

# **Investigating the relationship between private sector credit extension and economic growth: A case study of Namibia**

A Dissertation

Presented to

**The Development Finance Centre (DEFIC),**  
Graduate School of Business  
University of Cape Town

In partial fulfilment  
of the requirements for the Degree of  
**Master of Commerce in development finance**

by

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January 2018

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## **Abstract**

Financial development, especially through the mechanism of private sector credit lines, has an important role to play in an economy's growth. As such, economies with better financial institutions for lending and borrowing funds have the potential to grow faster. This is so because better financial systems alleviate external financing constraints that may hinder business growth and expansion. In light of this, the study investigated the relationship between private sector credit extension and economic growth in Namibia. Using quarterly data on Gross Domestic Product (GDP) and other variables covering the years from 2005 to 2017. The study employed co-integration and error correction procedures. From the results the study concluded that there is an existence of a positive relationship between private sector credit extension (PSCE) and economic growth. Our findings are consistent with theoretical propositions. The causality test indicated a unidirectional relationship running from PSCE to GDP entailing that the extension of credit to the private sector would enhance GDP growth and not vice versa. Based on these findings, it is recommended that the policy makers focus on long term economic growth policies, develop the financial sector, promote the development of efficient financial markets and infrastructure in order to increase the private sector credit lines which are instrumental in long term growth.

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## **GLOSSARY OF TERMS**

ADF:	Augmented Dickey Fuller Test
ARDL:	Auto-Regression Distributive Lag
BON:	Bank of Namibia
CGS:	Credit to the Government Sector
CPS:	Credit to the Private Sector
GDP:	Gross Domestic Product
GD:	Government Debt
IF:	Inflation
LR:	Lending Rate
M2:	Broad Money Supply
NGOs:	Non-Government Organisations
NSA:	Namibia Statistics Agency
PSCE:	Private Sector Credit Extension
SADC:	Southern African Development Community
TFP:	Total Factor Productivity
TSLS:	Two-Stage Least Squares
VAR:	Vector Auto Regression
VECM:	Vector Error Correction Model

## **ACKNOWLEDGEMENTS**

Foremost, I am highly grateful to God for his blessings that continue to flow into my life and because of you; I made this through against all odds. I offer my gratitude and appreciation to my supervisor Dr Abdul Latif Alhassan, for his professional guidance throughout the study. Your comments and criticisms were constructive and contributed enormously to the quality of this study.

With a great pressure, let me offer my appreciation to friends, family and colleagues who were a great source of support and encouragement throughout this project; I thank you all and wish you all the best in your endeavours.

A special thank you goes to my brother Gabriel for the constant support, motivation and for always being there for me through thick and thin. I do not know what I would do without you, my gratitude to you is eternal.

Lastly, a big thank you to every person who gave me something to light my pathway and believing in me, I am highly grateful. Thank you so much.

## CHAPTER 1: THE INTRODUCTION

### 1.1 Background of the study

The availability of financial resources is an important aspect in economic development and this has been an on-going debate especially in developing countries. This debate dates back to the work of economists such as Schumpeter (1911), who stressed that financial development promotes economic growth. This is made possible by the role that financial institutions play in the financial sector of a country, which is to source funds from those with extra finances and lend to those in need of extra funding. A study that was carried out in Namibia by Sindano (2009) shows that economic growth enhances the development of financial institutions. Financial institutions such as banks and public financial corporations provide financial resources in the form of loans and non-equity securities to the private sector which is measured as the percentage of the Gross Domestic Product (GDP). A high GDP translates to an increase in financial resources available to the private sector something that promotes the growth of the sector and the overall development of the country.

The Namibian financial system includes commercial banks, non-banking financial institutions, public financial corporation and non-profit organisations (NGOs) that provide funds in the form of credit lines and non-credit lines to the private sector in support of economic developmental activities in Namibia. Spencer (1977) noted that credit implies a promise by one party to pay another for money borrowed or goods and services received. Credit cannot be divorced from the banking sector as banks serve as a conduit for funds to be received in the form of deposits from the surplus spending unit of the economy and passed on to the deficit spending units who need funds for productive purposes. Banks are therefore debtors to the depositors of funds and creditors to the borrowers of funds.

Bank credit is the borrowing capacity provided to an individual, government, firm or organization by the banking system in the form of loans. The availability of credit lines provides an opportunity to channel savings into productive investments thereby promoting economic growth. More specifically, credit is an important aspect of financial intermediation that provide funds to economic entities who can make use of such funds in a more productive way. Theoretical, studies have established that there is a relationship that exists between financial intermediation and economic growth (Yakubu & Affoi, 2013). Thus, the availability of credit lines allows the role of intermediation to be carried out, which is important for the growth of the economy especially in Namibia where the government is on a drive to promote

economic growth. Therefore, credit extension is very important for rapid economic development particularly in a bank-based economy like Namibia. Statistics show that the ratio of private sector credit to GDP is quite high in Namibia. Hence, there is still a need to direct credit to the private sector.

The capacity of economic growth is one of the attributes that could be used to measure the performance of an economy. Riley (2000) argues that economic growth is dependent on certain factors in the long run. These factors that contribute to the GDP growth include the growth of the nations stock of capital, the trend rate growth of the productivity of labour, the entrepreneurial ability of human and the technological improvement. These inputs are used by businesses in the production process.

Economic growth is very important when formulating the macroeconomic policy objectives for every government both in developed and developing countries. It enables the uplifting of the living standards and greater consumption of goods and services. Most economists describe economic growth as an increase in the real output of goods and services in a country. However, there are different definitions and ways of measuring economic growth. Todora and Smith (2006) define economic growth as a steady process by which the productive capacity of the economy is increased overtime to bring about rising levels of national output and income. There will be economic growth if full employment level of the GDP is attained; however, growth will come into its own only if employment is utilised to the fullest.

Richard and Paul (2007:2) stated that economic growth occurs whenever people take natural resources and rearrange them into other activities that are more valuable. Truu (1987: 173) stated that economic growth is concerned with the conditions of achieving the greater productive capacity, which is, expanding the stock of productive factors in the course of time. The steady growth should mean the rising in the production of goods and services for each head of population in the long term and that means labour and capital are variable rather than fixed. Furthermore, Richard and Paul (1990:722) argued that economic growth is “the single most powerful engine for generating long –term increase in living standards”. What happens to the living standards over time depends mainly on the growth in the real GDP in relation to population growth and the growth of the real per capita GDP. Instruments promoting GDP growth include increased consumption, government spending, investment and improved productivity in an economy. Basing on this premise, GDP can be defined as a measure of the total value added (total value of the goods and services produced within the country less raw

materials, and other goods and services consumed during the production process) in all resident producing units (National Accounts, 2013). Since 1990, Namibia's economy has experienced growth in its GDP with an exception of 1993 when Namibia experienced some negative growth when diamond production was cut dramatically in response to De Beers stockpiling (Sherbourne, 2010). Estimates had shown that GDP growth was expected to increase by 5.3 percent in 2014 and 5.6 percent in 2015 (Bank of Namibia, 2014).

## **1.2 Statement problem**

The literature does not provide conclusive results on the subject of private sector credit lines availability and economic growth. The provision of credit lines to the private sector is crucial to the growth of any country's GDP. The availability of credit lines to the private sector could potentially stimulate economic growth for developing countries like Namibia whose financial systems are still going through stages of revolution and development since the gaining of independence. Studying the relationship between the private sector credit extension (PSCE) and economic growth is critical for Namibia considering that the financial sector is still underdeveloped.

Financial development, especially in the form of private sector credit lines has an important role to play in the growth of an economy. As such, economies with better financial institutions for lending and borrowing funds have the potential to grow faster. This is so because well-functioning financial systems tend to reduce external financing constraints that may hinder business growth and expansion. While financial institutions mainly banks in Namibia are expected to drive economic growth through channelling credit to the private sector, it is not clear whether these institutions are making a significant impact on the most important sectors of the economy. As a result, the annual growth in sectors such as mortgage credit extended to the private sector has slowed down at the end of December 2017, (Bank of Namibia quarterly bulletin,2018).

Further, high GDP growth may also increase credit demand thus leading to more credit supply. The availability of investable funds and sound financial systems that are inclusive and well-functioning play a crucial role in promoting economic growth and development by providing the much-needed financial resources to economic projects and activities. Such developments have a positive effect on the creation of employment opportunities. The purpose of the study is therefore, to investigate the relationship between the private sector credit lines and economic

growth. Focus is on the impact this may have had on the private sector's contribution towards economic development.

### **1.3 Research Question and Objectives**

The following research question was outlined in order to address the problem statement highlighted above: What is the effect of private sector credit extension on economic growth of Namibia?

The research main question was broken down into sub-questions as follows:

- a. How have the credit line facilities in the Namibian private sector evolved over time?
- b. What is the relationship between the PSCE and economic growth in Namibia?

In light of the above research main question, this study aimed to investigate the effect of private sector credit extension on the Namibian economy. The research main objective was translated into the following sub objectives:

- a. To evaluate the evolution of credit line facilities in Namibia's private sector.
- b. To investigate the relationship between the PSCE and economic growth in Namibia

Using the PSCE as a proxy of bank credit and GDP as a proxy of economic growth, the study focused on testing the following hypothesis using the Trace and Max eigen statistics.

*H<sub>0</sub>*: there is no significant relationship between PSCE and economic growth

*H<sub>1</sub>*: there is a significant relationship between PSCE and economic growth

### **1.4 Justification of the study**

Empirical evidence has supported the relationship between private sector credit extension and economic growth by establishing that the private sector credit lines availability positively impacts economic growth (Akpanung & Babalola, 2011). A study by Were, Nzomo and Ruto (2012) supported this line of thinking as they found a positive and significant impact of credit on gross domestic product measured as real value added exists. However, most empirical studies did not produce conclusive results on the direction of this causality between credit to private sector and economic growth. This has been a major issue on the economies of developing countries. Nakanma et al. (2014) investigated the nature of the long-run relationship between bank credits to the private sector and economic growth of Nigeria. They found a relationship that had no significant causality with economic growth. Given that little has been

done and not any study specifically investigated the relationship between private sector credit extension and economic growth in Namibia, the study attempts to close this gap.

### **1.5 Significance of the research**

The study is relevant to the Namibian economy in the sense that no study has specifically examined the relationship between private sector credit extension and economic growth in Namibia. Therefore, the study may help policy makers in formulating policies to capitalise on private sector credit extension as it contributes for the growth of GDP. On the external perspective, this study can be used by researchers to broaden their knowledge and as a source of secondary data.

### **1.6 Structure of the study**

The study is organised into five (5) chapters. These chapters are organised as follows:

- Chapter one introduces the study. It explains the research background and identifies a research problem, question and objectives.
- Chapter two provides a literature review. Chapter two discusses the theoretical frameworks on economic growth and the provision of private sector credit lines. Chapter two also presents findings on studies that had empirical evidence on economic growth and the provision of credit lines.
- Chapter three discusses the methodology of the study which explains how information is going to be obtained and analysed.
- Chapter four presents the research findings. It goes on to interpret the results and discuss the results.
- Chapter five provides a conclusion to the study and make recommendations on future research.

## **CHAPTER 2: THE LITERATURE REVIEW**

### **2.1. Introduction**

This section reviews both the theoretical framework and literature that is available on Private Sector Credit Extended (PSCE) and economic growth. The chapter starts with a presentation of the theoretical view of PSCE. The chapter goes on to explore the relationship between PSCE and economic growth using previous studies in the literature. An overview of the Namibian private sector credit system concludes the chapter.

### **2.2. Theoretical Framework: PSCE and Economic Growth**

This section discussed PSCE and economic growth theories. These include the Solow growth model, endogenous growth theory and neoliberal theory.

#### **2.2.1 Solow growth model**

The Solow-Swan model or neo-classical growth theory is an economic model which is based on the long run economic growth. The model was first introduced by Robert Solow and Trevor Swan in 1956 and it is an extension to the 1946 Harrod-Domar model. The model identified labour, capital accumulation and technological progress as factors necessary for the growth of an economy. The Solow model states that changes in labour can be induced by changes in population while changes in technology depends on net investment. This implies that, as long as the net investment is positive, capital and production growth will follow suit. Solow (1956) also argued that permanent economic growth cannot take place without technological progress, thus technological change has a major influence on an economy as better technology will increase the total factor of productivity.

