AN INVESTIGATION OF THE RELATIONSHIP BETWEEN PRIVATE CONSUMPTION EXPENDITURE AND LENDING RATE IN NAMIBIA

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ABSTRACT

The study examines the relationship between private consumption expenditure and lending rate in Namibia, with the aim of highlighting the effect of lending rate as an important factor that determine the private consumption expenditure growth. The study is based on annual data covering the period from 1980 to 2011. The Unrestricted Vector Auto – regression Model (VECM) procedure was adopted. Two proxies for real wealth and real disposable income are used in the study. The results show that real private consumption expenditure in Namibia adjusts fast to changes in nominal lending rate, real wealth and real disposable income and that the effects wear off in the long run. The results also reveals that the real private consumption expenditure in Namibia is significantly explained by the changes in lending rate, income and wealth and the effects confirms with the theories of consumption. Real wealth and real disposable income have a positive impact on real private consumption expenditure, while nominal lending rate has a negative impact. The negative impact realized from the findings shows that in Namibia, the relationship between private consumption expenditure and lending rate depends on the magnitude of the substitution effect. A fall in lending rate by the commercial banks will be an appropriate instrument for stimulating the levels of private consumption expenditure in Namibia. With income and wealth playing a vital role in influencing consumption levels of households, fiscal policies, through its impact on disposable income and wealth, should be considered as effective tools in promoting private consumption expenditure.

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DEDICATION

This thesis is dedicated to my parents, Mr. and Mrs. Kalumbu, for giving the opportunity, sacrificing for me and standing by me all the way until the end of this program. It is also dedicated my brothers Gideon and Thomas, if it was not for them, this could have not been possible.

DECLARATIONS

I, Sakaria Angula Kalumbu, declare hereby that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

……. Date……..

Sakaria Angula Kalumbu

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CHAPTER ONE: INTRODUCTION

1.1. Background

Achieving higher rates of economic growth and good performance in all macroeconomic variables are the main goals of all governments in the world. However, for the economy to be at a stable position and to perform well, consumers' or residents' welfare should also be taken into account. Welfare is enhanced when consumers maximize their utility from the consumption of basic goods and services (Caglayan & Astar, 2012). One of the measures of consumer welfare is private consumption expenditure. Generally, expenditure is defined as the overall spending on goods and services in an economy, whilst consumption is defined as the use of goods and services to satisfy consumers' wants and needs. Consumption decisions are important determinants of business cycles and economic performances (Petev, Pistaferri & Eksten, 2010).

Descriptively, private consumption expenditure includes the consumption of market and non-market related goods and services, as well as, the consumption flow ownership of assets (Ersado, Alwang & Alderman, 2000). Private consumption expenditure is part of total consumption expenditure and is the amount which private entities, mostly households spend in the economy, and hence it is measured as the portion of households' incomes that are not saved but available for spending on goods and services. Private consumption expenditure characterizes consumers' behaviour in an economy which is considered as a foundation of traditional demand theory. Caglayan and Astar (2012) define consumers' behaviour as the decisions made by the consumers in a given period of time. These can be decisions on what to consume, how to consume and the purchasing decisions for consumers, as well as, how much to save for the future. Therefore, private consumption expenditure is an important macroeconomic variable and a component of

aggregate demand. The level of consumption in an economy reflects the mechanisms of how consumers manage the risks they face (Ersado et al., 2000). An analysis of private consumption expenditure is thus important because it is an analysis of consumers' behaviour which enables an economy to keep track of the changes in growth and development. Generally, private consumption expenditure is determined by a number of factors such as; disposable income, inflation and exchange rate. Disposable income is one of the main determinants of consumption in general. This is an amount consumers earn after tax is deducted, which includes the earnings from the jobs they do this is known as labour income and earnings from other sources, be it inheritances or investments which is known as the non-labour income. Additionally, disposable income is known to have a positive impact on consumption, as well as, on private consumption expenditure because when income increases, private consumption expenditure and consumption in general also increases.

In addition, inflation is another factor that influences and determines private consumption expenditure. Literally, inflation is defined as the percentage change in the general price level in an economy. Therefore, when prices increase, the level of private consumption expenditure is likely to fall. Hence, the inflation rate is known to have a negative impact on private consumption of consumers. Exchange rate can also influence private consumption expenditure (Onyema, Ogechi & Chukwuemeka, 2012). Furthermore, the rate of interest is another factor that influences private consumption expenditure. There is also lending rate which is one of the several interest rates that are used in the financial service sector which is the rate of interest which commercial banks charge when they lend money to the general public. Generally, borrowing plays a vital role in consumption levels in developing countries and Namibia in particular. Due to the fluctuations and risks faced by consumers, their borrowing often serves to

ease the consumption patterns and daily obligations. Households insulate their consumption in two ways, namely insurance and credit or financial markets (Ersado et al., 2000). Insurance is like savings because consumers put away certain amounts for precautionary purposes. Borrowing however occurs when consumers draws from the financial market to smoothen their living standard. In most cases borrowing happens because of consumers' inability to save for the future. Borrowing takes place in two segments of the financial services sector in that consumers can borrow from the informal financial sector, which includes the moneylenders, families and friends and from the formal financial sector, in which the commercial banks are found. The focus of this study is on the formal financial sector. In Namibia specifically, commercial banks borrow from the central bank at a given repo rate and lend funds out at a specified lending rate.

The level of private consumption expenditure is interpreted as an outcome of the decision-making process of an individual household (Hansen, 1996). The popular opinion is that interest rate is negatively related to consumption which brings about a reduction in the demand component. This is known as substitution effect which is defined as a situation by which consumers reduce present consumption and consume more in the future (Hansen, 1996; Nakagawa & Oshima, 2000). Interest rate is also known to have an income effect and that effect can offset the substitution effect and make present consumption more attractive compared to the future consumption. The relationship between interest rate, private consumption expenditure and the overall consumption depends on the magnitude of the income and the substitution effects (Nakagawa & Oshima, 2000). As indicated earlier, lending rate is one of the interest rates in the financial market. This makes it one of the important and potential channels that can reflect the impact of interest rate on private consumption (Hansen, 1996). That is so, because lending rate reflects how responsive the demand for consumers' credit is to a change in interest rate. This

study examines the impact which the lending rate has on private consumption expenditure in Namibia.

1.2. Problem Statement

Private consumption expenditure plays an important role in the Namibian economy because it reflects the living standard of residents and the level of economic growth. Most of the previous studies only consider the real rate of interest when looking at private consumption expenditure and not the lending rate, which is an important factor in the borrowing world. Among the studies that have been undertaken on private consumption expenditure and interest rate, Richards and Roland (2012) looked at private consumption expenditure in the Eastern Caribbean Currency Union. Wadad (2011) also studied private consumption expenditure and factors that influence private consumption expenditure in Lebanon thereof. With a primary focus on the US economy, Shokoofeh (2005) examined factors that influence private consumption expenditure. Despite all these studies, it appears that there was a research gap that exists regarding the effect that lending rate has on private consumption expenditure in Namibia. This study attempted to fill the literature gap using Namibia as a case study.

1.3. Research Objectives

The overall objective of the study is to examine the behaviour of private consumption expenditure in Namibia over the years, as well as to identify the factors that drive the behavioural pattern with lending rate as the primary factor to look at.

1.4. Research Hypotheses

The research hypotheses of the study are as follows:

- H_0: Private consumption expenditure is positively influenced by lending rate.
- H_1: Private consumption expenditure is negatively influenced by lending rate.

1.5. Significance of the Study

As stated earlier, private consumption expenditure is an important macro-economic variable and a component of aggregate demand. The level of consumption in an economy reflects the mechanisms of how consumers manage the risks they face. This study showed how private consumption expenditure, as a component of aggregate demand and as a driver of economic growth, gets to be influenced by the lending rate in Namibia. Therefore, the study makes a contribution to the body of literature on private consumption expenditure in Namibia. This may help policy makers in ascertaining the suitable lending rate needed to boost consumption expenditure and economic growth.

1.6. Limitation of the Study

Although private consumption is influenced by several factors, this study only examined three of them namely: lending rate, wealth and real disposable income. That was made to limit the scope of coverage for the study with an intention to make a meaningful contribution to the existing literature. The concern that the exclusion of other determinants of private consumption expenditure may influence the model-output in some way has been catered for.

1.7.Organization of the Study

The study is organized in the following manner: Chapter one gives the theoretical background of private consumption and its determinants, the problem statement and significance of the study. Chapter two is about the Namibian economy. In chapter three, the key theories pertaining to an investigation of the relationship between private consumption expenditure and the lending rate in Namibia are discussed. An overall picture of theories and studies done related to the study are discussed thereof. This is followed by a theoretical literature review beginning with an overview of studies about consumption in general, followed by empirical studies.

Chapter four presents the methodology in the context of data sources, data collection and analysis. The explanation of how unit root tests are conducted, how cointegration tests are done and specification of the Vector Auto-regression Model are both introduced and critiqued respectively. This chapter further outlines the data sources and the econometric package used in the study.

In chapter five, the research findings of the study are presented and discussed along with the results of the statistical analysis, as well as descriptive statistical findings. Chapter six is a summary of the findings of the study but also gives a reflection of the entire study. Furthermore, recommendations are suggested. Comments are made regarding the limitations of the current study in order to inform possible future studies. References and appendix are included at the end.

CHAPTER TWO: THE NAMIBIAN ECONOMY AND CONSUMERISM

2.1. Introduction

This chapter reviews the Namibian economy over the past 32 years. The issue of consumerism which has become an important macro-economic phenomenon in the world is also introduced here. A picture of the Namibian economy is also presented. Consumerism is looked at from the Namibian perspective in the context of what it is and its causes.

2.2. An Over all Picture of the Namibian Economy

The Namibian economy is one of the stable economies in Africa. It moves closely with the South African economy, which is one of the well performing economies on the African Continent. During the period 1980 and 1988, Namibia recorded gross domestic product (GDP) growth rate of between 0.89% and 1.84% which increased to 8.17% in 1990. In 2010, Namibia recorded GDP growth of 3.79% and 6.27% in 2012 and an estimated 4% in 2013. The GDP per capita growth rate in Namibia has also been quite modest, compared to other African countries. Back then in 1981 and 1985, Namibia's GDP per capita stood at -1.23% and 0.74 respectively. In 1991, GDP per capita improved to 4.45 up to the year 2000 when it dropped to 1.04. It later picked up to 4.54 in 2010 and dropped to 3.83 in 2012. That makes the Namibian economy quite different from other developing African nations that have seen declining GDP figures in most cases. Namibia is an upper middle income country. However, like other developing economies in Africa, Namibia is faced with social challenges, such as high poverty rates and wide income disparities. Namibia is one of the countries with the highest degree of income inequality in the world and it was ranked as one of the worst in 2008, with a GINI coefficient of 0.6 (National Planning Commission, 2008). According to the African Development Bank (2012), the GINI

coefficient in Namibia, which is used to measure the gap between the rich and the poor, has been fluctuating above 0.5. It was estimated to be around 0.63 in 2003 and 2004 and decreased to 0.58 in 2009 up to 2011. It was estimated to be 0.7 in 2012 and 2013. The large income disparity was mostly brought about by apartheid of the colonial era. Apartheid made most of the people in the country excluded from the productive entities, thus stiffening entrepreneurship and professional development, especially among black people who are the majority in the country.

With such a high rate of income inequality, most of the residents live in poverty. In 2008, 33% of the Namibian population of 2 million people lived on US$ 1 or less in a day (African Development Bank, 2012). With the Gini Coefficient of about 0.58, the majority of the population is in the group of middle income and below. If the majority of households in an economy live under such conditions, the welfare of consumers which needs to be accounted for by means of economic growth, is not certain. The Namibian government has, however, put various social safety net programs in place, such as the affirmative action and the supports of vulnerable members of the society (Black Economic Empowerment). The affirmative action and the BEE were put in place to help those who are disadvantaged, however, the opportunities that rise, mostly benefits a very small number of well-connected people (African Development Bank, 2007).

A practical example can be seen in the construction industry. The opportunities that could benefit the poor and the majority are feasible in this industry, but there are constraints such as the large competitive Chinese Companies. The small and medium companies are thus out of their league and do not get the contracts. This pushes local entrepreneurs down who are one of the major sources of increments in private consumption expenditure and economic growth in an Economy. Other programs such as the Medium-Term Expenditure Framework (MTEF) were also put in

place. The MTEF was implemented in 2001 and 2002. It helps to keep track of expenditure in the economy, targeting the poor and the vulnerable groups, as well as addressing issue of inequality. It also protects the social sector, by allocating a large portion of public expenditure on health and education.

