship between saving and investment. This contrasted the views of Feldstein and Horioka (1980) who argued that such a relationship should not exist under conditions of capital mobility. The study findings were, however, consistent with the results of Aghion, Comin and Howitt (2009) who showed that increases in saving cause increases in investment in developing countries. Furthermore, the VECM revealed that increases in investment are associated with increases in GDP in Namibia. This finding is consistent with the growth theories reviewed in this study (Domar, 1946; Solow, 1956). The results from the long-run analysis were complemented with short-run causality tests. The Granger causality tests revealed a two-way causal relationship between investment and saving which was consistent with the VECM results. Results from the impulse response

functions were consistent with the VECM results as they revealed that a saving innovation results in transient increases in investment. In addition, the impulse response functions showed that investment innovations are associated with increases in economic growth. This was in contrast with the Granger causality test which showed that there was no causal relationship between GCF and GDP. The differences in results can be attributed to the fact that the Granger causality tests only included one lag whereas the relationship appears to take longer to manifest as the impulse response functions and variance decompositions showed. Finally, variance decomposition was conducted on GDP and GCF. This was done to understand whether Namibia can achieve economic growth by saving more. The variance decomposition showed a strong link between saving and investment but a weak link between investment and economic growth. These results are consistent with findings from the Granger causality tests. Overall, the results show that even though a pro-saving policy can drive investment levels in Namibia, it takes a longer time period for the investment to increase gross domestic product as revealed by the long run relationship between GCF and GDP.

4.8 Summary

This chapter presented the findings from the empirical analysis. The relationship between saving and investment was found to be consistent with the findings by Aghion, Comin and Howitt (2009) who revealed that saving had a positive effect on investment in developing countries. Furthermore, the analyses showed that there is only a long run relationship between investment and economic growth in Namibia. The next chapter concludes this study based on the research findings.

5. RESEARCH CONCLUSIONS

5.1 Conclusions

This study examined the interaction between saving, investment and economic growth in Namibia. The specific objectives of the study were to investigate the causal relationship between saving and investment in Namibia. Furthermore, the study sought to reveal the impact of the saving-investment relationship on economic growth in the country.

The study utilised GCF, GDS, GDP and the real interest rate. The diagnostic testing using the Johansen cointegration test revealed a long-run relationship between the study variables with two cointegrating equations. The VECM analysis showed that there is a long run relationship between GDS and GCF. The second run relationship exists between GDP and GCF. The long-run analysis was followed by a causal analysis using the Granger causality test. The tests revealed that there was a bi-causal relationship between GDS and GCF. Furthermore, a causal relationship between GCF and GDS was also identified. This relationship is one way with GDS Granger causing GCF. To determine whether the relationship between variables is positive or negative, impulse responses were estimated from the VECM model.

The impulse response analysis showed that GCF has a positive impact on national income in the first two years. However, the effect of GCF on income growth steadily decreases and results in reduced income growth after a period of about three years. This is associated with increased debt burden and low returns from public infrastructure which is typical of public investment in Namibia. The results are consistent with the Granger causality test which showed there is no causal relationship between GCF and GDP.

Insights from the impulse response functions show that there is a sustained positive contribution of GDS to GDP. This may be attributed to the fact that GDS is mostly private saving. This is because the government has operated on a sustained budget deficit since 2010. Private savings are mostly channelled towards more productive investments, hence this results in increased national income. This was consistent with the Granger causality analysis which showed that there was a causal relationship between GDS and GCF.

The study concludes that there is a causal relationship between GCF and GDS in Namibia. The decrease in savings' contribution to investment over time is consistent with growth theory. According to the Solow growth model, increases in capital stock wear off over time due to

capital depreciation hence in the absence of further additions in the capital stock, the contribution of saving to capital formation reduces over time (Galor, 2005).

The study also concludes that based on the VECM analysis, there is a positive relationship between investment and economic growth in Namibia. Based on the VECM, impulse response analysis and variance decomposition the study concludes that there is no short run relationship between investment and economic growth.

5.2 Recommendations

Given the results discussed in the previous chapter and the conclusions, the study recommends that to achieve economic growth, there is need to implement policies that encourage long term investment in Namibia. This is achieved through encouraging the acquisition of capital goods through giving duty exemptions on capital goods. In addition, tax exemptions can be offered to strategic sectors of the economy to encourage investment in such sectors.