#### **2.2.2 Endogenous growth theory**

The endogenous growth theory was developed by Romer (1986) and Lucas (1988) who argued that the technological progress is endogenous rather than exogenous. This view is one of the central missing elements in the neoclassical model that consider external factors as predictors of economic growth. The theory suggests that growth is generated from endogenous technical change resulting from innovation and investment in human capital. Romer's model can be viewed as an equilibrium model endogenous technical change in which long-run growth is driven primarily by the accumulation of knowledge by forward – looking profit maximising agents.

The key element of the endogenous growth model is the absence of diminishing returns to capital. The AK (capital stock) function is one of the simplest models of production function that is based on the assumption of constant saving ratio. The model assumes that the production

function does not exhibit diminishing returns something that leads to endogenous growth. According to the AK model, a sustainable high growth rate is attained by saving a large portion of GDP with the assumption that some of the savings will go into financing a high rate of technological progress thereby promoting economic growth.

Another version of the endogenous theory is the innovation-based growth theory initiated by Romer (1990). The innovation-based growth theory posits that innovation causes productivity growth by creating new, but not necessarily improved, varieties of products. Romer points out that the growth rate arises endogenously as innovators expand resources in order to invent specialised capital goods that enhance the efficiency of labour.

### **2.2.3 Neoliberal theory**

The neoliberal theory proposes that, when it comes to stimulating economic growth, it is of great essence to consider financial deepening and high interest rates (Ogbokor & Moses, 2014). McKinnon and Shaw (1973) popularised the neoliberal theory by arguing that developing countries suffers from financial repression which is generally equated with controls on interest in a downward direction. If these countries are liberated from these restrictive conditions, savings, investment and growth could be induced. Liberalisation will increase savings and loanable funds which results in a more efficient allocation of funds something that could contribute to the economic growth of the country.

### **2.3. Empirical literature on PSCE and Economic growth**

The literature focuses on the different factors on the level of financial resources extended to the private sector. The studies provide evidence that the drivers of credit to private sector can either have a positive or negative effect.

Hofmann (2001) analysed the determinants of credit to the private non-bank sector in 16 industrialised countries since 1980 based on cointegrating Vector Auto Regression (VAR) model. A cointegration test suggests that the long-run development of credit cannot be explained by standard credit demand factors. But once real property prices, measured as a weighted average of real residential and real commercial property prices are added to the system, the study was able to identify long-run relationships linking real credit positively to real GDP and real property prices and negatively to the real interest rate. These long relationships may be interpreted as long-run extended credit demand relationships but may also reflect effects of credit supply.

Mushendami (2007) analysed the relationship between financial development and economic growth in Namibia. He used quarterly data covering the first quarter of 1993 to the fourth quarter of 2005 which made a total of 53-time series variable. The study used a cointegration test and the error correction modelling (ECM) for analysing the relationship between financial development and economic growth in the obtained quarterly data for Namibia. The results indicated that the direction of causality runs from the financial development variables to GDP. This implies that the development of the financial sector in Namibia had a positive effect on growth as the theory suggests.

In another related study, Younus (2008) examined the relationship between economic growth (output), private sector credit and inflation in Bangladesh. The study used real private sector credit (from banks) and real GDP to examine whether private sector credit has any impact on economic growth in Bangladesh. The study used various econometric techniques such as unrestricted VAR and Granger Causality to examine any possible relationships. The study found that private sector credit has no real effect on economic growth but is inflationary. Economic growth, however, has a positive impact on real private sector credit growth reflecting higher credit demand emanating from increased economic activities. This result is consistent with the conventional belief that when an economy starts to grow it creates immediate additional demand for financial services and helps grow a better financial system. Basing on these findings, Younus (2008) recommended the need for monitoring the expansion of private sector credit lines such that much of the credit will be channelled towards productive investments rather than consumption purposes.

Sogut (2008) investigated the determinants of financial development and private sector credit for a panel of 85 developing and industrialized countries using annual data from 1980 to 2006. The results from the panel cross-sectional fixed effects procedure suggested that an increase in the public-sector credits and central government debt leads to a decrease in private sector credits in low income and lower middle-income countries. For this group of countries, public sector credits, albeit leading to a financial crowding out, were found enhancing financial development. For upper middle income and high-income countries, private sector credits were seen as increasing together with public sector credits and financial development but decreasing with central government debt. Financial development is affected adversely by inflation and positively by real GDP and public-sector credits in high income countries. In upper middle-income countries both the real GDP and credits to public sector affect financial development

positively. In low income countries, on the other hand, public sector credits and inflation correlated positively with financial development.

Oluitan (2009) examined the significance of bank credit in stimulating output within the real sector and the factors that prompt financial intermediation within the economy. The study is a contribution to the existing literature on finance and growth applied to the Nigerian economy. Evidence from this study shows that real output causes financial development, but not vice versa. It was observed that the export of oil and non-oil products does not significantly drive financial developments, but growth in the financial sector is highly dependent on foreign capital inflows.

Sindano (2009) determined the causal relationship between financial development and economic growth in Namibia. Data used were quarterly data from 1993 to 2007. The study employed a cointegration and vector error correction model (VECM) technique to test for the existence of a long run relationship between the variables. Granger causality test was applied to test for the direction of causation between variables. The results showed that there was a stable long-run relationship between financial development and economic growth. The Granger causality test indicated that the causality runs from economic growth to financial development. The results also suggested that the real sector of the economy should be developed further in order to stimulate further development in the economy through policy interventions like industrial development to diversify the economic base, enhance the performance of small and medium enterprises, and, enhance the performance of the tourism sector which has a great potential in promoting growth.

Using data on Indian banks for 1996-to-2008, Ghosh (2010), examined the interconnection among credit growth, bank soundness and financial fragility. The analysis appears to suggest that a high credit growth translates to bank fragility. Besides, the results points to the fact that sounder banks increase loan supply. Coming to bank ownership, the evidence testifies that credit growth has been rapid in state-owed and de novo private banks. In terms of policy implications, the analysis appears to suggest the need for giving priority to risk-based supervision as a way to contain the potential risks associated with rapid credit growth.

Akpansung and Babalola (2011) investigated the relationship between banking sector credit and economic growth in Nigeria over the period 1970-to-2008. The causal links between the pairs of variables of interest were established using Granger causality test while a Two-Stage

Least Squares (TSLS) estimation technique was used for regression analysis. The results of the analysis indicated that the private sector credit impacts positively on economic growth over the period of coverage. However, lending rates were found impeding growth.

Murty and Sailaja (2012) examined the long-run impact of bank credit on economic growth in Ethiopia via a multivariate Johansen cointegration approach using time series data for the period 1971/72 to 2010/11. The study also investigated the transmission mechanisms through which bank credit to the private sector affects long-run growth. The results supported a positive and statistically significant equilibrium relationship between bank credit and economic growth in Ethiopia. Deposit liabilities also affect the long-run economic growth positively and significantly through bank services of resource mobilization. Moreover, the effect of control variables such as human capital, domestic capital and openness to trade on growth were found to be positive and statistically significant while inflation and government spending have a statistically significant negative impact on economic growth in the long-run. A major finding is that bank credit to the private sector affects economic growth through the efficient allocation of resources and domestic capital accumulation. Thus, the result imply that policy makers should put more attention on the long-run policies to promote economic growth-the creation of modern banking sector so as to enhance domestic investment, which is instrumental in increasing output per capita and hence promoting economic growth in the long run.

Despite the growing literature on financial development-economic growth nexus, there is a paucity of studies with empirical evidence that explore the impact of access to credit and economic performance at sectoral country level as most studies focus on country level analysis. Were, Nzomo, and Ruto (2012) investigated the impact of access to bank credit on the economic performance of key economic sectors using Kenyan sectoral panel data. The results of the study indicated a positive significant impact of credit on sectoral gross domestic product measured as real value added. However, the magnitude of the impact is smaller once factors such as the employed labour and past economic performance of the sectors are considered. Policies aimed at financial sector deepening and increasing access to credit are of essence to enhancing economic performance. The study recommended that, such policies should, however, be complemented with strategies that enhance the efficiency of the key sectors of the economy.

Yakubu and Affoi (2013) examined the impact of the commercial banks credit on economic growth in Nigeria from 1992 to 2012. Simple regression model was used in the study for data

analysis. Based on the findings of the study, it was observed that bank credit has impacted significantly on the growth of the Nigerian economy. This implies that banks should continue to give credit to the private sector of the economy as it is contributing significantly to GDP growth in Nigeria.

Neelam (2014) used Johansen co-integration approach and Error Correction model to examine the impact of Bank credit on economic growth in Nepal. Neelam (2014) went on to find that bank credit to private sector has positive effects on the economic growth in Nepal in the long run only. These findings suggest that, policy makers should focus on long run policies to promote economic growth, development of modern banking sector, efficient financial market and infrastructure as to increase the private sector credit which is instrumental to promote growth in the long run.

Nwakanma et al. (2014) evaluated the nature of a long-run relationship that exists between the availability of credits lines to the private sector of the Nigerian economy and economic growth. The Autoregressive Distributed Lag Bound (ARDL) and granger Causality techniques were used for data analysis. The results indicated a significant long-run relationship between the study variables but without significant causality in any direction. Measures that include the development of relatively long tenured bank credit products as well as enforcement of credit regularization contracts were recommended to strengthen the operations of banks in Nigeria and their expected roles in financing entrepreneurship.

Ogbokor and Moses (2014) investigated the determinants of commercial banks credit by the business sector in Namibia: a co-integration analysis. The study used co-integration and error correction procedures in carrying out the investigation and used annual time series data for the period running from 1993 to 2010. The study concluded that the demand for bank credit in Namibia responds more to factors such as inflation rate and GDP other than interest rate. Furthermore, their study found that the principles in the neoclassical theory were insignificant in Namibia.

Shifotoka (2014) investigated the determinants of banking sector developments in Namibia. The study used quarterly data for Namibia covering the period of 2001: I to 2011: IV, obtained from the Bank of Namibia. The study used the GDP as a ratio of credit extended to the private sector to represent banking sector development. The study used the autoregressive distributed lag model for data analysis. ARDL framework was also used to test whether any of the included variables: real gross domestic product, nominal interest rates, inflation and the ratio of market

capitalism to nominal GDP as a proxy of stock market development, have any impacts on the developments in the banking sector. The results from the study showed that there is a long run relationship between the variables. Secondly, the estimated coefficients for the variables impacting banking sector development have expected signs. The real GDP and nominal interest rates positively influence banking sector development while inflation was found negatively impacting the banking sector development. Stock market development is insignificant in determining banking sector development. The results suggest that developing the formal without keeping interest rates too low could benefit the banking sector development.

Sassi (2014) studied the credit markets development and economic growth: Theory and Evidence. GMM dynamic panel data estimations of 27 European countries were used for the period 1995 to 2012. A second-order Taylor expansion was used for data analysis. Research findings shows that credit market promotes economic growth by lending to productive enterprises whereas consumer credit has a significant negative effect on real-economy performance. These findings provided a missing piece of the credit-growth puzzle. It was also noted that the positive effect of investment credit market is dampened by the reverse relationship between consumer credit market and economic growth.

Escribano and Han (2015) explored the contribution of credit growth and the composition of credit portfolio to economic growth in emerging market economies (EMs). Using cross-country panel regressions, the study found the impact of credit growth on real GDP growth, with the magnitude and transmission channel of the impact of credit on real activity depending on the specific type of credit. To be specific, the results show that corporate credit shocks influence GDP growth mainly through investment while consumer credit shocks are associated with private consumption.