The huge gap between the poor and the rich in Namibia also lead to shortages of skills needed in the Labour market. The majority of the people are not able to pay for the school fees and other costs involved, such as, accommodation fees and transport costs. A large portion of human capital ends up un-utilized. This leads to the majority to fall under middle income group and below and they are unable to obtain jobs of good qualities without the necessary education and training. The economy ends up with a large amount of un-utilized human capital, rotting and a need for skilled labour, which hampers the growth of an economy, thus the economy will not be able to operate at its full potential.

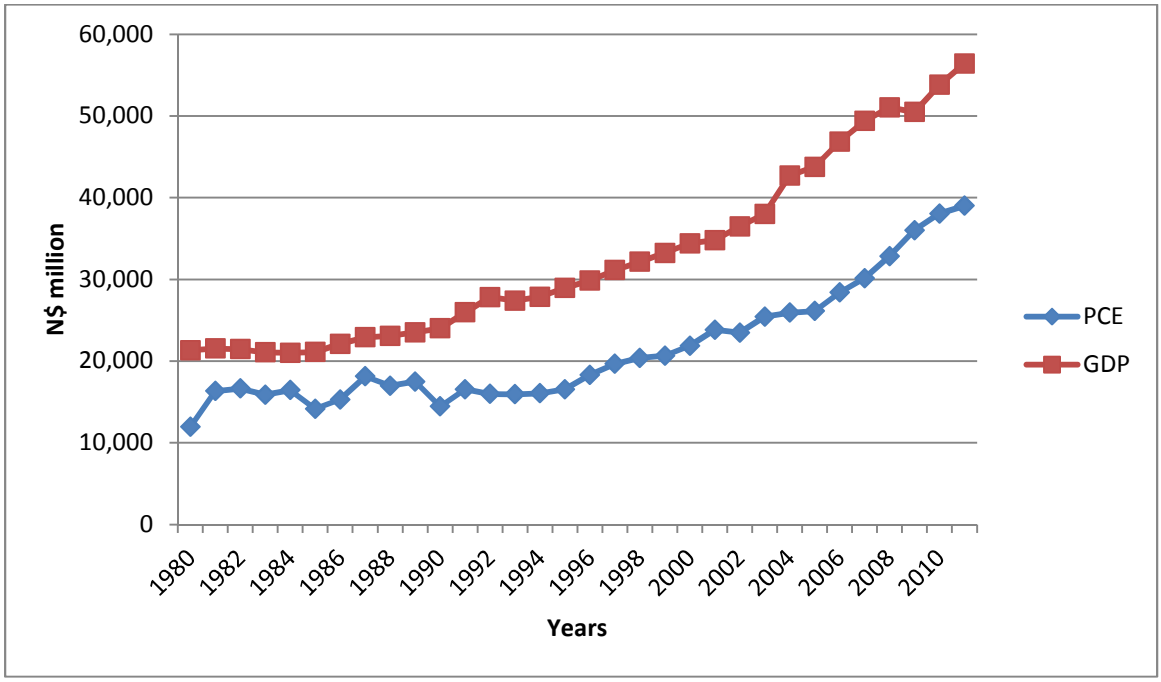
Namibia is a small open economy, highly dependent on imports, with about 80% of imports coming from South Africa. Namibia is also a commodity exporter, mostly exporting solid minerals such as diamonds and uranium. The tendency of dependence on exports of raw material makes the Namibian economy vulnerable to various risks, such as inflationary pressures, tighter conditions in the financial market, high and volatile oil prices and commodity price fluctuations. For example, in 2012, an increase in food inflation in South Africa caused by the strikes in the South African industries and the increases in international food prices led to an increase in inflation in Namibia, from 6.0 in the second quarter, to 6.2 in the last quarter (Bank of Namibia, 2012), which resulted in an increase in prices of goods which affected the middle income and low income groups hard who are the majority of the economy.

Despite a large gap between the poor and the rich, as well as a high dependence of the exports of solid minerals, the Namibian economy has one of the stable financial sectors in Africa. Namibia is a member of the Common Monetary Area (CMA), together with Lesotho, Swaziland and South Africa. The three small economies' currencies are pegged to the South African rand which is the biggest and the industrialised economy in the CMA. The Namibian financial sector is in line with the South African financial market, in terms of exchange rate. The Namibian banking sector is well capitalized, with low level of non-performing loans (Colijin, 2009). The regulators of the financial sector, such as the Bank of Namibia, have been implementing some policies to pave ways for the middle income and the low income groups to participate actively in the economy. In line with the common monetary area, Namibia has committed itself to implementing a tax system that is progressive and has some benefit for the low income groups (African Development Bank, 2012). In 2008 and 2009 amendments of the income tax act were introduced to provide for Value Added Tax (VAT) zero rating on basic commodities that constitute the largest share in the consumption basket of the poor. According to Bank of Namibia (2010) the Bank of Namibia reduced the repo rate to 6.0 % in 2010. The purpose was to boost domestic demand following the improved inflation outlook and the adequacy of international reserves. The commercial banks also reduced the prime lending rate to 9.75 %, from 11.25% in 2010. In line with the above, the downward path in the money market rates that started during the later part in 2008 continued during 2010 (Bank of Namibia, 2010). This also led to a downward revision of the average nominal lending rate from 10.75% in 2009 to 9.10% in 2010, and further down to 8.7% in 2011.

Private consumption expenditure goes hand in hand with economic growth. With such a high level of income inequality, majority of the households in the economy falls under the middle and

low income level groups. These groups face a lot of constraints and hardships including the increase in prices. When majority of the households in an economy falls under the least preferable income group economic growth is likely to be hampered. Despite all the shortcomings, the level of private consumption expenditure and GDP in Namibia has been increasing over the past 32 years as shown in figure 2.1.

Figure 2.1: Private Consumption Expenditure and real GDP of Namibia at constant prices of 2004 (N$ million)



Source: Bank of Namibia

Before 1990, both private consumption expenditure and GDP were increasing at a decreasing rate but private consumption expenditure fluctuated at higher rates than GDP. After independence in 1990, both variables started to increase monotonically. Between 1992 and 2001 private consumption expenditure and GDP increased almost at the same rate. Private consumption expenditure increased by 14%, while GDP increased by 8%. Both have then been

increasing further after that, with GDP experiencing a sharp increase of 5.8% between 2001 and 2002 and private consumption expenditure increased by less than 1%. At the end of 2011 GDP is shown to be increasing, with private consumption expenditure following not too far. That shows that despite the unequal distribution of income in the Namibian economy, Namibia had been doing quite well over the past 32 years with increasing economic growth and private consumption expenditure.

2.3.Consumerism and the Namibian Economy

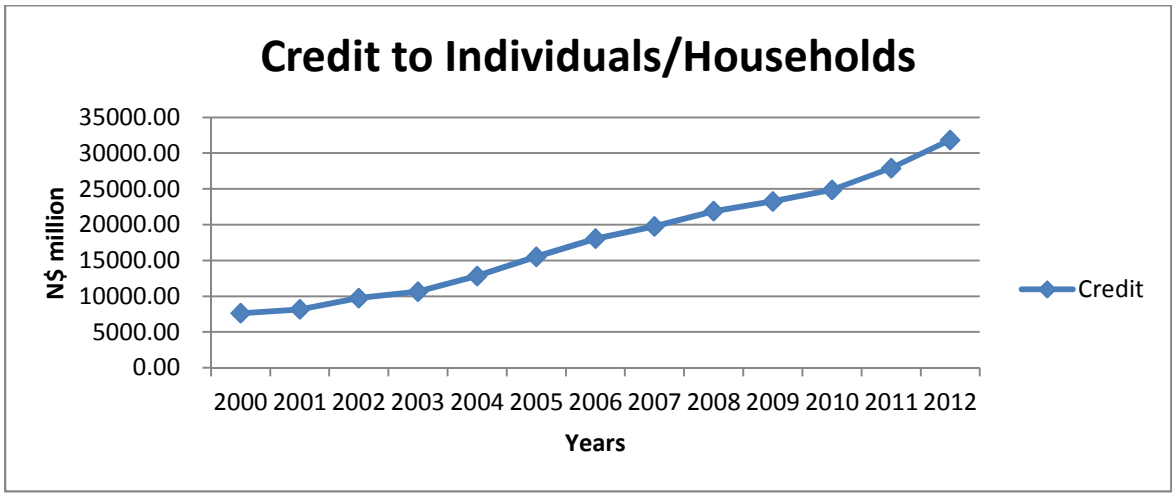
Consumerism is the belief that personal well-being and happiness depends on the level of personal consumption, particularly, on the purchases of material goods (Wright & Rogers, 2009). Orel and Zeren, (2011), Kotler (2000) and Parreault and MacCarthy (2002) defined consumerism as the social movement aimed at increasing the right and the power of consumers in an economy. Consumerism is a growing phenomenon in most developing economies including, Namibia. In almost all countries, consumption and possession of material are at the center of happiness.

The Namibian society, like most developing countries, is a consumerist society. The consumerist society is one in which the members devote their time, energy and all they have to consuming (Wright and Rogers, 2009). This is a society in which more consumption is considered better than less and where consumption is a good. In developing countries, the majority of the people are in the middle income group due to large income inequality. Most people end up wanting to consume at higher levels than they can afford. According to Wright and Rogers (2009), this can go down in two ways. The first is that people opt to buy their basic needs with their earnings, save the left overs and leave them to accumulate until they are enough to buy what they cannot afford with what they earn. However, waiting for the amount to accumulate might take long and

the culture of consumerism fosters desires to consume in the current period. The second way is that people opt to borrow money to consume now and pay back in the future.

Income inequality is one of the causes of consumerism. Namibia is one of the economies with the highest income inequality in the world. An increase in income inequality leads to an increase in positional consumption. Positional goods are goods whose subjective value is dependent on comparisons with what the other people consume (Wright and Rogers, 2009). An increase in positional consumption has an influence on the income structure. It has a negative effect on the households in the middle income group. The middle income distribution household will not see a significant increase in income, but will experience increasing pressure for positional consumption as it increases. This forces people to go and borrow and in turn they will increase their positional consumption. Wright and Roger (2009) indicated that consumption norm for materials and assets such as cars and houses for the middle income class are driven in part by increasing inequality in income. Bank of Namibia (2012) reported that there was an increase in the borrowing towards less productive activities such as the purchase of vehicles, credit cards and personal loans. This is illustrated in the following figure 2.2 below:

Figure2.2: Credit to Individuals in Namibia



Source: Bank of Namibia

The amount of credit issued to households has been increasing over the past 12 years. The increase has been noticed between 2004 and 2008 at an amount between N$ 20 000 and N$ 25 000 and only to start increasing at a decreasing rate between 2008 and 2010. The amount of credit to individuals shows a sharp increase of N$6976 in 2010 up to the end of 2012. An increase in consumerism leads to an increase in private consumption expenditure through borrowing. This increase in credit to consumers spreads to the other sub-sectors of the economy. When households have a lot of money to spend on, they consume more of the goods and services produced and sold in the economy. This leads to the increase in production in different sectors like manufacturing and others. This in turn leads to growth of the economy. Increasing credit to individuals as presented in figure 2.2 indicates a rise in consumerism, as well as an increase in private consumption expenditure and economic growth. The largest portion of the increment in consumerism is carried by the middle income group, which strives to make a living but constrained by the high prices of materials and assets in Namibia.

According to African Development Bank (2012), Namibia had a GINI coefficient of 0.7 at the end of 2012 and at the end of 2013 it was 0.597. This shows that out of 10 people, only 3 to 4 are rich and the remainder is poor. It means that there is a huge margin between the poor and the rich. Such also shows that majority of Namibian residents are in the middle income group. With fluctuations in prices, the households are likely to borrow from the financial sector to smoothen their consumption and other obligations, especially the middle income group. It is, thus, very important to examine how the level of private consumption expenditure in Namibia which is faced by a lot of constraints is influenced by the lending rate which is in a stable financial sector.

CHAPER THREE: LITERATURE RIVIEW

3.1. Introduction

In this chapter theories and studies done related to the study were reviewed. Theories were reviewed and presented first followed by the empirical studies.

3.2. Theoretical Literature

Private consumption expenditure is part of domestic absorption. Together with government expenditure, gross capital formation and net trade, the sum of these components makes up the aggregate demand, which is the same as GDP of an economy (Blinder & Deaton, 1985). Most studies on consumption make references to three major models of consumption: the absolute hypothesis by Keynes, the permanent income hypothesis by Friedman and the life cycle hypothesis. The absolute theory of consumption is not one of the theories to be focused on in this study but it is one of the main theories of consumption. The absolute hypothesis theory of consumption is from the school of thought of Keynes from the 1930s.