Overall, a pro-saving policy is effective in achieving economic growth in Namibia, the government can implement policies that give incentives to saving. This can be achieved through tax relief for individuals who save in long term financial products such as pension funds. Given the relatively low levels of education in Namibia, compared to other countries in the region, provision of financial education through financial literacy initiatives would be effective in mobilising saving.

The relationship between GCF and real interest rate shows that increases in GCF causes increases in RR. Higher interest rates imply that higher costs of borrowing have negative long run effects on GCF. The implication is that depending on the way investment is financed, there might be long run negative effects on growth because of debt financed infrastructural spending. It is therefore recommended that government encourages market driven approaches to pursue economic growth. This can be done through promoting private sector participation in infrastructural investment, thus reducing the debt burden on the economy

5.3 Recommendations for future research

Given the findings of the study, the researcher recommends a detailed analysis of the effects of different deficit regimes on economic growth in Namibia. This would shed light on the effectiveness of predominantly Keynesian economic policies implemented by the Namibian government, which is coming at a cost of a widening budget deficit. A detailed cost-benefit

analysis of government infrastructural spending and cost of servicing debt is therefore required to establish if the country will meet its vision 2030 target.

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APPENDIX 1: VECM

Vector Error Correction Estimates

Date: 12/06/17 Time: 14:20

Sample (adjusted): 1994 2015

Included observations: 22 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1	CointEq2		
LGDP(-1)	1.000000	0.000000		
LGDS(-1)	0.000000	1.000000		
LGCF(-1)	-0.504307 (0.03809) [-13.2384]	-1.079637 (0.27773) [-3.88741]		
RR(-1)	-0.027096 (0.00508) [-5.32976]	-0.165911 (0.03706) [-4.47639]		
C	-14.02315	1.354027		
Error Correction:	D(LGDP)	D(LGDS)	D(LGCF)	D(RR)
CointEq1	-0.123071 (0.15994) [-0.76946]	4.820190 (1.64464) [2.93085]	2.855817 (0.85295) [3.34816]	-77.75520 (27.2702) [-2.85128]
CointEq2	0.035361 (0.02384) [1.48329]	-0.785843 (0.24514) [-3.20574]	-0.132479 (0.12713) [-1.04205]	14.32870 (4.06468) [3.52518]
D(LGDP(-1))	-0.198579 (0.26014) [-0.76337]	-1.974666 (2.67487) [-0.73823]	-2.185606 (1.38726) [-1.57549]	20.10194 (44.3529) [0.45323]
D(LGDS(-1))	-0.000926 (0.02034) [-0.04554]	-0.094301 (0.20919) [-0.45080]	0.140274 (0.10849) [1.29297]	-1.897212 (3.46860) [-0.54697]
D(LGCF(-1))	-0.035226 (0.03822) [-0.92171]	0.571988 (0.39298) [1.45551]	0.105415 (0.20381) [0.51722]	-18.59955 (6.51613) [-2.85439]
D(RR(-1))	0.002336 (0.00167) [1.40089]	0.009915 (0.01715) [0.57830]	0.035665 (0.00889) [4.01092]	-0.150391 (0.28429) [-0.52900]
C	0.054917 (0.01224) [4.48530]	0.150602 (0.12590) [1.19622]	0.152100 (0.06529) [2.32947]	1.180192 (2.08756) [0.56535]
R-squared	0.251103	0.569172	0.802763	0.606611
Adj. R-squared	-0.048456	0.396840	0.723868	0.449255
Sum sq. resids	0.011965	1.265092	0.340275	347.8242
S.E. equation	0.028243	0.290413	0.150615	4.815421
F-statistic	0.838241	3.302775	10.17509	3.855025
Log likelihood	51.46813	0.198228	14.64284	-61.58385
Akaike AIC	-4.042557	0.618343	-0.694804	6.234896
Schwarz SC	-3.695408	0.965493	-0.347654	6.582045

Mean dependent	0.042722	0.111225	0.079487	0.041095
S.D. dependent	0.027583	0.373938	0.286623	6.488718

Determinant resid covariance (dof adj.)	1.95E-05
Determinant resid covariance	4.22E-06
Log likelihood	11.27249
Akaike information criterion	2.247955
Schwarz criterion	4.033297