Iwedi, Igbanibo and Onegbu (2015) examined the impact of bank domestic credits on the economic growth of Nigeria. Using time series analysis of Nigerian data for a period of thirty-three years: 1980-to-2013. Credit to private sector, credit to government sector and contingent liability were used as proxy for bank domestic credit while gross domestic product was used to represent economic growth. The relative statistics of the estimated model shows that credit to the private sector (CPS) and credit to the government sector (CGS) positively and significantly correlated to GDP in the short-run. The analysis revealed the existence of a poor long-run relationship between bank domestic credit indicators and gross domestic product in Nigeria. The study recommended that Nigerian managers fashion appropriate policies that will enhance

the bi-directional flow of influence between the banking sector, where investable funds are sourced, and the real sector of the economy, where goods and services are produced. Iwedi et al. (2015) went on to call for an efficient and effective utilization of borrowed funds to achieve the nominated objective of investment, productivity and economic growth.

Shidhika (2015) examined the effect of financial innovation on the demand for money in Namibia. The sample period of the study covered the first quarter of 2000 to the fourth quarter of 2013. The study employed the following variables; real Gross Domestic Product (GDP) as a proxy for income, inflation, repo rate and credit extended to the private sector as a proxy for financial innovation. The results indicated that the private sector credit extension significantly affects money demand in the short run. This implies that financial innovation may not be having an impact on demand for money in Namibia. The study concluded that the inclusion of financial innovation to model the demand for money in Namibia need cautious consideration as financial innovation was insignificant in the model. However, policies to deepen the financial market in Namibia by way of promoting financial intermediation between savers and investors in the economy still need to be pursued like the Namibia financial sector strategy 2010-to- 2020.

Strike (2015) studied the determinants of credit to private sector for eleven SADC countries focusing on the possibility of a crowding out the effect of government debt and the contribution made by institutional quality. The study used both fixed effects and dynamic model based on GMM estimations. The study found strong evidence suggesting that financial development, economic growth, trade openness and domestic credit by banks were important in explaining growth in credit to the private sector. The study also concluded that the extension of financial resources to the private sector is enhanced by keeping low levels of corruption, improving government effectiveness as well as the regulation quality. Reductions in the risk profile for investments allow banks to release more financial resources to the private sector. Monetary policy initiatives like favourable credit rationing policies play a key role in developing financial markets.

Kayum et al. (2016) researched the influence of the private sector credit lines on private investments in Bangladesh. Their study findings pointed to the fact that the private sector credit variable is the most persuasive factor stimulating private investment in Bangladesh. The study also found a positive relationship between the public and private sector investments. This implies that the public sector investment could promote private sector investment in

Bangladesh by increasing private returns through the provision of infrastructures like transports, communication and energy. It is therefore argued that policy-makers in Bangladesh should capitalise on the private sector credit to influence private investment directly or indirectly.

Katusiime (2018) investigated the effect of inflation volatility on private sector credit growth in Uganda. Research findings by Katusiime (2018) showed that the private sector credit growth is positively linked to the one period lagged inflation volatility. Given that previous monetary policy actions continue to affect the targeted variables due to the substantial lags in the transmission mechanism. The positive response of private sector credit growth on past inflation volatility suggests a credible monetary policy regime in Uganda, which has led to a reduction in the level of macroeconomic uncertainty and the restoration of favourable economic conditions and prospects, thus increasing the demand for credit. Further, the study findings showed that the lagged private sector credit growth, nominal exchange rate, and inflation have a statistically significant effect on private sector credit growth while financial innovation, interest rates, and GDP growth appear not to be important determinants of private sector credit growth.

#### **2.4 Overview of Private Sector Credit in Namibia**

This section gives an overview of the PSCE in Namibia. Namibia has been on a derive to promote economic growth as she gears towards her national vision: Vision 2030 of reaching an Information Society. In line with the vision, Namibia promulgated several economic developmental plans among them the Harambe Prosperity Plan that aims to promote shared economic growth where the private sector is expected to play a critical role. As such, it is important to establish if Namibia is creating a conducive environment for the development of effective credit facilities that could fund activities in the private sector and how these are impacting economic growth. It should be noted that the PSCE in Namibia has been growing at fast pace over the previous years. The International Monetary Fund (2016) report states that although the Namibian financial sector is sought to be largely dominated by non-bank financial institutions, commercial banks accounted for about 70 % of the GDP in 2016 and are considered to be large due to their dominance in contribution. The growth in PSCE accelerated at the end of 2014 reaching its highest growth rate of 18.0 since independence (Bank of Namibia annual report, 2015) and PSCE growth continue to grow at the fast pace and remained in the double digit. Growth in PSCE reflects a rise in borrowing activities by both the business and household sectors. In 2014, the Bank of Namibia twice increased the repo rate within four

months and went on to make another increase at the beginning of the year 2015. These decisions were taken to control the accelerating high growth in household credit, particularly overdraft and instalments credit. However, it is worthy asking if increasing the policy rate to control credit will not hamper economic growth in the process.

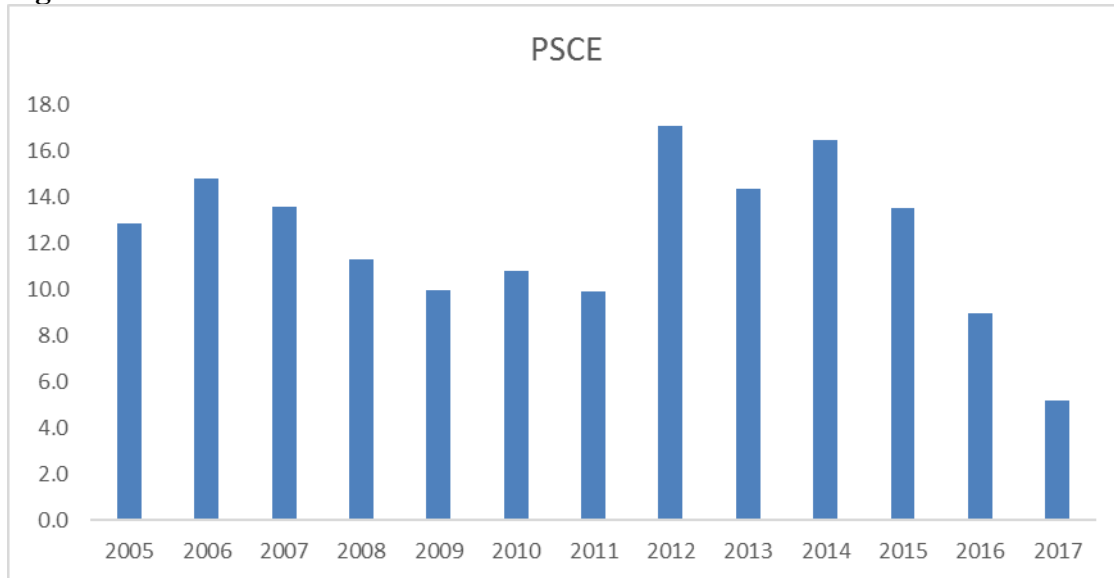
The mortgage credit increase from 7.5% in September to 8.2% in October 2017 is the first sign, in as many months, of a higher demand for credit for capital investments. It is also possible that the higher demand was down to refinancing existing properties which must be corroborated first by building plans completed before a turning point can be identified, which is not the case at this point in time.

The Bank of Namibia monthly statistics (2017) banking overview indicated that the acceleration in mortgage credit was seen for both businesses and households. The business sector was the major contributor of this rise in mortgage credit. This rise coincided with an increase in commercial property developments along the coastal markets. However, the growth in mortgage credit has shown a moderate downward trend since July 2016 after the introduction of the mandatory Loan to Value ratio for all mortgage deals.

Overall, credit growth to the corporate sector took a further blow in October decreasing by 0.2 percentage points from 2.4% in September to 2.2% in October 2017. The decrease was driven mostly by a lack of demand for short-term financing which almost halved registering only 5% in October. Similarly, the category of “Other Loans & Advance” decreased on a monthly basis from 3% to only 1.6%. Although the demand for short-term credit is slightly higher for private households, the growth in overall credit to individuals decreased by 0.1 percentage point on a monthly basis to 7.4% in October. According to the Bank of Namibia, this corresponds to the continued decrease in vehicle sales for October.

Overdraft credit which makes up 12.6 percent of the overall new private sector credit also started reflecting changes in the broader economy, decreasing by 3.7 percentage points to a growth rate of only 6.6% in October 2017 compared to October 2016. This metric is of a huge concern as it reflects negatively on economic growth. A month to month comparison shows that “on a nominal basis, overdraft credit extended to businesses stood at N\$8.1 billion at the end of October 2017, lower than the N\$8.7 billion in the previous month” (Bank of Namibia annual report, 2017). Figure 1 summarises these trends.

**Figure 1: Trend of Private Sector Credit**



*Sources: Author's construct*

According to bank of Namibia annual report (2017), the annual growth in credit extended to the private sector rose to 5.1 percent at the end of December 2017 from 4.7 percent at the end of November 2017. The improved growth in PSCE was mainly reflected in the higher growth observed in credit extended to the business sector, specifically in the categories of overdraft credit, other loans and advances which rose at the end of December 2017. The annual growth in total credit extended to businesses edged up to 2.7 percent at the end of December 2017 from a growth of 1.3 percent at the end of November 2017.

The improved growth could be attributed to the business community that was gearing up for the festive season in order to meet consumer demand during December 2017. Thus, anticipated increase in demand by customers during the festive season saw an increase in demand for short-term borrowings i.e. overdraft credit, other loans and advances. The annual growth in credit extended to individuals slowed down to 6.7 percent at the end of December 2017 from a growth of 7.1 percent at the end of November 2017.

The sluggish growth in credit extended to individuals is evident in most of the credit categories except for other loans and advances which rose at the end of December 2017. The annual growth in other loans and advances (i.e. personal/commercial loans and credit cards) rose at the end of December 2017. On an annual basis, growth in other loans and advances rose to 10.2 percent at the end of December 2017 from 6.6 percent at the end of November 2017.

The increased growth in other loans and advances was evident from both the household and corporate sectors, but primarily more pronounced in other loans and advances extended to the corporate sector. Growth in other loans and advances extended to businesses rose to 3.8 percent at the end of December 2017 from a contraction of 1.2 percent at the end of November 2017.

The annual growth in total overdraft credit remained steady at the end of December 2017. Total overdraft credit, which represents about 12.5 percent of total PSCE, grew by 4.1 percent at the end of December 2017, maintaining the same growth rate from the previous month. The steady growth in overdraft credit mainly stemmed from the increased growth observed in overdraft credit extended to the corporate sector during the month under review.

The annual growth in mortgage credit extended to the private sector slowed at the end of December 2017. Growth in mortgage credit, edged lower to 8.0 percent at the end of December 2017, compared to 8.1 percent at the end of November 2017. It could be argued that the moderate decline in mortgage credit was attributed to weak domestic economic conditions in the household sector coupled with the introduction of the maximum loan to value (LTV) ratios for mortgages.

## **2.5 Summary of the Chapter**

The chapter conducted a literature review. The literature showed the use of different methodologies and data for various periods to establish factors of economic growth. These reviewed studies researched on different instruments of economic growth something that led to the identification of different factors of economic growth. However, mixed results have been identified. In some studies, the results showed a short and long run significant and positive effects, while other studies showed a negative effect or no significance at all. In the light of the above, it is concluded that the empirical literature is inconclusive with regards to relationship between PSCE and economic growth. Hence, this paper will use the techniques that has been used already in other countries to test the same relationship in Namibia and the results will be compared to similar studies carried out elsewhere. and This calls for a need to investigate the relationship between the availability of credit lines to the private sector and economic growth in Namibia. To date, the literature shows a scarcity of studies that examined the relationship between private sector credit extension and economic growth in Namibia. further studies using different methodologies are encouraged

The next chapter describes the research methodology to be used in the study.

## **CHAPTER 3: RESEARCH METHODOLOGY**

### **3.1. Introduction**

This section discussed the methodology used to carry out the study in an effort to investigate the relationship between PSCE and economic growth in Namibia. This study followed an approach used by Sindano (2009) and Akpansung and Babalola (2011) in testing the relationship between PSCE and economic growth.