Descriptively, that theory is made up of two hypotheses which are as follows; the first hypothesis is that current consumption spending of consumers depends on the level of current income and it increases as income goes up, but by less than the full increase in income. That is due to the fact that some portion of that increase in income is saved. The second assumption is that average propensity to consume falls as income increases. Thus, the latter means that those households which are rich save more than poor ones, because those with more income spend a small portion of it on consumption compared to poor households. The two hypotheses are the foundation of the absolute theory of consumption. That shows that this theory was based on the assumption that current consumption is explained primarily by current disposable income. Keynes (1936) states

that as income goes up, consumers are likely to increase their spending thus, spending will increase proportionally but only by a fraction of the initial increase in income. The theory runs short of explaining the trade-offs between current consumption and consumption in the next period except that it only gives a static explanation of the household's behaviour. Singh (2004) also looked at the absolute theory. He states that the absolute income hypothesis is better or suitable for stable economies. The households' under the latter theory adapt instantaneously to changes in income.

Another theory of consumption worth looking at is one by Fisher in 1930. Fisher is from the neoclassical school of thought. His whole idea was to show that, unlike Keynes who stated that consumption depends on current disposable income only, Fisher was of the idea that consumption depends on more than just current income and expectations; hence he added the importance of interest rate in consumption in his model. Assumptions were made that households strive to maximize their utility over a period that covers their entire life span. Given that assumption, Fisher postulated that households aimed at smoothing their consumption, thus they would sacrifice certain amounts of consumption in the current period in order to have higher amounts in the future. That means that households can save in the present at a given interest rate and use up their saving in the future where they could have earned returns then and their consumption levels will be higher in the future because they will have extra amounts from their savings compared to the current period. Fisher (1930) called this intertemporal choice and concluded that consumption depends on life time income. Another theory of consumption that is worth looking at is the Permanent Income Hypothesis.

3.2.1. The Permanent Income Hypothesis

The Permanent Income Hypothesis is from the school of thought of Friedman in 1957. The Friedman's Permanent Income Hypothesis is the foundation of consumption literature (Holmes, 2010). That theory postulates that an individual's consumption does not only depend on an income of that period, but it also on their lifetime income (Romer, 2006). It is assumed that under this theory, consumers aim at maximizing their life time utility function, subjected to a constraint and they repay any outstanding debt at the end of their lifetime wealth. Romer (2006) further indicated that individuals can either save for the future or borrow at that point in time, at an exogenous interest rate. If households decided to save in the current period then consumption in the current period will be reduced by the amounts saved, however, in the next period spending will be higher than the previous period because by then consumers could have earned extra amounts from their savings, hence consumption will be higher. If consumers decide not to save in the current period, with the assumption that they will borrow in the future, then consumption will be high in current period because consumers do not put away any amount for the future. Consumption might be low in the next period compared to the present given the assumption that consumers have to borrow to smooth their consumption. Households' consumption decision under the Permanent Income Hypothesis is said to be a result of intertemporal decision making (Shokoofeh, 2005).

Shokoofeh (2005) further quantified that under Permanent Income Hypothesis consumption is divided into two components. The first portion is the permanent planned component which is based on habits budget planning and current needs. That component of consumption is that part of consumption which the households plan for, the one they put a certain portion of money aside just for the consumption of certain goods and services. The second portion of consumption is the

transitory capricious component. That component is based on chance, acurance and random phenomenon. The second component covers the “in case” moments. A good example is the amounts that the households put away for precautionary purpose. According to Keynes (1936), that is money put aside in case of emergencies and unforeseen circumstances.

The unforeseen circumstances can be the loss of jobs or temporal loss of incomes, among others. When households are faced with such situations they are likely to borrow from the financial institutions, at a given lending rate in order to smooth their consumption. That forms the second component of the Permanent Income Hypothesis. Friedman (1957) also stated that a consumer’s labour income in a distant future had little influence on that consumers’ current consumption. The reason behind that argument is that consumers are faced with capital imperfections, future labour incomes were uncertain and there might be difficulties faced by the consumers when borrowing, while having such incomes. Parker (2010) supports the latter argument; he states that households are faced with fluctuations in income over time. Those fluctuations are brought about by the life-cycle factors or the business cycles. Holmes (2010) braced that idea. He mentioned that consumers are likely to be faced with fluctuations in their incomes from one period to another. Hence they might borrow or lend due to those fluctuations. Permanent Income Hypothesis mainly focused on the relationship between consumption and permanent incomes (Parker, 2010). Parker (2010) further states that given the future income path, the permanent income can be calculated from the budget constraint as:

$$\sum_{t=0}^{\infty} \frac{Y^P}{(1+r)^t} = A_0 + \sum_{t=0}^{\infty} \frac{Y}{(1+1)^t} \quad \text{.....(3.1)}$$

where Y^p is permanent income, such that Y^p = r Ω, where Ω is the wealth measure. Permanent income is assumed to be given by the real interest rate multiplied by wealth effects from equation (3.1). That shows that if permanent income goes up by the rate of interest times the temporally

changes in income, consumers will consume the interest they will earn and increase private consumption expenditure. Campbell and Mankiw (1989) looked at Permanent Income Hypothesis and the rule of thumb in their study where they mentioned that the Permanent Income Hypothesis looks at aggregate consumption as a representation of consumers' decision when striving to maximize the following utility function:

$$E_t \sum_{s=0}^{\infty} (1+\delta)^{-s} U(C_t + s);\ U' > 0;\ U'' < 0 \quad \text{.....(3.2)}$$

where C is consumption, δ is the subjective rate of discount, E_t is the expectation condition on information available at time t. If a consumer is assumed to borrow and lend at real interest rate r, then the first order condition necessary for optimality becomes:

$$E_t\, U'(C_t + 1) = \left(\frac{1+\delta}{1+r}\right) U'(C_t) \text{.....(3.3)}$$

Equation (3.3) thus tells us that the marginal utility in the current period is up to a constant multiple, the best forecast of the next period's marginal utility. However, assuming that $r = \delta$, and that the marginal utility is linear, then the outcome will be random walk Campbell et al. (1989), which will be:

$$E_t C_{t+1} = C_t \text{ .....(3.4)}$$

The assumption that today is the optimal forecast of tomorrow's consumption will imply that:

$$\Delta C_t = \epsilon_t \text{ .....(3.5)}$$

where ϵ_t is a rational forecast error, which is the innovation in permanent income. The formulation of the Permanent Income Hypothesis thus shows that changes in consumption are unpredictable (Campbell et al., 1989). Singh (2004) also looked at Permanent Income

Hypothesis. In his study he states that under the Permanent Income Hypothesis consumers prefer to smooth consumption levels, even when they are faced with fluctuations in incomes and aim at maintaining the constant level of consumption. One way in which households can maintain the level of consumption when faced with varying incomes is through borrowing. When borrowing comes into picture, lending rate is at play, thus influencing private consumption expenditure in that way.

Singh (2004) further states that when households are faced with changes in income, they will only change their levels of consumption when they are guaranteed that the increase in income is permanent. He further adds that the Permanent Income Hypothesis introduces lags in the consumption function because it takes several years for households to see the increase in income as permanent.

3.2.2. The Certainty Equivalent Model

The Certainty Equivalent Model is one of the consumption theories. The model is of the assumption that consumers are faced with a quadratic utility function (Carroll, 2001). The quadratic utility function is known to have shortcomings that the risk aversion of consumers' falls as wealth increases. This simply means that the wealthier the consumers get, the risk loving they become. As consumers start to own more and more assets they are likely to be reluctant on spending their wealth, investing their wealth and their income even on riskier projects so long as they promise good returns at maturity. Another shortcoming of the utility function which is assumed by the Certainty Equivalent Model is the bliss point. A bliss point is a point of satiation and a point in time where a consumer is said to be satisfied with the utility of the consumable good and service at hand. Carroll (2001) further adds that the Certainty Equivalent Model is the

same as the perfect foresight, there are no uncertainties. This means that consumers are assumed to be aware of what the future holds for them in terms of their consumption. The perfect foresight hypothesizes that the optimal level of consumption is the same as or directly proportional to total wealth, which is the sum of market wealth W_t, and human wealth H_t, so that total consumption is given as:

$$C_t = k_t (W_t, H_t) \quad \text{.....(3.6)}$$

where W_t is market wealth which includes real and financial capital and H_t is human wealth which is current and discounted future labour income and the proportionally, k_t , depends on the time preference rate, the interest rate and other factors.

Equation (3.6) implies that the marginal propensity to consume out of the unexpected transitory shocks to noncapital income is the same as the marginal propensity to consume out of wealth (Carroll, 2001). That is because, if a consumer had wealth already and the same consumer wins money or find money in the street, the new wealth will be theoretically indistinguishable from the wealth that the consumer had before he or she got that lucky.

Hall (1978) stipulates that under the Certainty Equivalent Model, the changes in consumption that are predictable in a given period in time, are by no chance related to any information from earlier periods that the consumer possessed. For example, what a consumer knows now and factors that influences that consumer's level of consumption expenditure in the current period will not by any chance reflect that consumer's future consumption outcomes. This means that households will not change their levels of consumption unless unexpected events push them to revise their expectations of future income. The latter implies that consumption should follow a

random walk under the Certainty Equivalent Model. Hall (1978) assumes that the rate of interest is positive and none zero, so that the utility function is given as:

$$U(c) = -\frac{1}{2}(ć - c)^2 \quad \text{.....(3.7)}$$

And due to the positive interest rates and the positive time preference, the life time utility function becomes:

$$E[U] = E\sum_{t=1}^{T}\frac{1}{(1+\rho)^t}[\,U(c_t)\,] \quad \text{.....(3.8)}$$

And the budget constraint is given as:

$$\sum_{t=1}^{T}\frac{E_t[Ct]}{(1+r)^t} = A_0 + \sum_{t=1}^{T}\frac{E_t[Yt]}{(1+r)^t} \quad \text{.....(3.9)}$$

Such that consumption follows the following time path with the utility functions (3.7) and (3.8), and a budget constraint given by equation (3.9):

$$c_{t+1} = ć\,\frac{r-\rho}{1+r} + \frac{1+\rho}{1+r}\,c_t + \varepsilon_{t+1} \equiv \beta_0 + \Upsilon c_t + \varepsilon_{t+1} \quad \text{.....(3.10)}$$

In equation (3.10), ε_{t+1} is the random variable. The random variable represents and captures the effect on the consumption path with respect to changes in income that the consumers face in period t+1. Under the Random Walk Hypothesis it is said that in each new period, consumption is thought of as taking a step relative to its past position. Singh (2004) also looked at the Certainty Equivalent Model as the rational expectation hypothesis. He states that under that hypothesis, households are assumed to be aware of the income generating process and that they can only change their consumption levels when faced with new information.

The Random Walk Hypothesis relies on the Euler equation which links marginal utility in adjacent periods (Carroll, 2001). Campbell et al. (1989) were also in the same line of thinking. They stated that the Euler equation, which is the same as the random walk, only determines the consumers' consumption level in the current period. To explain the Euler equation, Campbell et al. (1989) looked at the Random Walk Hypothesis by considering two types of consumers, namely the single fully rational consumers and the forward looking consumers. They defined the fully rational consumers as the consumers who make decisions after considering all the possible choices at hand. This would be consumers that would change their consumption behaviour following changes in the interest rates.

The forward looking consumers are those consumers who consume their permanent income, but are not likely to change their consumption attitude in response to changes in interest rates. The two authors suggested that the Euler equation is best looked at with this two consumers, half being the fully rational consumers and the other half being the forward looking consumers. The Euler equation is said to allow for a varying and uncertain real interest rates. Campbell et al. (1989) suggested that the variations in real interest rates makes consumption look excessively sensitive to income, such that when income changes consumption is going to change by a larger margin. They looked at two different forms of Euler equations. The first was the one which only includes the permanent income consumers and excluding the rule of thumb consumers, which is given as:

$$\Delta c_t = \mu + \delta r_t + \epsilon_t \quad \text{.....(3.11)}$$

Where Δc_t is the changes in consumption in period t, r_t is the real interest rate contemporaneous with Δc_t , ϵ is the error term which may be correlated with r_t , but uncorrelated with lagged

variables, δ is the coefficient of the real interest rates which represents the temporal elasticity of substitution.

Equation (3.11) according to Campbell et al. (1989) will give small values for the coefficient on real interest rate and further stated that the equation is thus mis-specified because it does not include the rule of thumb consumers. Campbell et al. (1989) than looked at another equation which included the rule of thumb consumers, which is given as:

$$\Delta c_t = \mu + \lambda \Delta y_t + \theta r_t + \epsilon_t \quad (3.12)$$

where λ is a fraction of income which goes to individuals who consumes their current income and the remainder goes to those who satisfy the Euler equation, $\theta = (1 - \lambda)\ \delta$ and Δy_t is the growth of actual income. The second equation thus included the actual income growth and the ex post real interest rate and the instruments are using twice lagged variables. The second equation is the best to explain the Euler equation because it includes the two sets of consumers presented earlier (Campbell et al., 1989).

3.2.3. The Life-Cycle Model

The Life-Cycle Model is from Modigliani (1949) school of thought. The theory states that income changes systematically over the phases of the household's life-cycle. Modigliani and Brumberg (1954) further state that the proportional lifetime income spend by households on consumption in any given period depends on the interest rate, the age and a multi-period utility function. Households are assumed to consume a constant portion of the present value of their lifetime income and save while they are working in order to finance their consumption after retirement. Nakagawa and Oshima (2000) support that assertion. They state that the elderly are likely to have a bigger portion of safety assets and savings. That shows that their consumption

level is suppressed by a reduction in interest payments when the rate of interest goes down. The younger and middle aged households have the small portion of safety assets and savings, hence they do not hesitate to borrow.

Households in general are assumed to use their whole life span when planning for their consumption and are assumed to smooth their consumption through savings. Under this model, it is assumed that savings could be used as a mechanism of transferring purchasing power from one period to another (Parker, 2010). That means that if a consumer saves today he or she can use up that savings for consumption in the next period. In other words, the amount of money forgone today is used up in consumption in the following period. The Life-Cycle Model further assumes that income is usually low in the early periods of life compared to the later years in life. That is because in the early periods most consumers are young and they do not work, they depend on those around them for financial assistance. As young consumers grow older, they complete their educations, find jobs and start earning their own income which is relatively higher compared to the one they use to have when they were young.

That shows that under the Life-Cycle Model, current consumption and saving decisions are parts of the households' lifetime plans in order for them to maintain constant levels of consumption even after retirement. That indicates that households tend to save throughout their working lives and consume less than their incomes. During their working period, they accumulate enough savings to enable them to sustain the same level of consumption during retirement (Parker, 2010). As stated earlier, when households retire their income falls significantly. For them to maintain the level of consumption they had during their working period, they use their past savings. The later shows that consumption is not only dependent on current income, but also on the level of wealth that the consumer holds. That can be represented by the following function:

$C_t = aw_{t+1} + bY_t + b2Y_t^e + U_t$ .....(3.13)

where C_t is current real consumption spending in period t, w_{t+1} is total real wealth or savings the household have accumulated up to the end of period t-1. Y_t is the total current real income of all households in period t, Y_t^e is what household estimate to be their annual real income from period t+1 upwards, U_t is the random error term.

In the last part of the working life, income tends to reach its peak (Parker, 2010). He further added that income tends to fall as consumers reach their retirements. It was from that point of view that Parker (2010) mentioned that consumers are not all better off in life and those who wish to smooth their consumption are likely to borrow in their early low income periods, build up their wealth and repay those funds in the high income periods and spend the accrued savings during retirement when income is said to be dropping monotonically. This is why it is called the Life-Cycle Model.

It is further assumed that there was a budget constraint that links consumption at various stages during the lifetime of a consumer (Parker, 2010). The slope of that budget constraint also determined the trade-off between consumption in period t and the consumption in period t + 1. It was given as:

– (1 + r) .....(3.14)

where r is the real interest rate at which consumers lend and borrow.

The position of the budget constraint depends on the present value of lifetime earnings or wealth (Parker, 2010), which is given as:

$\Omega_0 = A_0 + \sum_{t=0}^{T} \frac{Yt}{(1+r)^t}$ .....(3.15)

where Ω_0 is the stock of wealth , both human and non-human wealth at time zero, A_0 is the value of current financial and physical assets, Y_t for t = 0,1,2,..;T is the expected stream of real labor income over time and r is the real interest rate.

According to Parker (2010), early empirical tests were conducted aimed at explaining if wealth and interest rate explain consumption better that current disposable income, but measuring wealth was difficult, thus made testing the Life-Cycle Model difficult. Despite all that the Life-Cycle Model is one of the theories that link interest rates to consumption which is the focus of this study.

All those theories discussed above are linked to one another. The absolute income hypothesis is the source of the establishment of the Life-Cycle Model and the Permanent Income Hypothesis (Singh, 2004). The Permanent Income Hypothesis is the foundation of the consumption theory in general. It describes consumers' saving or borrowing, by which borrowing depends on the rate of interest in the future. That shows the importance of borrowing and the importance of lending rate in the consumption world. The Certainty Equivalent Model focuses on the uncertainty in labour incomes which shows that at some point in time, consumers will borrow. Equation (3.4) in the random walk outcome of the Permanent Income Hypothesis, it shows that the Permanent Income Hypothesis can be used to explain the Certainty Equivalent Model, showing that the Certainty Equivalent Model and the Permanent Income Hypothesis are linked to each other.

The Life-Cycle Model focuses on the consumers' lifetime earnings. It states that consumers are likely to borrow at the early ages and pay back at the end of their working period where their incomes are said to be at peak. Again the Life-Cycle Model, like the Permanent Income Hypothesis and the Certainty Equivalent Model, looks at borrowing which means that lending

rate is also an important variable in the consumption concept. Under the Life-Cycle, the Certainty Equivalent Model and the Permanent Income Hypothesis, consumers tend to smoothen out the fluctuations in their income. Equation (3.1) shows the relationship between the Permanent Income Model and the Life-Cycle Model. Even if the Life-Cycle Model assumes that consumption depends on wealth, while the Permanent Income Hypothesis assumes that consumption depends on permanent income, they make similar predictions about the consumption effects of permanent income and temporary changes in income (Parker, 2010). Hall (1978) as cited in Hansen (1996) analysed the stochastic implications of the Life-Cycle Hypothesis for private consumption and showed that the Certainty Equivalent Model and the Life-Cycle Hypothesis are one.

3.3. Empirical Studies

Several studies have been undertaken on private consumption expenditure and interest rate. Lending rate being one of the interest rate in the financial sectors and it is an important determinant of consumption. The banks are the main sources of external funds for most private and public entities. In other words, banks are the key players on the level of credit available to the public and private sector in an economy. Douglas (1996) looked at interest rate, household consumption and savings. He examined the effect of interest rate changes on the consumption behaviour and saving of people who follows the life cycle model and those households who sets fixed targets and work towards them.

Douglas (1996) focuses mainly on individual approach in the estimation of the elasticity that combines models of individual household behaviour with estimates of certain features of those individual's preferences. At most, the study was limited to the behaviour of households in the short run. He finds that the short run interest elasticity of saving is positive and that it

corroborates with the models that described the behaviour of the people who accounts for most aggregate savings used in the study and implied that interest elasticity is positive. When an individual is given income, they either consume it or put it aside for future use (saving). If interest rate has a positive impact on savings, one can conclude that it also has an impact on consumption because most empirical studies shows a negative relationship between savings and consumption in such a way that when households decide to save a portion of their incomes they fore-go a certain amount of consumption. This also shows that as savings goes up, consumption is likely to fall. In this study, the combination of empirical evidences and the theories used reflected that aggregate interest elasticity of savings is not likely to be negative. Douglas (1996) thus concluded that it is positive. As the rate of interest increases at the bank, more households are likely to save to earn extra returns on their savings and reducing private consumption expenditure.

The changes in interest rate only have a positive impact on savings and a negative impact on consumption. An increase in lending rate will lead to a reduction in borrowing because households have to borrow at high rates and are expected to pay high interest on those funds. As borrowing falls, consumption for those consumers who rely on borrowing will fall, thus one can conclude that lending rate has a negative impact on private consumption expenditure. Kapoor and Ravi (2001) were in the same line of thinking with Douglas. They looked at the effect of interest rate on consumption in India. They specifically examined the responses of consumption to high interest rate in India. They did a monthly consumption expenditure survey to calculate the regression discontinuity estimates and they used OLS. Despite the fact that it was unclear on the period of observation used in the study, they concluded that 50% increase in the rate of interest will lead to an immediate 10% reduction in the level of consumption, in the short run. In

the long run, they have found the effect on consumption to be small. The later study also shows that the interest rate (lending rate) plays a huge role in the level of consumption and it is negatively related to private consumption expenditure.

Richard and Roland (2012) have looked at consumption expenditure in the Eastern Caribbean currency union. Their main aim was to examine the factors that determines and drive private consumption in the ECCU. They used annual data, with most of the data dating between 1965 and 2009. They used panel dynamic least square methods to test the data and concluded that private spending is driven by income, financial wealth, terms of trade, the degree of export orientation and the rate of interest. Interest rate is thus an important determinant of private consumption. There was no evidence from the study that showed the impact of interest rate in the short run, however, in the long run, the results revealed that an increase in the rate of interest lead to a fall in household spending and a fall in private consumption expenditure.

Nakagawa and Oshima (2000) have done a study on real interest rate and personal consumption in USA, France, UK and Japan. They used quarterly data of the four countries from 1961 to 1999, applied scatter diagrams and the consumer-based capital asset pricing model (C-CAPM). Their aim was to determine the impact or the relationship between real interest rate and consumption of durable goods. They used an indirect method to remove durable goods from the overall consumption levels of the four countries. Using per capita consumption, real interest rate, rates of change in real stock prices and uncertainty indexes, they have found that interest rate has a negative impact on consumption in the USA and the UK. It is good to bare in mind that lending rate in one of the interest rates used in the financial sector as stated earlier. These studies show that interest rate is negatively related to private consumption expenditure. This shows that

lending rate has a negative impact on private consumption expenditure too, because it is one of the interest rates. All this also shows that the substitution effect dominates the income effect.

Some studies, like Wadad (2011) stated that interest rate can have a positive impact on private consumption expenditure. He did an econometric study on private consumption expenditure in Lebanon, using annual data from 1975 to 2007. He used annual data, dating from 1975 to 2007 and used the VAR procedure and the Johansen test in his cointegration analysis. The aim of the study was to examine how real private consumption responds to real disposable income, real interest rate, anticipated inflation and wealth. He has found that in the long-run, real private consumption was affected by real disposable income, anticipated inflation and wealth. The direction of the effects was not clearly stated in the study. Also the short-run effect of these three variables was not presented in the study. He, however, states that interest rate can have a positive impact on private consumption through savings. An increase in interest rate leads to an increase in income from assets. As shown earlier, income has a positive impact on consumption, so the increase in income will lead to increases in consumption at the expense of savings. This is known as the price effect. That shows that at times, the income effect might have domination over the substitution effect.

Despite all those studies that show a relationship between interest rate and consumption, some studies do not show any. Campbell et al. (1989) have done a study on consumption, income and interest rates using time series data. It is unclear on which economy the study was focused, as well as the sample that were used. However, despite those short comings, in the conclusion they revealed little or no correlation between expected changes in consumption and the real interest rate and concluded that expected change in consumption dependents on the expected changes in income instead. Wadad (2011) in his econometric study on real private consumption expenditure

in Lebanon found that the effects of real discounted interest rate to be statistically insignificant both in the short-run and long-run in both models. All variables had effects on private consumption, except the interest rate.

Shokoofeh (2005) supported the idea of no relationship between interest rate and consumption. He focused on the US economy and used data from 1990 to 2003 on monthly base. In his study, his main focus was to test whether the index of consumers' sentiment, which is used as a measuring instrument, was a good measure of future consumption expenditure, thus tested the relationship between consumption and consumers' confidence. He states that the relationship between consumption and interest rate might be insignificant due to the simultaneous effect that real interest rate has on consumption. He further states that as it has been shown by most empirical evidence, an increase in interest rate might lead to a fall in the level of consumption. However, that this increment might also increase future income level for each dollar saved in the current period and increase the future consumption.

Nakagawa and Oshima (2000) find no clear evidence that supports that there is a relationship between real interest rate and private consumption expenditure in Japan. As a matter of fact, the data which they used in their study were not significant for Japan. Some of those studies show that not all studies done on interest rates and consumption have shown a relationship between the two variables.

Lending rate influences private consumption expenditure through credit availability. Holmes (2010) conducted a study on credit constraint and consumption in Jamaica. He used quarterly data from 1997 to 2010 and used the two stage least square methods. Using credit and non-performing loans as a proxy for credit constraints, the scholar found out that consumption is

sensitive to credit and non-performing loans. However, it was unclear of whether the sensitivity of credit availability negatively or positively influences the level of private consumption. He further adds that consumption levels in an economy can be influenced by monetary policies put in place by the regulators through permanent income but the demand behaviour of the consumers in an economy is heavily influenced by the cost and the availability of credit.