### **3.2. Research design**

Trevor (1993) defines research design as the plan according to which we obtain research participants (subject) and collect information from them. There are two types of research design, which are mainly quantitative and qualitative designs. However, this study used a quantitative research method by employing statistical, mathematical and numerical analysis of the data to establish the relationship among the variables. The following sections discuss this study's use of the quantitative research method.

#### **3.2.1. Quantitative Design**

According to Kruger (1999), quantitative research is all about quantifying relationships between variables. Variables are things like weight, performance, time, and treatment. The aim of quantitative designs is to classify features, count them, and construct statistical models to explain what is observed. Its aim is to determine the relationship between one element (an independent variable) against the other (a dependent or outcome variable) in a population. In this regard, this study used statistical and numerical analysis as well as mathematical values of data to establish the relationship among the variables in question.

### **3.3 Sample period**

The study utilized secondary quarterly time series data on GDP covering the period 2005: first quarter (Q1) to 2017: the fourth quarter (Q4). This data was obtained from the annual and quarterly reports of the Bank of Namibia (central bank) and national accounts from Namibia Statistics Agency (NSA). The NSA is mainly responsible for collecting and computing the statistical data in Namibia. Quarterly data was used to avoid heteroscedasticity problem which is a major concern in the regression analysis because it can invalidate statistical tests of insignificance that assume that the modelling errors are uncorrelated and uniform.

### **3.4. The analytical framework: regression equation**

The study used econometric techniques to determine the relationships between the PSCE and economic growth in Namibia from 2005 to 2017. The study used the time series data that is

subject to non-stationary. Unit roots test was employed to test for stationary of the variables. Furthermore, the study also employed a cointegration test on the different variables used to examine a long run and short run relationships. Granger causality test was used as the last test to establish the direction of the relationship between variables used in this study.

The model used was specified as follows:

$$Y_t = f(X_1, X_2, X_3, X_4, X_5, X_6) \dots\dots\dots (1)$$

Where Y is Dependent and Xn are the explanatory variables.

Although GDP is dependent on many variables, the variables used to estimate the model as the exogenous variables are the PSCE (private sector credit extension), M2 (broad money supply), LR (Lending rate), IF (Inflation), TO (Trade openness) and GD (Government debt). As such, the above equation (1) can be re-written as:

$$GDP = f(PSCE, M2, LR, IF, TO, GD)$$

Using t to denote time period (quarters), the model can be written as follows:

$$GDP_t = f(BCPS_t + M2_t + LR_t + IF_t + TO_t + GD_t)$$

We specify the above model linearly in the form of an equation

$$GDP_t = \beta_0 + \beta_1 PSCE_t + \beta_2 M2_t + \beta_3 LR_t + \beta_4 IF_t + \beta_5 TO_t + \beta_6 GD_t + U_t \dots\dots Eq. (2)$$

Equation (3) was log transformed and estimated in the following form for easy interpretation:

$$\ln GDP_t = \beta_0 + \beta_1 \ln PSCE_t + \beta_2 \ln M2_t + \beta_3 \ln LR_t + \beta_4 \ln IF_t + \beta_5 \ln TO_t + \beta_6 \ln GD_t + U_t \dots\dots Eq. (3)$$

Where GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP);  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$  = Coefficients of the explanatory Independent variables.  $U_t$  = Stochastic or error term assumed statistically independent and randomly distributed with mean zero, constant variance and serially uncorrelated.

### 3.5 Description of variables

The variables that were used in this study are: Gross domestic product, which is a dependent variable and its lags as an explanatory variable like Private sector credit extended (PSCE) as a

proxy of banking sector development, Broad money (M2) as a % of GDP, Lending rate, inflation rate, trade openness and government debt as a % of GDP.

### **3.5.1 Gross Domestic product**

Gross domestic product measures the total added value of goods and services produced within the country less raw materials, and other goods and services consumed during the production process in all resident producing units. The study will use real GDP as a proxy for income. Sindano (2009) found that real GDP is crucial for financial development more especially when proxied to economic growth.

### **3.5.2 Private sector credit extended (PSCE)**

The private sector credit extension was measured as a ratio of nominal GDP and is a proxy for bank credit. The supply of credit to the private sector is one of the important elements of an investment. An increase in private investments will accelerate growth rate which in turn could increase financial development. A study by Huang (2010) found that, it is appropriate to measure opportunities for new firms in the market in order to acquire funds for investments projects.

### **3.5.3 Broad money (M2)**

The study used M2 as a proxy for money demand and it is an exogenous variable. M2 includes M1 which constitutes coins and currency in circulation, checkable (demand) deposits and travelers' cheques. M2 contains M1 plus saving deposits, money market funds, certificate of deposits and other time deposits. The demand for money is very crucial in macroeconomics as people use money as a medium of exchange and this implies that money is held by individuals and businesses in the form of cash or assets. However, the shortfall with the M2 is that it does not measure the capacity of the credit line to carry out its financial intermediary functions and may hinder economic growth (Levine, et al, 2000).

### **3.5.4 Lending rate**

The lending rate was used to represent the nominal interest rate in this study. The lending rate is described as the cost of borrowing money by the borrower. Positive lending rate will promote and develop the financial intermediary because private sector tends to save more money which stimulates growth in the economy through increasing productivity and volume of capital. Again, credit extended to private sector at a reduced interest rate will increase economic

growth. Banks tend to generate their income from credit they extend to the private sector; therefore, the lending interest rate is expected to be positive.

### **3.5.5 Inflation**

Inflation is described as the long-term increase in the prices of goods and services caused by the devaluation of currency. Countries with high inflation rates tend to have less active and inefficient financial system. High inflation rates may cause problems such as asymmetric information between lenders and borrows which results in moral hazard and adverse selection affecting the investment projects and later growth rates. Therefore, price stability is very important in financial intermediation. Inflation coefficient is expected to be negative.

### **3.5.6 Trade openness**

Openness to trade (imports and exports) as a share of GDP is very important for any successful economy. According to Mbulawa (2015), trade openness has significant influence on credit to private sector. This means that more resources are extended to the private sector as the country's level of output grows opening up to the outside world for business and increase the level of broad money supply as a proportion of GDP which leads to economic growth.

### **3.5.7 Government debt (GD)**

Government debt ratio is the amount of a country's total gross public debt as a percentage of GDP. It is a key factor for the sustainability of public finance and an indicator of how healthy the economy is. According to the database by OECD (2018), "debt" is defined as a specific subset of liabilities identified according to the types of financial instruments included and excluded such as currency and deposits, loans, and other accounts payable.

## **3.6. Estimation Technique**

### **3.6.1 Unit root tests**

The stationary test is basically a pre-request of the cointegration procedure of each individual time series over the sample period. Before running the analysis of the long run relationships of variables, the unit root properties of each set of time series data need to be checked as a pre-requisite for inclusion in co-integration analysis and evaluation of long-run relationships. Most time series in economics pose a trend over time and these are series containing unit root.

A time series data is said to be stationary if the mean and variance are constant over time and the value of the covariance between the two-time periods depends only on the distance or lag

between the two-time periods and not the actual time at which the covariance is computed (Gujarati, 2009). However, if the mean and variance change in samples for different time spans then, this type of variable is known as non-stationary variables which imply that any results from such data will be nonsensical.

Although there are a number of tests for stationary, this study used a popular test for evaluating the unit root test. The Augmented Dicker-Fuller (ADF) and Philips Peron (PP) statistics were applied to test the stationary or non-stationary of the variables and their order of integration to avoid the spurious regression problem.

### **3.6.2 Co-integration**

Co-integration means that a long run relationship of variables that are linked to form an equilibrium relationship when the individual series themselves are non-stationary in their levels. Co-integration of two or more-time series suggests that there is a long run or equilibrium relationship between them. There are two broad approaches to test for cointegration; the Engel test (1987) and Johansen test (1998). Johansen uses more complicated Vector Auto Regression Model (VAR) structure to test for the cointegration. In a multiple non-stationary time series, it is possible that there is more than one linear relationship to form cointegration. This is called a co-integration rank.

Johansen test usually involves two tests namely “trace statistics” and “maximum eigenvalue”. The null hypothesis to be tested for the case of trace test is; there at most “r” number of co integration vectors while the null hypothesis for the eigen value test is; there “r” co integrating vectors against the existence of alternative  $r+1$ . The null hypothesis of no cointegration is checked on this test (Johansen and Juselius, 1990). To test for cointegration, this study used the Johansen procedure which is based on a vector auto regression (VAR) model, to determine the existence of the long-run relationship among variables.

### **3.6.3 Estimating long run and short run analysis**

The error correction model can be used to test for a long run or short run analysis between variables. The term ‘error correction models applies to any model that directly estimates the rate at which changes in  $Y_t$  return to equilibrium after a change in  $X_t$ . The ECM behavioural justification implies that the behaviour of  $Y_t$  is tied to  $X_t$  in the long run and that short run changes in  $Y_t$  respond to deviations from a long run equilibrium.

### **3.6.4 Granger causality**

A limited notion of causality where past values of one series ( $X_t$ ) are useful for predicting future values of another series ( $Y_t$ ) after past values of  $y$  have been accounted for (Wooldridge, 2009).

Granger causality provides important information about the exogeneity.,  $X_t$  is defined as an exogenous variable if the current and past values of  $Y_t$  do not affect  $X_t$ .

There are different situations under which granger causality test can be applied. These include:

- i. A simple bivariate granger causality where there are two variables and their lags.
- ii. A multivariate granger causality where more than two variables are considered, and it is most applicable where more than one variable can influence the results.
- iii. Granger causality can also be tested in a Vector Autoregressive (VAR) framework where a multivariate model is extended to test for simultaneity of all included variable.

The VAR can be considered as a means of conducting causality tests or more specifically granger causality test.

### **3.7 Limitations**

Models that were used in this study do not include all the variables because of existing data problems given the nature of the Namibian economy and developing countries. Another limitation was the statistical quality of data that was used in this study had the potential to lead to coefficients in the equations not being stable and poses wrong signs.

### **3.8 Conclusion**

This chapter described the research methodology used in the study. The research methodology was explained and the targeted sample period. Sources of the data used in this study were explained together with the different analytical frameworks and estimation techniques assumed by the study. The next Chapter shall discuss the findings and data analysis using the information from secondary data. Chapter five (5) goes on to present the research conclusion.

## CHAPTER 4: DISCUSSION OF RESULTS

### 4.1 Introduction

This chapter discussed the results of the data analysis as explained the Chapter 3. It covers the discussions of the descriptive analysis, unit roots test for stationary, cointegration results and the regression results.

### 4.2 Descriptive statistics

Table 1 presents the descriptive summary statistics of the variables which indicates that the number of observations that corresponds to the period covered by the study is 52. In terms of variability measured by the standard deviation, the lending rate have the lowest variability whilst trade openness recorded the highest during the period under study. The skewness and kurtosis coefficients ranging from -5.00 to 0.64 and 29.4 to 2.44 suggesting a far to normal distribution amongst the variables. It also shows that the distributions are mostly positive. GDP, inflation and trade openness are negatively skewed. All kurtosis coefficients are more than 3 except for the lending rate; this is no surprise as this variable has the lowest variability.

**Table 1: Summary statistics**

	lnGDP	lnDEBT	lnINF	lnLR	LnM2	lnPSCE	lnOPENNESS
<b>Mean</b>	0.52559	0.493225	0.72721	1.004557	1.050122	1.079623	-52.15917
<b>Median</b>	0.686636	0.462398	0.767303	1.001084	1.030619	1.097711	24.52065
<b>Maximum</b>	1.185755	1.534026	1.054859	1.143951	1.827291	1.451483	175.0127
<b>Minimum</b>	-1.39951	-0.522879	0.13393	0.913814	-0.34917	0.704353	-1976.596
<b>Std. Dev.</b>	0.540759	0.424029	0.184477	0.066693	0.368725	0.132173	314.0314
<b>Skewness</b>	-1.62048	0.162659	-0.764134	0.641307	-0.67905	-0.42426	-5.002177
<b>Kurtosis</b>	5.656367	3.303516	3.888078	2.435688	6.40753	4.299334	29.44854
<b>Sum</b>	27.33069	25.6477	37.81491	52.23694	54.60634	56.14042	-2712.277
<b>Observations</b>	52	52	52	52	52	52	52

*Note: GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP); Source: Author's compilation.*

### 4.3 Unit root Test

Data analysis began with testing for unit roots. In this regard, the study employed the Augmented Dickey-Fuller (ADF) procedures in testing for unit roots. It is important for data analysis of econometric time series studies to start with testing the unit root test because of the possibility of producing spurious correlation results from time-series data as a result of the problem of non-stationary time series. The results of unit root test in level form and in first and second difference are summarised in Table 2 below.

**Table 2: Unit root tests.**

	Levels	First Difference	
Variables	ADF stat	ADF stat	Remarks
lnGDPt	-3.060207**	-13.06646**	I (0)
lnDEBTt	-5.585660**	-10.89063**	I (0)
lnINFt	-4.731818**	-5.148969**	I (0)
lnLRt	-1.112842	-6.521432**	I (1)
LnM2t	-3.663177**	-8.817072**	I (0)
lnOPENNESSt	2.909931	-2.853348***	I (2)
IPSCEt	-1.86123	-9.268199**	I (1)

*Notes: Note: GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP); \*\* implies rejection of the null hypothesis at the 5 percent level. \*\*\* implies rejection of the null hypothesis at the 5 percent level after second difference. Source: Author's compilation.*

Table 2 shows that the Gross Domestic Supply (GDP), Government Debt (LNDEBT), Inflation (LNINF) and Broad Money Supply (LNM2) attained a stationary status in levels, while the Lending Rate (LNLR) and Private Sector Credit Extension (PSCE) only became stationary after first differencing. It is worth noting that the Openness Index (LNOOPENNESS) only became stationary after \*\*\* differencing. This implies that the data is suitable for carrying out a regression analysis and testing of the null hypothesis of unit root can be rejected at 5 percent level of significance.

#### **4.4 Cointegration Results**

Testing for cointegration implies that if two or more variables do converge to some long-run equilibrium then they are said to be cointegrated. The economic interpretation of cointegration is that if two or more series are linked to form an equilibrium relationship of the long-run, they will move closely together over time.

It is essential to establish whether the variables have some long-term relationships. That is, the existence of a long-run equilibrium to which an economic system converges over time. The study made use of the Johansen test of co-integration. Table 3 displays the co-integration test results

**Table 3: Johansen co-integration test**

Maximum Eigen test				Trace test			
H <sub>0</sub> : rank = r	H <sub>a</sub> : rank =	Statistic	95% Critical value	H <sub>0</sub> : rank = r	H <sub>a</sub> : rank =	Statistic	95% Critical value
r = 0	r = 1	153.4904	125.6154	r = 0	r = 1	50.57948	46.23142
r <= 1	r = 2	102.9109	95.75366	r <= 1	r = 2	35.91026	40.07757
r <= 2	r = 3	67.00066	69.81889	r <= 2	r = 3	26.76596	33.87687
r <= 3	r = 4	40.23471	47.85613	r <= 3	r = 4	19.48410	27.58434
r <= 4	r <= 5	20.75061	29.79707	r <= 4	r <= 5	15.21978	21.13162
r <= 5	r <= 6	5.530827	15.49471	r <= 5	r <= 6	4.951669	14.26460
R <= 6	R <= 7	0.579158	3.841466	R <= 6	R <= 7	0.579158	3.841466

*Note: The Maximum-Eigen test and Trace test shows one and two co-integrating equations at the 5 percent level respectively. Source: Author's construct.*

It is apparent from the results reported in Table 3 that the variables under investigation are co-integrated. In this context, the study employed the Maximum-Eigen and Trace tests. The null hypothesis ( $H_1$ ) of  $r=0$  (No cointegrating relations) was tested against the alternative hypothesis ( $H_0$ ) of  $r \neq 0$  (There are cointegrating relations). The rejection of  $H_0$  would imply the acceptance of  $H_1$ . That is the existence of cointegrating relations among the variables being examined. In this particular case, the Maximum-Eigen test and Trace test show one and two co-integrating equations at a significance level of 5 percent since the t-Statistic is greater than the critical value at the 5% level implying co-integrating of relationships among the variables assessed. Hence, we reject the null hypothesis of no relationship between PSCE and economic growth in Namibia. These results are reported in Table 3 above. Afterwards, the study proceeded with the estimation of the long-run equation.

#### **4.5 Correlation analysis**

The study tested for multicollinearity in the data by observing the above correlation coefficients. The results confirm the absence of multicollinearity, this is depicted by the low correlation coefficient amongst all independent variables in the study. The highest correlation coefficient observed is 0.411 between LOGM2 and LOGLR.

**Table 4: Correlation Matrix**

	lnDEBT	lnINFL	lnLR	lnM2	lnPSCE	lnOPENNESS
lnDEBT	1.000	-0.076	-0.235	-0.308	0.194	-0.043
lnINFL	-0.076	1.000	0.279	0.269	-0.024	0.153
lnLR	-0.235	0.279	1.000	0.411	-0.166	-0.013
lnM2	-0.308	0.269	0.411	1.000	-0.008	0.006
lnPSCE	0.194	-0.024	-0.166	-0.008	1.000	0.515
lnOPENNESS	-0.043	0.153	-0.013	0.006	0.515	1.000

Notes: GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP); Source: Author's compilation.

#### 4.6 Long Run and short run regression results

The equation (1) confirms a long-run relationship among the dependent and independent variables used in the study. Only one independent variable, namely private sector credit extension is positively related to real gross domestic product. This finding satisfies the theoretical propositions. All the independent variables namely, Government Debt (LNDEBT), Inflation (LNINF), Broad Money Supply (LNM2) Lending Rate (LNLR) and Openness Index (LNOOPENNESS) were negatively related to real gross domestic product. These results are shown in Table 5.

**Table 5: Long run regression results**

Variable	Coefficient	t-statistic	P-Values
Constant	4.426366	-3.56615	0.04217**
$\Delta$ lnPSCE	2.558444	-5.78615	0.0442**
$\Delta$ lnOPENNESS	-0.001565	-2.44308	0.0000***
$\Delta$ lnLM2	-0.177139	-1.22859	0.1441
$\Delta$ lnLR	-1.222539	-1.92626	0.6346
$\Delta$ lnINF	-0.801135	-2.61010	0.03069**
$\Delta$ lnDEBT	-0.368394	-2.83676	0.01298**

Note: Notes: GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP); \*\* and \*\*\* denotes significance at 5% and 1% respectively. Source: Author's construct.

A further scrutiny of the estimated model suggests that a 1 percent increase in private sector credit extension leads to approximately 2.6 percent rise in economic growth. Furthermore, a 1 percent increase in openness is expected to lead to approximately no detraction in economic growth. Error correction for private sector credit extension is statistically significant at 0.138240 with a t-statistic of 2.99. This suggests that there is long run causality from Private sector credit extension to the dependent variable. The value of R-square is 0.633729 meaning that 63.4% of the variation in real GDP is explained jointly by the variables in the model.

Consequently, adjusted R-square indicates that only 46.7% of the variation of GDP is explained by the model as a whole.

The long run impact between private sector credit and economic growth is in line with the findings of Sindano (2009), who suggested that the real sector of the economy should be developed further in order to stimulate further development in the economy through policy interventions like industrial development to diversify the economic base, enhance the performance of small and medium enterprise and financing of new investments.

#### 4.7 Short run regression results

Table 6 displays the results of the short run regression results. The results show that only the relationship between lending rates and economic growth was found to be positive and statistically insignificant in the short run. Variables like PSCE, trade openness, broad money, inflation and government debt were found to be statistically insignificant. The positive relationship between lending rates and GDP growth is in line with the theoretical expectations of the study. Although lending rates has a positive effect on economic growth in the short run, this effect is also quite insignificant.

**Table 6: Short run regression results**

Variable	Coefficient	t-statistic	P-Values
Constant	0.001589	-1.03509	0.05851*
$\Delta \ln \text{PSCE}$	-1.327120	-2.01381	0.065901*
$\Delta \ln \text{OPENNESS}$	-0.000109	-0.21623	0.5010
$\Delta \ln \text{LM2}$	-0.311123	-1.42825	0.21784
$\Delta \ln \text{LR}$	1.576712	0.71094	0.21779
$\Delta \ln \text{INF}$	-0.712875	-1.30918	0.54452
$\Delta \ln \text{DEBT}$	-0.938583	-5.30110	0.017705**
$\text{CointEq1}(-1)$ *	-1.888206	-8.69552	0.021715**

*Note: GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP); \*\*\*, \*\* and \* denotes significance 1%, 5% and 10% respectively. Source: Author's construct*

The study reports on the short run results. The results show that the estimated lagged error correction term of real GDP is negative and significant which suggest that real GDP equation in this analysis does constitutes the co-integrating relationship in terms of the first co-

integrating vector. The coefficient of ECM (-1) is -1.888206 with a t-statistic of 8.69552 was found statistically significant. This suggests that at the rate of about 188% disequilibrium in GDP is corrected in the long run, which is very strong.

#### 4.8 Diagnostic Tests

The normality assumption assumes that, a model should be normally distributed with a zero mean and constant variance to produce linear unbiased results. Violation of these assumptions will result in a model being inefficient or seriously biased or misleading. Therefore, the study tested for serial correlation and conditional heteroscedasticity. The results confirm the absence of serial correlation and conditional heteroscedasticity. Besides, the model was found to be not normally distributed. Indicating that, the econometric model employed in the study is not so vigorous, at least, from a technical perspective. These results are reported in Table 7 below.

**Table 7: Diagnostic checks**

Test	Null hypotheses	t-statistic	Probability
Breusch-Godfrey LM Test	No serial correlation	0.6896	0.5072
Jarque-Bera (JB)	There is normality	23.6729	0.0000
Breusch-Pagan-Godfrey	No conditional heteroscedasticity	1.6820	0.1475

*Source: Author's construct.*

#### 4.9 Pairwise Granger-causality Test Results

The granger causality test was conducted in order to determine whether there is an existence of causality linkage among the series in question. Therefore, in order to do that, we used the method developed by Granger (1969). Ordinarily, regressions reflect “mere” correlations, but Granger argued that there is an interpretation of a set of tests as revealing something about causality. The study conducted a Granger-causality test to determine the direction of causality between GDP growth and the independent variables in the study. The Granger-causality test results are displayed in Table 8.

**Table 8: Pairwise Granger-causality test results**

Null Hypotheses	Obs	Prob.
LGDEBT does not Granger Cause LGDP	50	0.9192
LGDP does not Granger Cause LGDEBT	50	0.2723
LINF does not Granger Cause LGDP	50	0.6636
LGDP does not Granger Cause LINF	50	0.8062
LLR does not Granger Cause LGDP	50	0.8857

LGDP does not Granger Cause LLR	50	0.8893
LM2 does not Granger Cause LGDP	50	0.6814
LGDP does not Granger Cause LM2	50	0.0013
<b>LPSCE does not Granger Cause LGDP</b>	<b>50</b>	<b>0.0379**</b>
<b>LGDP does not Granger Cause LPSCE</b>	<b>50</b>	<b>0.2796**</b>
LPSCE does not Granger Cause LGDEBT	50	0.0339
LGDEBT does not Granger Cause LPSCE	50	0.2226

*Note: Notes: GDP = Gross Domestic Product at current basic prices; PSCE = Private Sector Credit Extended; M2 = Broad Money; LR = Lending rates; IF= Inflation; TO = Trade openness; GD = Government debt (total external debt as % of GDP); \*\* means the rejection of the null hypothesis at the 5 percent level. Source: Author's computation.*

The Granger-causality test rejects the null hypothesis of no causality when the probability of the F-Statistic is less than 5%. Upon inspection of Table 8, a unidirectional relationship running from Gross Domestic Product to Broad Money Supply, Private sector credit extension to GDP, Private sector credit extension to Government debt was found. This finding is consistent with the theoretical explanations on causalities.