The cost of goods and services that consumers strive to maximize do reflect their demand and consumption behaviour, because given a situation in which one is given two goods, good A and good B, which are substitutes the given households strives to maximize their consumption from one of them. An increase in the price of good A will mean that there is an increase in the cost of that good and if we are to assume that the price of good B remains unchanged or low, the representative households are likely to shift their consumption from good A which involves high costs, to good B which is associated with low costs and offering the same level of satisfaction. Thus that shows that the costs of goods and services do reflect the consumers' demand and consumption behaviour as revealed by (Holmes, 2010).

As stated earlier, households borrow so that they can be able to smoothen their consumption and daily obligations, especially in developing countries like Namibia. If credit is available to consumers, at low lending rate, as well as few restrictions on who is not to receive, consumers are likely to consume more compared to the situation where credit is not freely available. Given a situation in which the interest rate is increasing or increased, consumption is likely to fall because as Bayar and Mac Morrow (1999) state in their study that the increase in the interest rate leads to a reduction in the relative price of consumer goods in the next period. That is the substitution effect that tilts consumption towards the future. That means that as interest rate increases, consumers are likely to save more in the current period and spend in the next period,

thus shifting their consumption to the next period. Hence the level of credit availability plays a vital role in determining consumer behaviour in an economy.

All those studies have shown a relationship between consumption and interest rate in different countries of the world, with different scholars showing different relationships between consumption and interest rate. Some studies show no relationship at all. However, none of those studies have focused on the Namibian economy, thus this study looked at how private consumption expenditure and lending rates, as one of the interest rates in the Namibian financial sector, relates to one another.

CHAPTER FOUR: METHODOLOGY

4.1. Introduction

This chapter discusses focused on the methodology of the study and formulation of models that were used and the procedures that were followed. It also highlights how the models are analysed in the chapter 5. This chapter explained how unit root tests are conducted. Furthermore, this chapter covers cointegration tests and specification of the Vector Auto-Regression. It also outlines the data sources and the econometric package used in the study.

4.2. Analytical Framework

The VAR approach is used assess the relationship between lending rate and private consumption expenditure in Namibia. VAR is a system of dynamic linear equations where all the variables in the system are treated as endogenous (Sims, 1980). It was introduced as an alternative to the traditional large-scale dynamic simultaneous equation models because it models all endogenous variables jointly rather than modelling one equation at a time.

However, there are two VAR techniques, the Cholesky technique and the generalised impulse response functions (GIRF). The Cholesky technique depends on the succession in which the variables are ordered. The use of the Cholesky decomposition imposes restriction on the ordering of the variables in the VAR. Hence, due to the sequential nature of responses in the system, the policy inductive variable should be placed first in the system if it assumed not to receive instant feedbacks from innovations of other variables. However, it should be placed last if it receives instant feedback from those innovations. Each variable responds only to changes in the innovations of those variables that precede it, while the shock to that variable effects only the

innovation of the variables that succeed it (Mousa, 2010). The results can be sensitive to VAR orderings and they become hard to interpret (Keating, 1992).

While the Cholesky technique is only applicable to the linear multiple series model, the GIRF analysis can be used in both the linear and the nonlinear multivariate models (Koop, Pesaran & Potter, 1996). The main advantage of the GIRF is that it does not need orthogonalistion of shocks and is therefore not affected by the ordering of the variables used in the VAR model. The generalized impulses are unique and take full account of the historical patterns of correlations between different shocks (Pesaran & Shin, 1998). To avoid the impact of the ordering restrictions, the GIRF is used in this study. It also minimizes the biasedness towards one school of thought in terms of theory. This justifies the use of the GIRF in this study.

When dealing with VAR models there is a concern about how the variables should appear in the model. To be specific, concerns of whether the variables should appear in level or first difference form. There has been debates on whether to transform models to stationary form by difference operators when dealing with *I (1)* variables leaning to Stock and Watson (2001) conclusion. Some authors advocates for the traditional approach of transforming the data to stationary regressors prior to estimation, regardless of whether the point of focus is long-run or short-run relationships (Enders, 2004). Both procedures yield similar results (Ngalawa & Viegi, 2011). This study follows the procedure of the VAR analysis of the relationship between private consumption expenditure and lending rate in Namibia using both the level variables and the first difference, depending on the stability of the VAR system.

Specifically, the main use of the VAR model is mainly for the impulse response analysis, variance decomposition and the Granger causality tests. This study follows this order. The first

step requires a test for non-stationarity (unit root) of the time series. This is done before the estimations to establish the univariate characteristics of the data and to select an appropriate methodology (Pindyck & Rubinfeld, 1991; and Gujarati, 1995; 2003). The Augmented Dickey Fuller (ADF) test by Dickey and Fuller (1979), and Said and Dickey (1984), the Phillips-Perron (PP) test by Phillips and Perron (1988) and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests are applied in this regard.

Thereafter, the Granger casualty test is performed to examine whether the lagged values of one variable help to predict another variable (Stock & Watson, 2001). The concept of Granger causality test is explored when the lagged coefficients of the other variables is not zero. Given two series, X_t and Y_t, then Y_t does not granger cause X_t if all lagged coefficients for Y_t are zero, that is:

$$X_t = \alpha_0 + \alpha_1 X_{t-1} + \ldots \alpha_q X_{t-q} + \beta_1 Y_{t-1} + \ldots + \beta_q Y_{t-q} + \varepsilon_t \quad (4.1)$$

Then $\beta_1 = \beta_2 = \ldots = \beta_q = 0$, that is lagged of Y_t has no effect on X_t.

Granger causality test is thus used to test how much of a current series X can be explained by the past values of X and to know whether adding lagged values of another series Y can back up the explanation of the variance of X. Pair-wise granger causality test is used in this regard. This test is sensitive to the lag length. Hence it is necessary to determine the number of lags before running this test. After determining the number of lags, it was then possible to conduct a pair-wise granger causality test.

In addition to that, the next step would be to conduct the cointegration test, which tests if two or more series have a long-run equilibrium. If the combination of the time series is stationary, then

the series are cointegrated (Granger, 1990). When conducting a cointegration test, one checks for the following relation between any two or more series:

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

Descriptive, this is known as the cointegration equation. X_t and Y_t are cointegrated if both series re *I (1)* and the error term from cointegration equation ε_t is *I (0).* Cointegration is thus used as evidence that there is a long-run equilibrium relationship among variables. The cointegration test can be applied in several ways according to the nature of the equation that is tested. If it is a single equation the Engle Granger method is used, if it is a multivariate system the Johansen Approach is used to determine the existence of the long-run relationship among variables. If the equation is a single one, an investigation of the error correction is conducted to determine if there exists a cointegrating relation between the series of each single equation. This requires an investigation of the short-run relationship by running the ordinary least squares (OLS) regression over difference series in order to eliminate the trends in the variables. The following OLS regression is conducted:

$\Delta X_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 \varepsilon_t(-1) + \mu_t$ .....(4.3)

where: ΔX_t indicates the difference in the endogenous variable, ΔY_t indicates the difference in exogenous variable, μ_t indicates the white noise error term and $\varepsilon_t(-1)$ represents the lagged error term estimated from the long-run relationship or represents what we call the Error Correction term in estimating the equations. The Johansen cointegration test is used to determine the number of cointegration relations for forecasting and hypothesis testing. The vector error correction model (VECM) is then estimated to investigate weak exogeneity. The VECM is applied only to cointegration series. The Johansen procedure use two tests to determine number

of cointegration vectors namely the Trace test and the Maximum Eigenvalue test. Trace statics investigate the null hypothesis of *r* cointegration relations against the alternative of *n* cointegration relation, where n is the number of variables in the system for *r* = 0, 1, 2 … *n*-1. The following formula is used:

$$LR_{tr}(r/n) = -T * \sum_{i=r+1}^{n} \log(1-\Upsilon) \quad (4.4)$$

The Maximum Eigenvalue static tests the null hypothesis of *r* cointegration relations against the alternative *r* + 1 cointegration relations for *r* = 0, 1, 2… *n*-1. The test statistics are computed as:

$$LR_{max}(r/n + 1) = -T* \log(1-\Upsilon) \quad (4.5)$$

Where Υ is the Maximum Eigenvalue and T is the sample size.

In some cases, Trace and Maximum Eigenvalue statistics may yield different results, the results of trace test should be preferred. If cointegration is found among the variable, the adjustment of the short-run to long-run equilibrium is obtained through the vector error correction model (VECM). The VECM model starts from the standard reduced form of VAR model:

$$X_t = A_1 X_{t-1} + \dots + A_q X_{t-q} + ED_t + \mu_t \quad (4.6)$$

Where X_t is a (n ×1) vector of *I (1)* variable, D_t a vector of deterministic terms and A, …, A_q are *(n×n)* coefficient matrices. E is the coefficient matrix associated with the deterministic terms. Subtracting Xt-1 from both sides of the VAR equation, the model which represents a Vector Error Correction model is obtained as follows:

$$\Delta X_t = \mu + \alpha_1 \Delta X_{t-1} + \alpha_2 \Delta X_{t-2} + \dots + \alpha_{t-q+1} + BA'Y_{t-1} + \varepsilon_t \quad (4.7)$$

Where $BA'Y_{t-1}$ represents the Error Correction Term, X_t is *(n x 1)* vector of *I (1)* variables; B is *(n x h)* matrix contains the adjustment parameters (long-run relationship), α_i holds the short-run parameters; μ is *(n x1)* constant matrix, A' represents *(h x n)* matrix of cointegrating vectors, whose rows are linearly independent such that $A'Y_t$ is a stationary *(h x 1)* vector. In cases when cointegration among the variables does not exists, then a VAR model specification is estimated.

Having estimate VAR or VECM, it enables one to derive the impulse response function and the variance decomposition tests. The impulse response function traces the response of the endogenous variables to one standard deviation shock or change to one of the disturbance terms in the system (Odior & Banuso, 2011). A shock in a variable is transmitted to all of the endogenous variables through the dynamic structure of the VAR. If the system is stable, the impulse responses will all approach zero. There will be a difference in the timing of the effects. The impulse response therefore shows the interaction between the endogenous variables sequence. The variance decomposition is an alternative method to the impulse response functions. This technique determines how much of the forecast error variance for any variable in the system is explained by innovations to each explanatory variable over a series of time horizons (Stock & Watson, 2001). Own series shocks explain most of the error variance usually, although shocks will also affect other variables in the system. This study thus reports the results from Granger causality tests, impulse response and the forecast error variance decompositions.

4.3. The Theoretical Framework

The model in the study follows from the Permanent Income Hypothesis, the Life-Cycle Model and the Certainty Equivalent Model, as formulated by (Darby, 1977; and Johnsson & Kaplan, 1999). Both models capture the income element. The Life Cycle and the Certainty Equivalent

Models adds the interest rate element. Generally, pure consumption is the sum of total consumers' expenditure, less the net investment in durable goods plus an imputed yield at the rate per period of the average durable stock for that period (Darby, 1977). However, before the function of the pure consumption is adopted, it is very important to note that the real stock of consumer goods which is also the durable stock at the end of the period is obtained by applying a depreciation rate per period and it is expressed as:

$$S_t = (1 + l)C_t^s + (1 + l)S_{t-1} \quad \text{.....(4.8)}$$

where S is the real stock of consumer goods in period t, ℓ is the depreciation rate, and C_t^s is the coefficient of durable goods expenditure. The coefficient of durable goods expenditure adjusts for intra-period depreciation on gross investment and it follows the net investment in durables, such that the change in durables can be expressed as:

$$\Delta S_t = (1 - l)\, C_t^s - lS_{t-1} \quad \text{.....(4.9)}$$

The pure consumption function is then expressed as:

$$C_t = C_t^{''} - \Delta S_t + r(S_t + S_{t-1})$$

$$= C_t^{''} - (1 - r)\, \Delta S_t + r\, S_{t-1} \quad \text{.....(4.10)}$$

where r is the rate per period which is used in computing the imputed yield . $C_t^{''}$ can be solved to obtain:

$$C_t^{''} = C_t + (1 + r)\, \Delta S_t - rS_{t-1} \quad \text{.....(4.11)}$$

$C_t^{''}$ shows that consumers' expenditure is given by pure consumption plus net durables investments minus the yield at the beginning of the durable stock. Since the real value of the

durable stock at the beginning of period t is predetermined by the past changes in that stock, the functions must be specified only for pure consumption and household investment in durable goods. Pure consumption is well explained by the Permanent Income Hypothesis (Darby, 1977), such that:

$$C_t = kY_{pt} \quad \text{.....(4.12)}$$

where k is a constant, and Y_{pt} is permanent income in period t.