The results show that extension of credit to private sector could positively impact economic growth in Namibia. This implies that when credit is supplied to the private sector of the economy it contributes significantly to the growth of GDP and overall development of Namibia. These results are in line with the findings of Yakubu and Affoi (2013), that credit to private sector contributes significantly to the GDP of the economy.

It is concluded that the rest of the variables do not influence the changes between themselves, thus do not demonstrate causality amongst each other, therefore the null hypothesis can not be rejected.

## **CHAPTER 5: CONCLUSIONS AND POLCIY RECOMMENDATIONS**

### **5.1 Introduction**

The previous chapter discussed the data and results obtained from the study. This chapter gives a summary of the study findings and goes on to provide research conclusion and recommendations.

### **5.2 Summary of findings**

The study was conducted using the quarterly data spanning from 2005: Q1 to 2017: Q4 for the sake of identifying the relationship between PSCE and economic growth in Namibia. The stationarity of the two variables was tested first using the Augmented Dickey Fuller test. The results showed that GDP attained a stationary status in levels while the Private sector credit extension only became stationary after first differencing. The two variables were taken in the regression model to proceed with the next technique of the cointegration analysis.

The study tested for serial correlation and conditional heteroscedasticity. The results confirmed the absence of serial correlation and conditional heteroscedasticity. Besides, the model was found to be normally distributed.

The cointegration test results confirmed the existence of a long run association ship on the variables of interest. While the granger causality test results show that there is a long run causality from private sector credit extension to economic growth. This came as no surprise as the real GDP equation in the ECM analysis does constitutes the co-integration relationship in terms of the first cointegrating vector. A unidirectional causality was established between Gross Domestic Product and Broad Money Supply, Private Credit Extension and GDP, as well as private Sector Credit Extension and Government Debt respectively. Lastly, the study tested for variance decomposition, the results confirmed that the model suffered mostly from own shock and minor innovations were a result of shocks from the independent variables.

Amongst the six explanatory variables used in the study, government debt contributed more towards innovations in economic growth during the forecast horizon. The inflation variable made the weakest contribution towards explaining economic growth consistently.

In the light of the above findings, the study concludes that the null hypothesis 1 that proposed a no relationship between private sector credit extension and economic growth was rejected. Therefore, the conclusion of the study is in support of the findings of prior empirical studies conducted on the subject matter by, among others, Neelam (2014), Shifotoka (2014), and

Mushendami (2007). Further, the study supports the endogenous growth model and neoliberal theory.

### **5.3 Policy implications**

In the light of the study conclusions, policy makers should focus on the long run policies that promote economic growth, development of the financial sector, efficient financial market and infrastructure development in order to increase the private sector credit which tends to be instrumental in promoting long term growth. As seen in the literature (Akpansung and Babalola, 2011), private sector credit impacts positively on economic growth. The results from this study also conforms to the findings in related studies (Younus, 2008). It is therefore recommended that the responsible authorities assume careful monitoring of the expanding private sector credit so that a lot of credit is allocated towards productive investments rather than consumption purposes. Further, it is vital that policy makers capitalise on the private sector to influence private sector investments in the economy.

Considering the negative relationship between trade openness and economic growth from the results, Namibia should control trade openness, especially the import of consumption of goods in order to boost economic growth through trade. Again, trade openness must be accompanied by policies that aims to promote the financing of new investments and enhancing the quality of institutions, and the ability to capture new skills development that will allow resources to be reallocated to most productive activities.

High inflation rate has a negative impact on the financial system of any economy. Countries with a high inflation rate tend to have less active and inefficient financial systems. This may lead to moral hazards and information asymmetry between lenders and borrowers something that directly hinder any form of investments. This study made a similar conclusion on inflation and economic growth. Therefore, policies aimed at price stability by keeping inflation as moderate as possible are very important in financial intermediation.

### **5.4 Recommendations for Future Research**

The findings of this study may contribute to the existing literature on the variables being examined for policy formulation. More variables that cover all aspects of financial systems can be used in future investigations. However, it should be noted that this study is without limitation since it has only covered the Namibian credit line with only a few variables being used in the investigation that spanned over a period of 12 years. Hence, caution should be taken on the results.

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## Appendix A

### Unit Root Analysis: Augmented Dickey-Fuller Test Results

#### Government debt

**Levels:**

Null Hypothesis: LGDEBT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.585660	0.0000
Test critical values:		
1% level	-3.565430	
5% level	-2.919952	
10% level	-2.597905	

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

#### Gross Domestic Product

Null Hypothesis: LGDP has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.060207	0.0362
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

#### Inflation

Null Hypothesis: LINF has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.731818	0.0003
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## Lending rates

Null Hypothesis: LLR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.112842	0.7040
Test critical values:		
1% level	-3.565430	
5% level	-2.919952	
10% level	-2.597905	

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

## Broad money

Null Hypothesis: LM2 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.663177	0.0077
Test critical values:		
1% level	-3.565430	
5% level	-2.919952	
10% level	-2.597905	

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

## Trade openness

Null Hypothesis: LOPENNESS has a unit root

Exogenous: Constant

Lag Length: 5 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	2.909931	1.0000
Test critical values:		
1% level	-3.581152	
5% level	-2.926622	
10% level	-2.601424	

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

## Private Sector Credit Extension

Null Hypothesis: LPSCE has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.861230	0.3476
Test critical values:		
1% level	-3.565430	
5% level	-2.919952	
10% level	-2.597905	

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

## First Difference:

### Government debt

Null Hypothesis: D(LGDEBT) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-10.89063	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

### Gross Domestic Product

Null Hypothesis: D(LGDP) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-13.06646	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## Inflation

Null Hypothesis: D(LINF) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.148969	0.0001
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## Lending rates

Null Hypothesis: D(LLR) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.521432	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## Broad money

Null Hypothesis: D(LM2) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.817072	0.0000
Test critical values:		
1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## Trade openness

Null Hypothesis: D(LOPENNESS) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.853348	0.0582
Test critical values: 1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## Private Sector Credit Extension

Null Hypothesis: D(LPSCE) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.268199	0.0000
Test critical values: 1% level	-3.568308	
5% level	-2.921175	
10% level	-2.598551	

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

## 2<sup>nd</sup> Difference

### Trade openness

Null Hypothesis: D(LOPENNESS,2) has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.846609	0.0000
Test critical values: 1% level	-3.571310	
5% level	-2.922449	
10% level	-2.599224	

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

## Cointegration Test:

Date: 08/04/18 Time: 09:03

Sample (adjusted): 3 52

Included observations: 50 after adjustments

Trend assumption: Linear deterministic trend

Series: LGDP LGDEBT LINF LLR LM2 LOPENNESS LPSCE

Lags interval (in first differences): 1 to 1

### Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.636360	153.4904	125.6154	0.0003
At most 1 *	0.512373	102.9109	95.75366	0.0147
At most 2	0.414518	67.00066	69.81889	0.0822
At most 3	0.322728	40.23471	47.85613	0.2142
At most 4	0.262431	20.75061	29.79707	0.3734
At most 5	0.094288	5.530827	15.49471	0.7501
At most 6	0.011516	0.579158	3.841466	0.4466

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

### Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.636360	50.57948	46.23142	0.0161
At most 1	0.512373	35.91026	40.07757	0.1369
At most 2	0.414518	26.76596	33.87687	0.2761
At most 3	0.322728	19.48410	27.58434	0.3780
At most 4	0.262431	15.21978	21.13162	0.2738
At most 5	0.094288	4.951669	14.26460	0.7479
At most 6	0.011516	0.579158	3.841466	0.4466

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

## Appendix B

### VECTOR ERROR CORRECTION MODEL, GRANGER CAUSALITY AND VARIANCE DECOMPOSITION

#### Vector Error Correction Model

Error Correction Estimates

Date: 08/04/18 Time: 10:07

Sample (adjusted): 4 52

Included observations: 49 after adjustments

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

Cointegrating Eq:	CointEq1
LGDP(-1)	1.000000
LGDEBT(-1)	-0.368394 (0.12986) [-2.83676]
LINF(-1)	-0.801135 (0.30694) [-2.61010]
LLR(-1)	-1.222539 (0.63467) [-1.92626]
LM2(-1)	-0.177139 (0.14418) [-1.22859]
LOPENNESS(-1)	-0.001565 (0.00064) [-2.44308]
LPSCE (-1)	2.558444 (0.44217) [-5.78615]
C	4.426366

Error Correction:	D(LGDP)	D(LGDEBT )	D(LINF)	D(LLR)	D(LM2)	D(LOPENNE SS)	D(LPSCE)
CointEq1	-1.025731 (0.29052) [-3.53069]	0.209461 (0.24549) [ 0.85325]	0.019186 (0.04039) [ 0.47504]	-0.006672 (0.01395) [-0.47822]	-0.265146 (0.15526) [-1.70780]	155.5865 (107.287) [ 1.45019]	0.138240 (0.04616) [ 2.99511]
D(LGDP(-1))	0.080897 (0.24609) [ 0.32873]	-0.314489 (0.20795) [-1.51236]	-0.036888 (0.03421) [-1.07820]	0.002104 (0.01182) [ 0.17805]	0.558860 (0.13151) [ 4.24941]	-265.9438 (90.8811) [-2.92628]	-0.110667 (0.03910) [-2.83055]
D(LGDP(-2))	0.070071	0.040906	-0.019726	-0.005018	0.263112	-126.4294	-0.043451