The permanent income concept appears to provide a relative accurate method for estimating aggregate wealth as compared to the direct estimates used in the Life-Cycle Model (Darby, 1977). The Permanent Income Hypothesis and the Life-Cycle Hypothesis are some of the major consumption theories. These two consumption theories are generally viewed as complements (Darby, 1987). The main difference between the Permanent Income Hypothesis and the Life-Cycle Hypothesis is in the time horizons (Johnsson & Kaplan, 1999). The Life-Cycle Hypothesis assumes a finite time horizon, while the Permanent Income Hypothesis assumes that time is indefinitely long.

The change in the stock of durable goods is in the nature of a portfolio adjustment problem. Households increase their holdings of durable goods if their total assets increases and reduce their holdings of durable goods when their wealth falls. Consumers face windfalls now and then, and they are able to increase their holding of durable goods stock in order to make up for part of any remaining discrepancy caused by the windfalls or as a temporary response to disproportionally large money balances, such that:

$$\Delta S_t = (\Delta S_t)^e + \lambda_1[S_t^e - (\Delta S_t)^e - S_{t-1}] + \lambda_2 Y_{Tt} + \lambda_3(m_t - m_t^e) \quad \text{.....(4.13)}$$

where Y_{Tt} is the transitory income, $(\Delta S_t)^e$ is planned investment, m_t is the real money demand in period t, and $\lambda(S_t^e - S_{t-1})$ is the stock adjustment.

The stock adjustment in equation 3.6 is strictly applicable to a non-growing world, under the assumption that no one ever plans ahead. Wachtel (1972) also had a similar model of consumers' portfolio balances which included durable goods. This model captures the main elements that generally influence the change in the stock of durable goods and private consumption expenditure, as explained in the literature. To complete the model which combines the three theories together, the long run durable stock demand, S_t^e ;the planned change in durable good, $(\Delta S_t)^e$; and the real money demand, m_t^e , has to be specified.

The durable stock demand is a linear function of permanent income, the relative price of durable goods and the long term interest rate. It is expressed as follows:

$$S_t^e = \alpha_0 + \alpha_1 Y_{pt} + \alpha_2 \frac{P_{dt}}{P_{ndt}} + \alpha_3 i_t \quad \text{.....(4.14)}$$

where Y_{pt} is permanent income, $\frac{P_{dt}}{P_{ndt}}$ is the relative price of durable goods ,and i_t the long term interest rate.

Planned change in durable goods through nominal savings is approximately proportional to permanent income :

$$(\Delta S_t)^e = \mu\ Y_{pt} \quad \text{.....(4.15)}$$

The monetary aggregate best explains wealth. The demand for real money balances is assumed to be a linear function of permanent income, transitory income which is captured by the Life-

Cycle Model and the long term interest rate which is captured by the Certainty Equivalent Model:

$$m_t = \gamma_0 + \gamma_1 Y_{pt} + \gamma_2 Y_{Tt} + \gamma_3 i_t \quad \text{.....(4.16)}$$

Substituting equation 4.16 into equation 4.13, yields the consumers durable goods investment function:

$$\Delta S_t = (\lambda_1\alpha_0 - \lambda_3\gamma_0) + [(1- \lambda_1)\mu + \lambda_1\alpha_1 - \lambda_3\gamma_1]Y_{pt} + (\lambda_2 - \lambda_3\gamma_2)Y_{Tt} + \lambda_3 m_t - \lambda_1 S_{t-1} + \lambda_1\alpha_2 \frac{P_{dt}}{P_{ndt}}$$

$$+ (\lambda_1\alpha_3 - \lambda_3\gamma_3)i_t \quad \text{.....(4.17)}$$

The coefficient of real money balances is unambiguously positive and the coefficients of the lagged real durable goods stock and the relative price of durable goods are unambiguously negative. The signs of the other coefficients are ambiguous.

Finally, equation 4.12 and equation 4.17 are substituted in equation 4.11 to obtain consumers' expenditure function:

$$C_t = ¥_0 + ¥_1 Y_{pt} + ¥_2 Y_{Tt} + ¥_3 m_t + ¥_4 S_{t-1} + ¥_5 \frac{P_{dt}}{P_{ndt}} + ¥_6 i_t \quad \text{.....(4.18)}$$

Equation 4.18 serves as a reasonable straightforward method of incorporating standard notions about factors influencing pure competition and households' investments in consumers' durable goods into consumers' expenditure function. It is also explained that present and future income, current income, expected interest rate and income uncertainty are important in determining present and future consumption (Johnsson & Kaplan, 1999). Having showed that permanent income, transitory income, wealth and the long run interest rate explain consumption expenditure behaviour, the estimated model is specified in the following section.

4.4. The Private Consumption Expenditure Model

The theoretical framework above illustrates pure consumption. Pure consumption is the consumption of goods, which does not yield any returns or any form of capital (Gottfield, 1995). This is the consumption of goods, which for example, does not add any value to the human body. It includes consumables like perfumes and novels. Consumption in general is a mix of pure consumption and reinvestment. Private consumption is the consumption of goods and services by the households which includes pure consumption. Goods categorized under pure consumption are consumed by individuals to satisfy their private needs and wants. Therefore, pure consumption is part of private consumption.

The private consumption expenditure model adopted in this study is similar to the one used by Singh (2004), Wadad (2011) and Roland and Richards (2012). The use of this model is well justified by the permanent income hypothesis theory in the sense that it shows private consumption expenditure, like consumption in general, depends on disposable incomes. The Life-Cycle Model adds the wealth element in the model. It also shows that income changes over the phases of the households' life-cycle. This is the main assumption of the Life-Cycle Model. The model also specifies lending rate as an independent variable. This is in accordance with the Certainty Equivalent Model, which introduced the importance of interest rate in the consumption function.

In equation 4.18, $¥_1 Y_{pt}$ represents the Permanent Income Hypothesis. The Permanent Income Hypothesis is explained by disposable income, thus this variable can be represented by disposable income. The $¥_2 Y_{Tt} + ¥_3 m_t$ variables are seen through wealth and they represent the

Life-Cycle Model. $¥_4 S_{t-1} + ¥_5 \frac{P_{dt}}{P_{ndt}} + ¥_6 i_t$ represent the Certainty Equivalent Model, which introduced interest rates to the model. It is represented by nominal lending rate in this case.

The model is thus a combination of these three consumption theories, as shown in the theoretical framework. The private consumption expenditure model can be written as follows:

$PCE_t = f(Y_t, W_t, LR)$ .....(4.19)

Where PCE is private consumption expenditure in period t, Y is disposable income in period t, W is wealth in period t, and LR is lending rate.

Generally, the use of the income variable in the consumption function is anticipated to have a positive impact on consumption as justified by the standard theories of consumption (Roland & Richards, 2012). Roland and Richards (2012) further states that wealth as well as interest rates are also justified by the theories of consumption, in the sense that wealth is assumed to have a positive effect on consumption, because when a household is assumed to hold more wealth, that household is more likely to spend more compared to one that is classified to be at a low wealth level. The increase in interest rate will lead to the fall in private consumption expenditure in the current period. However, it might also lead to a situation in which the households save less than before, to achieve the desired future income levels, thus increase current consumption. The rate of interest together with inflation are said to be used in capturing the short-run substitution effect in the consumption function (Singh, 2004).

From equation 4.12, the long-run steady-state between private consumption expenditure, disposable income, wealth and lending rate is as follows:

$\text{Log } PCE_t = \alpha_0 + \alpha_1 \text{ Log } Y_t + \alpha_2 \text{ Log } W_t + \alpha_3 \text{ Log } RL_t + e_t$ .....(4.20)

where the variables are named in equation 3.12, and e_t is the long-run residual term. Again the function shows that private consumption is a function of disposable income, wealth, and lending rate, which is justified by the theories of consumption.

To capture the speed of adjustment and the short-run dynamics, the Error Correction Model is given as follow:

$$\Delta \text{Log PCE}_t = \sum_{i=1}^{q} \beta_i \ \Delta \text{Log PCE}_{t-i} + \sum_{i=1}^{q} \delta_i \ \Delta \text{Log Y}_{t-i} + \sum_{i=1}^{q} \gamma_i \Delta \text{Log W}_{t-i} + \sum_{i=1}^{q} \varphi_i \Delta \text{Log LR}_{t-i}$$

$$+ \rho e_{t-1} + \varepsilon_i \quad \text{.....(4.21)}$$

The variables are still as defined in equation (4.19). A Δ is a first deference operator, ρe_{t-1} is the one period lagged error correction term and ε_i is the short-run error term. The coefficient of the lagged error correction term is what measures the speed of adjustment of deviations from the long-run equilibrium, which might be brought about by shocks in the system.

4.5. Data and Variables

The study used annual data, from 1980 to 2011. Data was obtained from the World Bank website in 2012 and also from the Bank of Namibia. Data for private consumption expenditure is expressed in real terms. Lending rate is expressed in nominal terms. Due to the fact that lending rate is measured against some other quantities or measures which are only known by the central bank, it is used in nominal terms as obtained in order to avoid yielding confusing results even if the other variables are in real terms. Quasi money is used as a proxy for real wealth. Monetary aggregates can be used as proxies for real wealth (Wada, 2011); however, due to lack of data on monetary aggregate in Namibia, quasi money is used. The use of quasi money is justified by Singh (2004) who mentions that quasi money is a suitable proxy for wealth because it comprises

of monthly time and saving deposits of the private sector. Quasi money is also a component of households' holding of broad money. Real disposable income is used as a proxy for income. Roland and Richards (2012) used real GDP as a proxy for income. Holmes (2010) also used real GDP as a proxy for income, in reference to De Broweur (1996) and Vaidyanthan (2003), respectively. Due to a lack of annual data in Namibia from 1980 to 1990, South African data on quasi money and lending rate were used. South Africa took over Namibia from Germany in 1915 and was in charge until in 1990 when Namibia became independent. This arrangement makes South African data a suitable proxy to use in covering the data-gap for Namibia. Eviews 6 software was used to examine the time series properties of the model and to estimate the equations.

CHAPTER FIVE: RESULTS AND DISCUSIONS

5.1. Introduction

This chapter provides the analytical outputs from the unit root and cointegration tests. Results from the VAR and Granger Causality are also presented. The results and the discussion are presented in that order.

5.2. Unit Root

The Unit Root test is a method that is used in testing for stationarity in the data. It is usually conducted prior to any estimation because most macroeconomic variables are trended and are mostly non-stationary (Wadad, 2011; Asterious & Hall, 2009). The results of the unit root for ADF, PP and KPSS tests are presented in Table 5.1below:

Table 5.1: Unit Root Test for ADF, PP and KPSS in levels and first difference.

Variable	**Model specification**	**ADF**			**PP**			**KPSS**		
		Levels	**D**	**O.I**	**Levels**	**D**	**O.I**	**Levels**	**D**	**O.I**
LnPCE	Intercept and trend	-0.651	-3.250	1	-1.798	-22.103	1	0.182	0.123	1
	Intercept	1.194	-1.643	2	-0.213	-7.821	1	0.701	0.165	1
LnLR	Intercept and trend	-3.020	-3.570	1	-3.429	-9.258	1	0.202	0.153	1
	Intercept	-0.822	-3.254	1	-1.739	-5.612	1	0.410	0.395	1
LnY	Intercept and trend	-2.396	-5.154	1	-3.259	-5.656	1	0.184	0.175	1
	Intercept	2.096	-4.380	1	2.519	-4.331	1	0.728	0.551	1
LnW	Intercept and trend	-1.584	-5.753	1	-1.584	-5.910	1	0.160	0.089	1
	Intercept	-1.735	-5.668	1	-1.725	-5.681	1	0.488	0.175	1

Notes for table 5.1: (a) O.I stands for order of integration, D stands for difference, LnPCE is private consumption expenditure, LnLR is lending rate, LnY is disposable income and LnW is wealth.(b) at 5%, the critical values at levels and first difference are:-3.595 and -3.612 for LnPCE, -3.568 and -3.581 for LnLR, -3.563 and -3.568 for LnY and LnW under the ADF test; -3.563and-3.568 for all variables in the PP test; and 0.146 for all variables under the KPSS test. At 10% critical values for levels and first difference are: -3.233and-3.243 for LnPCE, -3.218 and-3.225 for LnLR, -3.215and -3.218 for LnY and LnW under the ADF test; -3.215 and -3.218 for all variables under the PP test; and of 0.119 for all variables under the KPSS test.

Table 5.1 shows that all the variables are non-stationary in levels as reported by the ADF, PP and KPSS tests at 5% and 10% levels of significance, for the model with intercept and trend, as well as the one with intercept only. Having established that there is presence of unit root in the levels, the next step is to difference. After differencing ones, the test statistics indicate that all variables became stationary for the model with trend and intercept, with some variables being stationary at 5% and others at 10% levels of significance. Under the model with intercept only, private consumption expenditure had to be differenced twice since it became stationary at both 5% and 10% levels of confidence. When differenced once, the other three variables, namely lending rate, disposable income and wealth turned out to be stationary at 5% and 10% levels of significance. That suggested that the variables are integrated of the order 1.

5.3. Cointegration

Cointegration is conducted to test the linear combination of two or more time series. The series which are more than one are linked to form an equilibrium relationship in the long run, even if they individually contain stochastic trend/ non-stationary, as they are assumed to move closely

together over time and their difference will be stable and stationary (Granger, 1990). Since all variables are integrated of the order one, a long run relationship is expected among these variables. To check for cointegration among the variables, the Johansen test developed by Johansen-Juselius (1990) was used in this case. The results are presented in Table 5.2.

Table 5.2: Johansen Co-integration test based on Trace and Maximum Eigen Value test.

	Trace Test		**Maximum Eigenvalue Test**	
Hypothesized No. of CE(s)	**Trace Statistics**	**0.05 Critical Value**	**Maximum Eigen-Value Statistic**	**0.05 Critical Value**
None	42.57855	47.85613	18.18341	27.58434
At most 1	24.39515	29.79707	13.96773	21.13162
At most 2	10.42741	15.49471	9.474139	14.26460
At most 3	0.953272	3.841466	0.953272	3.841466

The null hypothesis of cointegration sys there is no cointegration, that is, $r = 0$ and the alternative says there is cointegration, that is, $r \geq 1$ or $r \geq 2, 3$. The calculated t-statistics value is compared to the critical value, and if the calculated turns out to be greater than the critical value then the null hypothesis is rejected. The Trace Test in Table 5.2 shows that the null hypothesis has not been rejected because the calculated t-statistic value of 42.579 is less than the tabular value of 47.856. The Trace Test therefore, identified no cointegration equation. The Maximum Eigenvalue Test shows that all calculated t-statistic values are smaller than the critical values at 5% level of confidence and failed to reject the null hypothesis of no cointegration.

At times these two tests conflict each other but the Trace Statistics is more robust than the Maximum Eigenvalue Test. If on the one hand, the Trace Test shows that there is one cointegration equation while on the other hand, the Maximum Eigenvalue Test shows no cointegration equations, the Trace Test results are chosen because of the usefulness of them when compared to the Maximum Eigenvalue Test as stated earlier. However, in this case both

tests show no cointegrating equations. This entails that private consumption expenditure; lending rate, real disposable income and wealth are not cointegrated.

5.4. The Vector Auto-regression Model

Having tested for the univariate characteristics of the variables, the Vector Auto-regression Model (VAR) is estimated. The VAR procedure can be used even in a situation where the variables are not cointegrated. The VAR is a procedure used to produce forecasts of economic variables and is also helpful in cases where there is a need to examine the effects of economic shocks (Engle & Granger, 1987). In this scenario, the VAR technique is used to test the relationship of private consumption expenditure and the variables lending rate, real disposable income and wealth.

There are two types of VAR, the Unrestricted VAR and the restricted VAR, which is also known as the VEC. The Unrestricted VAR is needed when the variables are not cointegrated. On the other hand, the VEC is conducted when the variables are cointegrated. The study, however, employed both the Unrestricted VAR and the VEC techniques. The Unrestricted VAR is conducted to test the stability of the model, while the VEC is conducted to get the results of the granger causality, the impulse response and the forecast error variance decomposition. Odior et al. (2011) used the Structural Unrestricted Vector Auto Regression Model (SVAR). Their results revealed an existence of a relationship between some macroeconomic variables and consumption expenditure.

The result on the unrestricted VAR was conducted and the results are presented in table 5.3 in the appendix. In testing the unrestricted VAR, interest was placed on obtaining the information

on lag length and to test how stable the model is. The information on lag length is presented in Table 5.4.

Table 5.4: Information Criteria for the Lag order selection for the VAR system.

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.24e-05	0.051303	0.238129	0.111070
1	163.0974*	5.34e-08*	-5.405928*	-4.471797*	-5.107092*
2	18.59839	6.82e-08	-5.224899	-3.543462	-4.686993

*Notes: (a) * indicates lag order selected by the criterion, (b) LR: sequential modified LR test statistic (each test at 5% level), FPE: Final Prediction Error, AIC: Akaike Information Criterion, SC: Schwarz Information Criterion and HQ: Hannan-Quinn Information Criterion*

The procedure is done to determine the level of lags and the point at which the model will converge. That operation is called the optimal lag length. In Table 5.4, LR, FPE, AIC, SC and HQ all selected one lag. The selected lag length performs well in robustness check. The results for modulus test are presented in Table 5.5.

Table 5.5: Characteristics of Polynomial Stability condition of the VAR system.

Roots	Modulus
1.025155	1.025155
0.832033	0.832033
0.404827 - 0.515724i	0.655634
0.404827 + 0.515724i	0.655634
0.046721 - 0.504313i	0.506473
0.046721 + 0.504313i	0.506473
-0.228626	0.228626
0.213290	0.213290

For the model to be stable all roots should lie inside the circle and the modulus has to be less than one. At the chosen lag length, the results in Table 5.5 shows that one of the modulus, 1.025,

is greater than one. The figures in table 5.5 are incoherence with the stability condition and thus it requires to be differenced. It is also shown in Figure 5.1 in the appendix that at least one of the roots lay outside the circle. After differencing, the model results were obtained and they are presented in Table 5.6, respectively.

Table 5.6: Characteristics of Polynomial Stability condition of the Generic Model.

Roots	Modulus
-0.130849 - 0.754262i	0.765528
-0.130849 + 0.754262i	0.765528
0.213890 - 0.490258i	0.534885
0.213890 + 0.490258i	0.534885
-0.486318 - 0.147633i	0.508233
-0.486318 + 0.147633i	0.508233
0.353980 - 0.357572i	0.503150
0.353980 + 0.357572i	0.503150

The results in Table 5.6 show that at the chosen lag length, all eight inverse roots of characteristic AR polynomial have modules that are less than one. Figure 5.2 in the appendix also show that all roots lies inside the circle. This confirms adherence to the earlier stated model stability condition. The next step was to conduct the VEC. It is important to state that the VEC was conducted so that the Granger Causality, the Impose Response Function and the Forecast Error Variance Decomposition could be conducted. The study adopted these approaches in this sequence and the statistics are computerized using the software package.

5.4.1. Granger Causality

Granger causality was conducted to test whether the variables at hand predict one another. Table 5.7 summarizes the results of a four variables. Conclusions were drawn through the comparison of the p values and the α which represents the level of significance. When α is greater than the p

value, then the variable is appropriate for predicting the other variable and reject the null hypothesis of granger cause.

Table 5.7: Granger Causality Test for the Generic Model.

	Dependent Variable in Regression			
Regressor	PCE	LR	Y	W
PCE	0.000	0.627	0.642	0.002**
LR	0.339	0.000	0.526	0.014**
Y	0.369	0.716	0.000	0.993
W	0.012**	0.638	0.023**	0.000

*Notes: (a) PCE is private consumption expenditure, LR is lending rate, Y is disposable income and W is wealth. The entries in the table show the p-values for F-tests. (b)** means the rejection of the null hypothesis at 5%*

As it is known with Granger causality, the dependent variables in regression do not predict themselves. However, the regressors are the predictors for the dependent variables as shown in Table 5.7. In this case, wealth is the only variable that is able to predict two variables, namely private consumption expenditure with 0.012 and income with 0.023. Private consumption expenditure predicts wealth, while lending rate also predicts wealth with 0.014. Iincome is the only variable that has no predictive power over any other variables.

5.4.2. Impulse Response Function

The Impulse Response Function traces the effect that a one-time shock to the endogenous variables will have on their current and future values (Odior & Banuso, 2011). Most studies used the traditional Cholesky Impulse Functions but the impulse and the Variance Decomposition are most applicable to the linear multiple time series models (Koop et al., 1996). The Cholesky Impulse Function is sensitive to the ordering of variables as stated earlier. The Generalized

Impulse Response Function (GIRF) caters for both the linear and the nonlinear multivariate models. Pesaran and Shin (1998) used the generalized impulse response function in their linear multivariate model and it proved to be worthwhile and non-problematic in explaining the responses. The GIRF is not sensitive to the ordering of the variables used in the VAR model and it did not require orthogonalistion of shocks. The GIRF takes into account the historical patterns of correlation between different shocks and that makes it unique (Pesaran & Shin, 1998). Despite all that, the GIRF has one short-coming. It will be hard to obtain the variance decomposition for any single equation of the system. Thus it is hard to differentiate between the direct impact of the shock on a single variable and the impact which might be brought about as a result of an innovation from other variables in the system.

The Impulse Response in this study is conducted to show how private consumption expenditure reacts to exogenous shocks in lending rate, disposable income and wealth over-time. The GIRF was chosen over the Traditional Cholesky Impulse Response Function because it is not sensitive to the ordering and does not require orthogonalisation of shocks. The results are presented in figure 5.3 below:

Figure 5.3: Impulse response of Private Consumption Expenditure of the Generic Model.

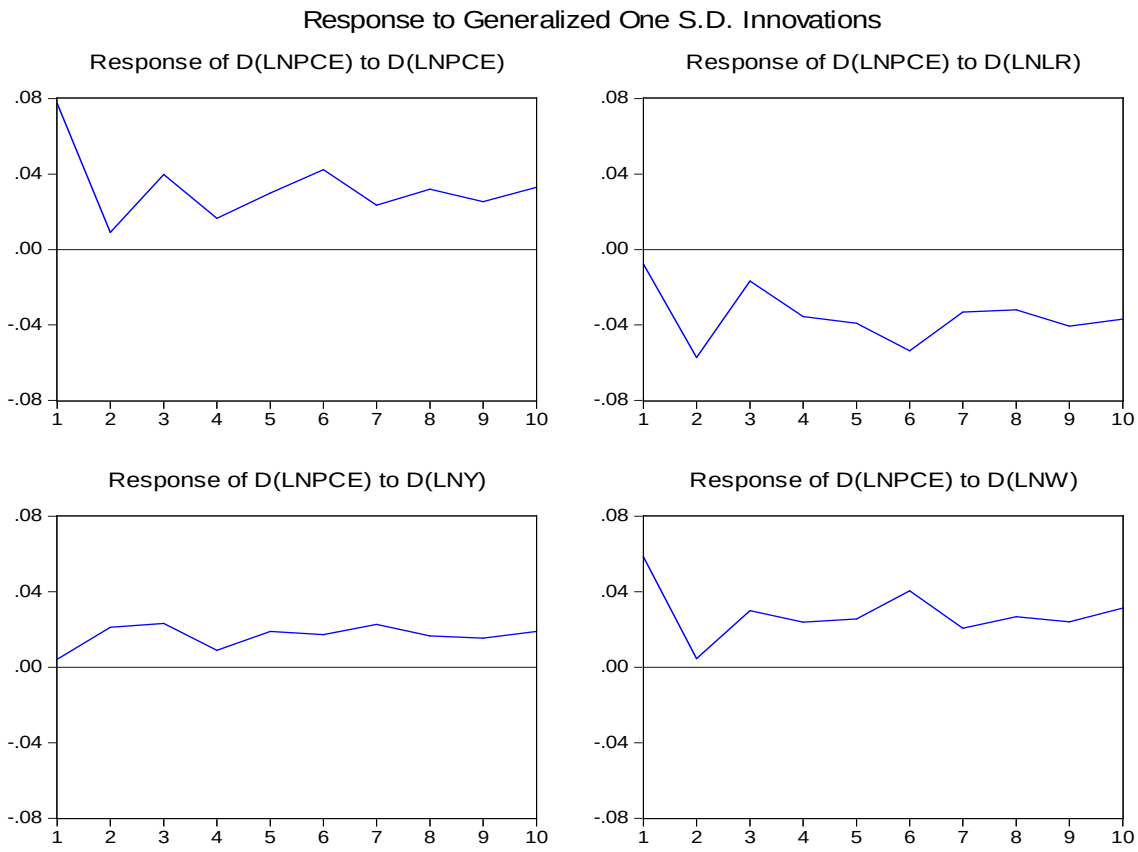


Figure 5.3 shows the response of private consumption expenditure to the shocks in lending rate, income and wealth. As depicted in Figure 5.3, a shock in private consumption expenditure will lead to a sharp drop in itself in the first year to the second year above the steady state from around .08 to .01. It will however, pick up sharply between the second and the third year. It will fall again in the fourth year and then increase at a decreasing rate between the fourth and the sixth year. A shock in lending rate leads to a reduction in private consumption expenditure below the steady-state as expected and confirms that lending rate has a negative impact on private consumption expenditure. In the first year, a shock in the lending rate will lead to a sharp drop in the level of private consumption expenditure at around -6.3, until the second year when it picks

up again and increases to -2.5 in the third year. The fluctuations are seen between the first seven years but after the eighth year, the fluctuations seize and become smaller between -4 and -3, respectively.