	(0.23278)	(0.19670)	(0.03236)	(0.01118)	(0.12440)	(85.9661)	(0.03698)
	[ 0.30101]	[ 0.20796]	[-0.60955]	[-0.44890]	[ 2.11501]	[-1.47069]	[-1.17489]
D(LGDEBT(-1))	-0.509531	-0.435214	0.028970	-0.005495	0.059818	84.83520	0.001827
	(0.20247)	(0.17109)	(0.02815)	(0.00972)	(0.10820)	(74.7727)	(0.03217)
	[-2.51652]	[-2.54379]	[ 1.02920]	[-0.56511]	[ 0.55283]	[ 1.13457]	[ 0.05679]
D(LGDEBT(-2))	-0.176913	-0.333350	0.000951	-0.005397	0.033879	134.9701	0.051515
	(0.19236)	(0.16254)	(0.02674)	(0.00924)	(0.10280)	(71.0385)	(0.03056)
	[-0.91969]	[-2.05083]	[ 0.03555]	[-0.58422]	[ 0.32956]	[ 1.89996]	[ 1.68565]
D(LINF(-1))	0.162644	-0.407819	0.572942	0.027564	0.279141	185.8421	0.189980
	(0.93048)	(0.78624)	(0.12936)	(0.04468)	(0.49726)	(343.620)	(0.14783)
	[ 0.17480]	[-0.51869]	[ 4.42919]	[ 0.61689]	[ 0.56136]	[ 0.54084]	[ 1.28515]
D(LINF(-2))	-2.458307	0.004900	-0.077429	-0.007078	0.669316	838.4770	0.235990
	(0.99418)	(0.84007)	(0.13821)	(0.04774)	(0.53130)	(367.144)	(0.15795)
	[-2.47271]	[ 0.00583]	[-0.56022]	[-0.14826]	[ 1.25978]	[ 2.28378]	[ 1.49411]
D(LLR(-1))	-1.163991	-3.851737	-0.224075	0.069273	-1.288337	2719.188	-0.668852
	(3.86508)	(3.26595)	(0.53733)	(0.18561)	(2.06554)	(1427.35)	(0.61405)
	[-0.30116]	[-1.17936]	[-0.41702]	[ 0.37323]	[-0.62373]	[ 1.90505]	[-1.08924]
D(LLR(-2))	1.135995	-1.521721	1.176079	0.067864	-1.800911	-2253.765	-0.651088
	(3.83342)	(3.23920)	(0.53293)	(0.18408)	(2.04862)	(1415.66)	(0.60902)
	[ 0.29634]	[-0.46978]	[ 2.20684]	[ 0.36865]	[-0.87909]	[-1.59202]	[-1.06907]
D(LM2(-1))	-0.164935	-0.476672	-0.020849	-0.006936	-0.293192	-111.8585	-0.049369
	(0.31439)	(0.26566)	(0.04371)	(0.01510)	(0.16801)	(116.104)	(0.04995)
	[-0.52462]	[-1.79430]	[-0.47702]	[-0.45943]	[-1.74504]	[-0.96344]	[-0.98840]
D(LM2(-2))	-0.245659	-0.367827	0.063163	0.002102	-0.211866	0.132324	-0.020398
	(0.23799)	(0.20110)	(0.03309)	(0.01143)	(0.12719)	(87.8897)	(0.03781)
	[-1.03221]	[-1.82906]	[ 1.90905]	[ 0.18395]	[-1.66579]	[ 0.00151]	[-0.53949]
D(LOPENNESS(-1))	-0.002069	4.88E-05	7.38E-06	-2.58E-05	-0.000878	0.764202	0.000158
	(0.00063)	(0.00053)	(8.7E-05)	(3.0E-05)	(0.00034)	(0.23152)	(0.00010)
	[-3.30078]	[ 0.09203]	[ 0.08469]	[-0.85769]	[-2.61975]	[ 3.30085]	[ 1.58252]
D(LOPENNESS(-2))	6.20E-05	-0.000344	-5.61E-05	1.88E-05	6.35E-05	0.302124	0.000189
	(0.00086)	(0.00073)	(0.00012)	(4.1E-05)	(0.00046)	(0.31894)	(0.00014)
	[ 0.07182]	[-0.47075]	[-0.46700]	[ 0.45279]	[ 0.13765]	[ 0.94727]	[ 1.37586]
D(LPSCE(-1))	1.014219	-0.657859	0.034614	-0.011842	-0.318579	745.4059	-0.028935
	(1.05196)	(0.88890)	(0.14624)	(0.05052)	(0.56218)	(388.485)	(0.16713)
	[ 0.96412]	[-0.74008]	[ 0.23669]	[-0.23441]	[-0.56668]	[ 1.91875]	[-0.17313]
D(LPSCE(-2))	0.377767	1.012758	0.271108	0.033730	-0.553766	238.3416	0.074326
	(1.02283)	(0.86428)	(0.14219)	(0.04912)	(0.54661)	(377.726)	(0.16250)
	[ 0.36934]	[ 1.17179]	[ 1.90660]	[ 0.68672]	[-1.01309]	[ 0.63099]	[ 0.45739]
C	-0.021184	0.005609	-0.001054	-0.001088	-0.022441	-36.28371	-0.011475
	(0.07359)	(0.06218)	(0.01023)	(0.00353)	(0.03933)	(27.1773)	(0.01169)
	[-0.28786]	[ 0.09020]	[-0.10306]	[-0.30794]	[-0.57060]	[-1.33508]	[-0.98143]
R-squared	0.633729	0.523451	0.531854	0.114325	0.591375	0.561778	0.491125
Adj. R-squared	0.467242	0.306837	0.319060	-0.288255	0.405636	0.362586	0.259818
Sum sq. resids	8.258340	5.896514	0.159607	0.019044	2.358528	1126260.	0.208442
S.E. equation	0.500253	0.422708	0.069546	0.024023	0.267340	184.7406	0.079476
F-statistic	3.806483	2.416521	2.499389	0.283980	3.183906	2.820282	2.123261
Log likelihood	-25.90337	-17.65024	70.78007	122.8663	4.799681	-315.5715	64.23988
Akaike AIC	1.710342	1.373479	-2.235921	-4.361889	0.457156	13.53353	-1.968975

Schwarz SC	2.328079	1.991217	-1.618184	-3.744152	1.074893	14.15127	-1.351238
Mean dependent	-0.011991	0.000000	0.002763	-0.000555	0.001478	-41.02265	-0.008375
S.D. dependent	0.685369	0.507719	0.084278	0.021165	0.346767	231.3937	0.092378

Determinant resid covariance (dof adj.)	7.89E-07
Determinant resid covariance	4.96E-08
Log likelihood	-74.60202
Akaike information criterion	7.902123

Vector Error Correction Estimates

Date: 08/04/18 Time: 10:25

Sample (adjusted): 5 52

Included observations: 48 after adjustments

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

Cointegrating Eq:	CointEq1
D(LGDP(-1))	1.000000
D(LGDEBT(-1))	-0.938583 (0.17705) [-5.30110]
D(LINF(-1))	-0.712875 (0.54452) [-1.30918]
D(LLR(-1))	1.576712 (2.21779) [ 0.71094]
D(LM2(-1))	-0.311123 (0.21784) [-1.42825]
D(LOPENNESS(-1))	-0.000109 (0.00050) [-0.21623]
D(LPSCE(-1))	-1.327120 (0.65901) [-2.01381]
C	0.001589

Error Correction:	D(LGDP,2)	D(LGDEBT,2)	D(LINF,2)	D(LLR,2)	D(LM2,2)	D(LOPENNES S,2)	D(LPSCE,2)
CointEq1	-1.888206 (0.21715) [-8.69552]	0.642895 (0.26190) [ 2.45476]	-0.014686 (0.04358) [-0.33698]	-0.016475 (0.01506) [-1.09403]	0.065172 (0.18377) [ 0.35463]	-127.4177 (102.171) [-1.24710]	0.032855 (0.05034) [ 0.65271]
D(LGDP(-1),2)	0.463544 (0.19193) [ 2.41520]	-0.633600 (0.23148) [-2.73716]	-0.011308 (0.03852) [-0.29356]	0.014174 (0.01331) [ 1.06494]	0.314621 (0.16243) [ 1.93695]	-19.88048 (90.3054) [-0.22015]	-0.047311 (0.04449) [-1.06340]
D(LGDP(-2),2)	0.073945 (0.13263) [ 0.55752]	-0.159060 (0.15996) [-0.99436]	-0.017071 (0.02662) [-0.64129]	0.003250 (0.00920) [ 0.35333]	0.226459 (0.11225) [ 2.01751]	-88.76584 (62.4048) [-1.42242]	-0.021502 (0.03074) [-0.69938]
D(LGDEBT(-1),2)	-1.491350 (0.16898)	-0.463133 (0.20380)	0.009018 (0.03391)	-0.011977 (0.01172)	0.141621 (0.14301)	-72.97766 (79.5056)	-0.008398 (0.03917)

	[-8.82586]	[-2.27252]	[ 0.26592]	[-1.02211]	[ 0.99031]	[-0.91789]	[-0.21441]
D(LGDEBT(-2),2)	-0.928724 (0.12770) [-7.27278]	-0.361007 (0.15401) [-2.34398]	-0.003213 (0.02563) [-0.12536]	-0.008073 (0.00886) [-0.91164]	0.125260 (0.10807) [ 1.15903]	51.24484 (60.0843) [ 0.85288]	0.021028 (0.02960) [ 0.71037]
D(LINF(-1),2)	-0.737656 (0.85491) [-0.86285]	-0.658101 (1.03109) [-0.63826]	-0.088085 (0.17158) [-0.51337]	-0.008106 (0.05929) [-0.13673]	-0.564675 (0.72352) [-0.78046]	-287.3137 (402.247) [-0.71427]	-0.044866 (0.19817) [-0.22640]
D(LINF(-2),2)	-2.130986 (0.63970) [-3.33122]	0.054366 (0.77153) [ 0.07046]	-0.117517 (0.12839) [-0.91531]	0.003940 (0.04436) [ 0.08882]	0.358285 (0.54139) [ 0.66179]	305.1685 (300.990) [ 1.01388]	0.306652 (0.14829) [ 2.06794]
D(LLR(-1),2)	2.622940 (2.54384) [ 1.03109]	-5.947212 (3.06808) [-1.93841]	-0.261686 (0.51056) [-0.51255]	-0.631411 (0.17641) [-3.57915]	-1.457452 (2.15289) [-0.67698]	3454.116 (1196.92) [ 2.88584]	-1.074796 (0.58968) [-1.82266]
D(LLR(-2),2)	7.186483 (2.68711) [ 2.67443]	-7.941355 (3.24087) [-2.45038]	1.018725 (0.53931) [ 1.88894]	-0.295645 (0.18635) [-1.58651]	-3.385699 (2.27414) [-1.48878]	1305.323 (1264.33) [ 1.03242]	-1.427976 (0.62290) [-2.29248]
D(LM2(-1),2)	-0.445906 (0.17455) [-2.55454]	-0.254153 (0.21053) [-1.20722]	-0.048194 (0.03503) [-1.37566]	-0.006795 (0.01211) [-0.56133]	-0.599514 (0.14773) [-4.05824]	-123.3192 (82.1308) [-1.50150]	-0.070137 (0.04046) [-1.73334]
D(LM2(-2),2)	-0.763254 (0.14730) [-5.18175]	-0.354904 (0.17765) [-1.99775]	0.010939 (0.02956) [ 0.37004]	-0.004043 (0.01021) [-0.39583]	-0.410949 (0.12466) [-3.29658]	-131.6595 (69.3055) [-1.89970]	-0.071103 (0.03414) [-2.08239]
D(LOPENNESS(-1),2)	-0.001764 (0.00035) [-4.99364]	9.40E-05 (0.00043) [ 0.22077]	-4.21E-05 (7.1E-05) [-0.59353]	-2.39E-05 (2.4E-05) [-0.97738]	-0.000394 (0.00030) [-1.31676]	-0.231308 (0.16619) [-1.39186]	-2.09E-05 (8.2E-05) [-0.25561]
D(LOPENNESS(-2),2)	0.000169 (0.00044) [ 0.38073]	-0.000540 (0.00053) [-1.00878]	-6.26E-05 (8.9E-05) [-0.70323]	2.27E-07 (3.1E-05) [ 0.00738]	-3.63E-06 (0.00038) [-0.00968]	0.289724 (0.20865) [ 1.38854]	-2.29E-05 (0.00010) [-0.22293]
D(LPSCE(-1),2)	-1.178095 (0.73131) [-1.61094]	-0.564022 (0.88202) [-0.63947]	-0.137474 (0.14678) [-0.93662]	-0.040666 (0.05072) [-0.80183]	0.295762 (0.61892) [ 0.47787]	290.9258 (344.093) [ 0.84549]	-0.861869 (0.16952) [-5.08406]
D(LPSCE(-2),2)	0.040925 (0.68641) [ 0.05962]	0.425729 (0.82787) [ 0.51424]	0.061703 (0.13777) [ 0.44789]	-0.009223 (0.04760) [-0.19376]	-0.517761 (0.58092) [-0.89127]	126.8617 (322.970) [ 0.39280]	-0.379495 (0.15912) [-2.38500]
C	-0.060568 (0.05851) [-1.03509]	-0.000721 (0.07057) [-0.01021]	-0.006464 (0.01174) [-0.55038]	-0.001046 (0.00406) [-0.25781]	0.001402 (0.04952) [ 0.02831]	-24.37861 (27.5321) [-0.88546]	-0.005281 (0.01356) [-0.38932]
R-squared	0.929167	0.793339	0.411740	0.404985	0.745579	0.564512	0.745377
Adj. R-squared	0.895963	0.696466	0.135993	0.126072	0.626319	0.360377	0.626022
Sum sq. resid	4.996319	7.267813	0.201260	0.024029	3.578605	1106116.	0.268479
S.E. equation	0.395139	0.476570	0.079306	0.027403	0.334412	185.9196	0.091597
F-statistic	27.98425	8.189523	1.493179	1.452011	6.251712	2.765387	6.245056
Log likelihood	-13.80906	-22.80316	63.27553	114.2836	-5.799578	-309.1930	56.35935
Akaike AIC	1.242044	1.616798	-1.969814	-4.095151	0.908316	13.54971	-1.681639
Schwarz SC	1.865778	2.240532	-1.346080	-3.471418	1.532049	14.17344	-1.057906
Mean dependent	-0.003068	0.009430	-0.004299	6.05E-05	-0.001451	-21.71483	-0.000400
S.D. dependent	1.225059	0.865015	0.085319	0.029313	0.547055	232.4681	0.149781

Determinant resid covariance (dof adj.) 2.76E-06

Determinant resid covariance	1.61E-07
Log likelihood	-101.4023
Akaike information criterion	9.183428
Schwarz criterion	13.82245