The impact of disposable income on private consumption expenditure will also be above the steady-state and this conforms to the consumption theory that disposable income has a positive impact on private consumption expenditure. In the first year, the shock leads to increases in private consumption expenditure from .01 to .25. Interestingly, private consumption expenditure remains high in the first three years and drops to .01 in the fourth year. Again it picks up in the fifth year and remains above .01 over a five year period. The response of private consumption expenditure to wealth is also above the steady-state and that conforms to the consumption theory of a positive impact on private consumption expenditure. In the first two years, the shock leads to a sharp drop in private consumption expenditure from .035 to a low .05. In the third year, private consumption expenditure picks up again. Later on private consumption expenditure moves in an almost constant line between the fifth and the seventh year. The impulse response appears unstable in this case, showing that the effects of the shocks are temporal. It is worth noting that a shock in the three determinants of private consumption expenditure leads to a sharp decrease in the first year, but pick up later from the second year. All these again are shown by Table 5.8 in the appendix.

5.4.3 Forecast Error Variance Decomposition

The Forecast Error Variance Decomposition (FEVD) separates the variation in an endogenous variable into the component shocks to the VAR (Stock & Watson, 2001). The FEVD provides

information about the relative importance of each of the random innovations in affecting the variables in the VAR model. The results of the FEVD are presented in Table 5.9.

Table 5.9: Variance Decomposition for the Generic Model.

Variance Decomposition of D(LnPCE)				
Year	**D(LnPCE)**	**D(LnLR)**	**D(LnY)**	**D(LnW)**
2	64.659	34.132	0.002	1.207
4	60.554	34.616	2.563	2.267
6	54.035	42.340	1.869	1.757
8	52.639	43.704	2.163	1.494
10	50.503	46.191	1.907	1.400
Variance Decomposition of D(LnLR)				
Year	**D(LPCE)**	**D(LnLR)**	**D(LnY)**	**D(LnW)**
2	4.059	94.632	1.274	0.034
4	3.527	88.610	5.233	2.630
6	3.015	89.339	5.447	2.199
8	2.688	89.267	5.415	2.630
10	2.403	88.879	6.046	3.672
Variance Decomposition of D(LNY)				
Year	**D(LnPCE)**	**D(LnLR)**	**D(LnY)**	**D(LnW)**
2	7.586	16.216	75.387	0.811
4	11.673	17.029	67.719	3.578
6	11.621	24.508	61.281	2.591
8	12.305	23.273	62.379	2.043
10	11.810	26.230	60.212	1.748
Variance Decomposition of D(LnW)				
Year	**D(LnPCE)**	**D(LnLR)**	**D(LnY)**	**D(LnW)**
2	52.653	5.879	0.498	42.185
4	62.065	6.829	1.508	28.757
6	58.010	11.016	4.240	26.734
8	59.255	11.030	4.630	25.086
10	61.129	10.379	4.542	23.950

Note: the forecast error variance decomposition of each variable in table 5.9 is made over a two years forecast horizon.

The forecast errors in private consumption expenditure, lending rate and income are attributed to their own innovation which also decreases as the time horizon increases. The forecast errors by lending late in private consumption increases as the time horizon increases for example, from 34.13 in the second year, to 42.34 in the sixth year. The forecast errors in lending rate by income are also increasing with the time horizon. The forecast errors of income by lending rate are increasing with the time horizon. The errors brought about by wealth and private consumption expenditure are fluctuating as the time horizon is increased. The highest forecast errors in wealth, however, are brought about by innovation in private consumption expenditure and not by itself like the other three variables. They also decline as the time horizon increases for example, from 52 in the second year to 58 in the sixth year respectively. The forecast errors in wealth which are brought about by itself are also quite high compared to those that are brought about by income and lending rate. Those that are brought about by lending rate and income in wealth are fluctuating as the time horizon increases.

To sum up, this chapter has presented the results of the estimations. Private consumption expenditure, lending rate, income and wealth were tested for stationarity and they were found to be non-stationary. This shows that there was a long-run equilibrium relationship between the four variables, which was later confirmed by the cointegration procedure. The model was also tested for stability, a condition which it satisfied after it was differenced. The VEC procedure was conducted, from which the Granger causality, the impulse response and the forecast error variance decomposition were conducted.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusions

The study examined the relationship between private consumption expenditure and lending rate in Namibia. Private consumption expenditure reflects the living standard and explains the issue of consumerism in an economy. It is therefore, an important macroeconomic variable. The data set covers the period of 1980 to 2011 structural break. Lending rate, disposable income and wealth all proved being relevant to private consumption expenditure in Namibia. All shocks in the determinants considered all showed to affect private consumption expenditure. However, the effect of the shocks in all of the three determinants and private consumption expenditure itself tends to wear out in the long-run. It was confirmed that lending rate has no positive impact on private consumption expenditure. It was also established that disposable income and wealth have a positive impact on private consumption expenditure. The negative impact of lending rate on private consumption, as well as the positive impact by disposable income and wealth stated by the Permanent Income Hypothesis Model, the Life-Cycle Model and the Certainty Equivalent Model, as well as by other scholars and theories, holds for Namibia. The relationship between private consumption expenditure and lending rate in Namibia depends on the magnitude of the substitution effect.

6.2. Recommendations

A fall in lending rate stimulates income, boosting private consumption in return. For the purpose of policy lessons, a fall in lending rate by the commercial banks will be an appropriate instrument for stimulating the levels of private consumption expenditure in Namibia. Therefore, a low lending rate can help in improving the lives of the middle income earners who are the

majority of the economy. With income and wealth playing a vital role in influencing consumption levels of households, fiscal policies should be considered as effective tools in promoting private consumption expenditure. This can occur through its impact on disposable income and wealth. For instance, a reduction in tax may be one of the fiscal policy tools for consideration. In the same manner, the effect brought about by innovations in the determinants of private consumption expenditure in the long-run tends to wear out.

It is very important to bare in mind that this study only considered three determinants of private consumption expenditure to narrow down the scope. This limitation lead to the results presented above. If the study could have considered more than three determinants of private consumption expenditure maybe it could have given different results. In future, one could take up this topic for further research, expand the model by adding more variables and use a different econometric approach to test if similar results will hold for the Namibian economy.

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APPENDIX

Figure 5.1. Characteristics of Polynomial stability condition of the VAR system

For the model to be stable all roots should lie inside the circle and the modulus has to be less than one. At the chosen lag length, the results in Table 5.5 shows that one of the modulus, 1.025, is greater than one. It is also shown by Figure 5.1. The model did not satisfy the stability condition, as shown:

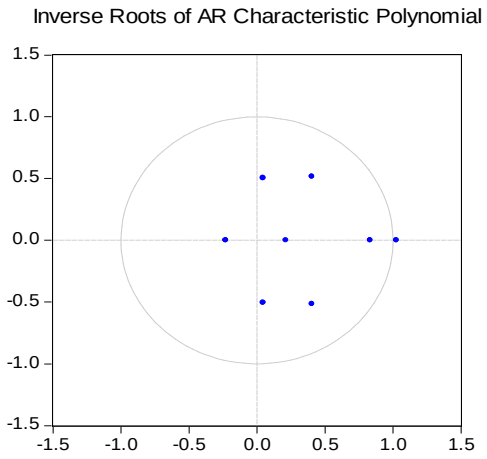

Figure 5.2. Characteristics of polynomial Stability condition of the generic model

The results in Table 5.6 shows that at the chosen lag length, all eight inverse roots of characteristic AR polynomial have modules that are less than one. Figure 5.2 in the also show that all roots lies inside the circle. That means that the model passes the stability condition.

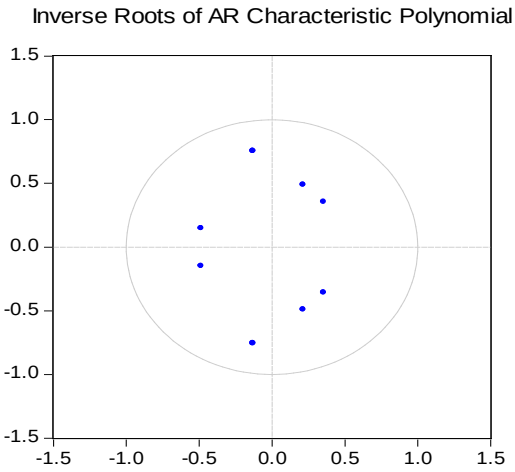

Table 5.3. The Vector Auto regression Estimates

When the Unrestricted VAR was conducted, the interest is not in the single coefficients, but in obtaining the information on lag length and to test the model's stability. The results of the VAR are presented below:

Vector Autoregression Estimates

Date: 07/06/13 Time: 10:49

Sample (adjusted): 1982 2011

Included observations: 30 after adjustments

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

	LNPCE	LNLR	LNW	LNY
LNPCE(-1)	0.499561	-0.188946	1.388652	0.043371
	(0.22390)	(0.51804)	(3.65453)	(0.11321)

	[2.23122]	[-0.36473]	[0.37998]	[0.38309]
LNPCE(-2)	-0.200253	-0.133643	-0.243703	0.048262
	(0.18160)	(0.42017)	(2.96413)	(0.09183)
	[-1.10272]	[-0.31807]	[-0.08222]	[0.52558]
LNLR(-1)	-0.180998	0.661258	-1.998923	-0.023792
	(0.08668)	(0.20056)	(1.41488)	(0.04383)
	[-2.08804]	[3.29703]	[-1.41279]	[-0.54280]
LNLR(-2)	0.150059	-0.427109	0.578436	-0.000167
	(0.07934)	(0.18356)	(1.29494)	(0.04012)
	[1.89145]	[-2.32680]	[0.44669]	[-0.00416]
LNW(-1)	-0.010255	-0.053892	0.664812	-0.015856
	(0.01676)	(0.03879)	(0.27362)	(0.00848)
	[-0.61177]	[-1.38946]	[2.42969]	[-1.87063]
LNW(-2)	0.040017	0.015451	-0.021523	0.004391
	(0.01733)	(0.04009)	(0.28284)	(0.00876)
	[2.30930]	[0.38537]	[-0.07610]	[0.50111]
LNY(-1)	0.226191	-0.853169	-5.564843	0.919317

	(0.46575)	(1.07762)	(7.60217)	(0.23551)
	[0.48565]	[-0.79171]	[-0.73201]	[3.90352]
LNY(-2)	0.566625	0.546640	3.065137	-0.017860
	(0.44368)	(1.02655)	(7.24187)	(0.22435)
	[1.27711]	[0.53250]	[0.42325]	[-0.07961]
C	-1.696171	9.220216	25.26662	0.429521
	(1.59523)	(3.69094)	(26.0380)	(0.80664)
	[-1.06328]	[2.49807]	[0.97037]	[0.53248]
R-squared	0.972968	0.817573	0.783741	0.993739
Adj. R-squared	0.962671	0.748077	0.701356	0.991354
Sum sq. resids	0.071760	0.384158	19.11839	0.018348
S.E. equation	0.058456	0.135253	0.954149	0.029559
F-statistic	94.48334	11.76430	9.513203	416.6515
Log likelihood	47.96623	22.80031	-35.80995	68.42312
Akaike AIC	-2.597749	-0.920021	2.987330	-3.961541
Schwarz SC	-2.177390	-0.499662	3.407689	-3.541182
Mean dependent	9.946720	2.751343	19.14543	10.36699
S.D. dependent	0.302556	0.269471	1.745980	0.317895
Determinant resid covariance (dof adj.)		2.39E-08		

Determinant resid covariance	5.74E-09
Log likelihood	114.3735
Akaike information criterion	-5.224899
Schwarz criterion	-3.543462

Table 5.8 Impulse response of Private Consumption Expenditure of the Generic Model

The results of the GIRF as discussed in chapter five.

Period	D(LNPCE)	D(LNLR)	D(LNY)	D(LNW)
1	0.077355	-0.007686	0.004186	0.058488
2	0.009186	-0.057229	0.021114	0.004585
3	0.039768	-0.016615	0.023193	0.030015
4	0.016496	-0.035578	0.008896	0.023962
5	0.030062	-0.039091	0.019029	0.025535
6	0.042264	-0.053654	0.017316	0.040477
7	0.023419	-0.033258	0.022685	0.020745
8	0.032016	-0.031943	0.016648	0.026732
9	0.025420	-0.040699	0.015300	0.024153
10	0.032983	-0.036908	0.018944	0.031314

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