## Granger Causality

### Pairwise Granger Causality Tests

Date: 08/04/18 Time: 11:54

Sample: 1 52

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LGDEBT does not Granger Cause LGDP	50	0.08442	0.9192
LGDP does not Granger Cause LGDEBT		1.33915	0.2723
LINF does not Granger Cause LGDP	50	0.41381	0.6636
LGDP does not Granger Cause LINF		0.21640	0.8062
LLR does not Granger Cause LGDP	50	0.12173	0.8857
LGDP does not Granger Cause LLR		0.11761	0.8893
LM2 does not Granger Cause LGDP	50	0.38684	0.6814
LGDP does not Granger Cause LM2		7.71317	0.0013
LGDP does not Granger Cause LM2	50	0.89853	0.4143
LGDP does not Granger Cause LOPENNESS		2.59175	0.0860
LPSCE does not Granger Cause LGDP	50	3.52363	0.0379
LGDP does not Granger Cause LPSCE		1.31122	0.2796
PERIOD does not Granger Cause LGDP	50	2.78814	0.0722
LGDP does not Granger Cause PERIOD		0.15920	0.8533
LINF does not Granger Cause LGDEBT	50	2.15131	0.1281
LGDEBT does not Granger Cause LINF		0.14675	0.8639
LLR does not Granger Cause LGDEBT	50	2.71219	0.0772
LGDEBT does not Granger Cause LLR		0.30173	0.7410
LM2 does not Granger Cause LGDEBT	50	0.51108	0.6033
LGDEBT does not Granger Cause LM2		1.03236	0.3644
LOPENNESS does not Granger Cause LGDEBT	50	0.40613	0.6686
LGDEBT does not Granger Cause LOPENNESS		2.29404	0.1125
LPSCE does not Granger Cause LGDEBT	50	3.65244	0.0339
LGDEBT does not Granger Cause LPSCE		1.55348	0.2226
PERIOD does not Granger Cause LGDEBT	50	2.35067	0.1069
LGDEBT does not Granger Cause PERIOD		1.92188	0.1582
LLR does not Granger Cause LINF	50	0.27144	0.7635
LINF does not Granger Cause LLR		1.54437	0.2245
LM2 does not Granger Cause LINF	50	1.17132	0.3192
LINF does not Granger Cause LM2		2.35049	0.1069

LOPENNESS does not Granger Cause LINF	50	0.48517	0.6188
LINF does not Granger Cause LOPENNESS		2.05867	0.1395
LPSCE does not Granger Cause LINF	50	0.23843	0.7889
LINF does not Granger Cause LPSCE		1.01195	0.3716
PERIOD does not Granger Cause LINF	50	1.42913	0.2502
LINF does not Granger Cause PERIOD		1.64109	0.2052
LM2 does not Granger Cause LLR	50	1.26957	0.2908
LLR does not Granger Cause LM2		1.66950	0.1998
LOPENNESS does not Granger Cause LLR	50	0.92193	0.4051
LLR does not Granger Cause LOPENNESS		1.06253	0.3541
LPSCE does not Granger Cause LLR	50	5.51167	0.0072
LLR does not Granger Cause LPSCE		1.83528	0.1713
PERIOD does not Granger Cause LLR	42	-0.07296	0.0000
LLR does not Granger Cause PERIOD		2209.42	0.0000
LOPENNESS does not Granger Cause LM2	44	0.50614	0.0000
LM2 does not Granger Cause LOPENNESS		0.00620	0.0000
LPSCE does not Granger Cause LM2	46	0.96666	0.0000
LM2 does not Granger Cause LPSCE		0.27162	0.0000
PERIOD does not Granger Cause LM2	48	0.35189	0.0000
LM2 does not Granger Cause PERIOD		0.00000	0.0000
LPSCE does not Granger Cause LOPENNESS	50	0.00000	0.0000
LOPENNESS does not Granger Cause LPSCE		0.00000	0.0000
PERIOD does not Granger Cause LOPENNESS	0	0.00000	0.0000
LOPENNESS does not Granger Cause PERIOD		0.00000	0.0000
	4173948		
PERIOD does not Granger Cause LPSCE	8	0.00000	0.0000
LPSCE does not Granger Cause PERIOD		0.06051	0.0000

### Variance Decomposition;

Variance Decomposition of D(LGDP):								
Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNESS)	D(LPSCE)
1	0.578485	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.716980	89.51537	0.284121	1.151450	0.289788	0.203578	2.211297	6.344397
3	0.801114	73.84204	0.317069	2.344439	1.572579	2.010136	11.43308	8.480658
4	0.822443	71.22533	0.786826	2.579783	3.137070	1.985754	11.19465	9.090582
5	0.830688	69.92562	0.848197	2.545758	3.693011	3.093991	10.97729	8.916132
6	0.834112	69.44822	0.866350	2.835131	3.847134	3.082515	11.06399	8.856660
7	0.836114	69.13509	0.878375	2.821565	3.883469	3.068493	11.36195	8.851069
8	0.838395	68.87581	0.873913	2.811737	3.886212	3.079457	11.66982	8.803053

9	0.839958	68.63987	0.913764	2.802774	3.871827	3.133690	11.86761	8.770468
10	0.840948	68.57722	0.912787	2.825811	3.878885	3.167822	11.88189	8.755582

Variance  
Decomposition  
of  
D(LGD  
EBT):

Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNES S)	D(LPSCE)
1	0.421014	1.744900	98.25510	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.540181	2.730552	83.29550	3.408433	2.674424	5.359434	0.726623	1.805030
3	0.565077	7.371425	76.14203	3.671945	2.541835	4.949725	0.963110	4.359930
4	0.591390	7.683010	69.89693	3.474653	2.795099	7.897672	3.991662	4.260972
5	0.609475	10.84625	65.83630	3.649086	3.393480	7.435991	3.807423	5.031465
6	0.612657	10.84638	65.83804	3.622665	3.492809	7.359539	3.812880	5.027681
7	0.616042	10.73287	65.19813	3.724668	3.466649	7.325797	4.558109	4.993777
8	0.618608	10.77575	64.74540	3.697761	3.448681	7.270063	5.098000	4.964353
9	0.620212	10.76149	64.41268	3.688135	3.482935	7.475932	5.234559	4.944275
10	0.621279	10.86766	64.19412	3.737896	3.501238	7.488627	5.260107	4.950358

Variance  
Decomposition  
of  
D(LINF)  
:

Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNES S)	D(LPSCE)
1	0.068749	0.941244	0.296802	98.76195	0.000000	0.000000	0.000000	0.000000
2	0.080464	6.211997	0.887483	91.23038	0.533079	0.893492	0.232000	0.011571
3	0.089007	7.240364	2.739075	78.11052	4.581151	1.210447	3.144411	2.974034
4	0.098242	9.120919	2.257040	64.19267	4.542191	1.191732	16.07221	2.623235
5	0.103870	9.023411	2.348027	57.63119	4.077377	2.973003	21.55245	2.394541
6	0.106017	9.791140	2.448815	55.64303	4.118602	3.741939	21.80068	2.455797
7	0.107205	10.40360	2.396019	54.74541	4.586098	4.060222	21.32575	2.482893
8	0.107659	10.32644	2.426300	54.45430	4.607889	4.026237	21.62088	2.537961
9	0.108828	10.17535	2.375511	53.30922	4.509444	4.080095	23.04572	2.504666
10	0.109932	10.34535	2.386183	52.25506	4.419840	4.246515	23.88835	2.458697

Variance  
Decomposition  
of  
D(LLR):

Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNES S)	D(LPSCE)
1	0.023749	1.513211	4.766041	3.146125	90.57462	0.000000	0.000000	0.000000
2	0.024209	1.775589	4.962600	3.642102	88.05200	0.090028	1.463770	0.013913
3	0.024886	2.965792	4.699519	4.293370	83.37039	0.202660	3.985262	0.483010
4	0.025169	3.191233	5.154246	4.242862	82.48520	0.348967	4.103571	0.473925
5	0.025365	3.626735	5.141922	4.906635	81.29544	0.379207	4.054534	0.595522
6	0.025442	3.724805	5.173748	4.942192	80.94051	0.564394	4.058150	0.596200
7	0.025498	3.709862	5.245761	4.963449	80.67114	0.581786	4.146288	0.681715
8	0.025577	3.694615	5.213623	4.935831	80.17700	0.610923	4.689370	0.678640
9	0.025623	3.794175	5.225627	4.918443	79.90575	0.643641	4.832044	0.680322
10	0.025646	3.816184	5.224548	4.922341	79.78750	0.690268	4.879877	0.679278

Variance Decomposition of D(LM2):								
Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNES S)	D(LPSCE)
1	0.274771	2.163474	1.139629	4.619883	0.149924	91.92709	0.000000	0.000000
2	0.358195	33.58907	2.046719	2.744605	0.094987	55.29395	6.230297	0.000373
3	0.386440	32.49501	5.863232	5.301213	3.238930	47.64024	5.363926	0.097445
4	0.401201	30.84007	5.715972	5.252584	3.531657	44.46471	10.03963	0.155379
5	0.408057	29.81789	6.727343	5.097169	5.430714	43.00486	9.705125	0.216901
6	0.411093	29.38017	6.762124	5.143609	6.146149	42.54036	9.813877	0.213714
7	0.412301	29.29327	6.833293	5.199116	6.336074	42.30082	9.819274	0.218159
8	0.413155	29.17246	6.941166	5.179601	6.498125	42.15379	9.820252	0.234609
9	0.413784	29.12107	6.920879	5.163931	6.478433	42.04148	10.03855	0.235651
10	0.414120	29.09987	6.972700	5.155708	6.491212	41.97755	10.06635	0.236611

Variance Decomposition of D(LOPENNES S):								
Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNES S)	D(LPSCE)
1	187.7135	1.439098	0.211082	1.236830	0.424456	0.720275	95.96826	0.000000
2	244.3345	8.290616	2.905152	1.484883	3.439696	8.212952	72.45024	3.216466
3	284.6650	12.89290	3.182104	3.058331	4.857036	11.11439	62.50240	2.392842
4	298.2807	14.89121	3.148236	4.493093	4.890414	11.81104	57.78076	2.985246
5	305.6743	14.36350	3.171388	5.022585	4.727396	11.36551	57.79823	3.551390
6	317.1839	13.47059	2.947857	4.931570	4.561959	10.99684	59.72733	3.363845
7	328.7246	13.61519	2.889317	4.607500	4.249826	11.13487	60.36981	3.133485
8	336.8789	14.18156	2.885754	4.613312	4.216086	11.50995	59.56913	3.024208
9	340.0175	14.52723	2.925191	4.864622	4.280883	11.69823	58.60911	3.094737
10	341.6158	14.49772	2.924513	5.038479	4.321452	11.61561	58.43740	3.164825

Variance Decomposition of D(LPSCE):								
Period	S.E.	D(LGDP)	D(LGDEBT)	D(LINF)	D(LLR)	D(LM2)	D(LOPENNES S)	D(LPSCE)
1	0.088302	0.409177	11.82083	0.667643	0.244773	6.372517	0.053688	80.43137
2	0.099667	1.192135	15.87761	0.812449	5.104732	10.65276	0.711036	65.64927
3	0.103752	1.107375	18.32970	1.264115	5.580958	10.32398	1.882681	61.51119
4	0.106337	1.481448	17.74539	1.748006	5.887406	9.832894	4.737770	58.56708
5	0.108623	4.274944	17.00872	1.688143	6.163219	9.470234	5.262107	56.13264
6	0.109582	4.420991	17.02582	1.671003	6.093535	9.801869	5.831821	55.15496
7	0.110349	5.250658	16.81069	1.943623	6.021322	9.685721	5.775499	54.51249
8	0.110457	5.252231	16.79522	1.952259	6.095030	9.713403	5.781460	54.41039
9	0.110735	5.226925	16.71546	1.978167	6.080834	9.743779	6.100353	54.15448
10	0.111025	5.306563	16.63980	1.973253	6.051174	9.712180	6.443967	53.87306

Cholesky  
Ordering:  
D(LGD  
P)  
D(LGD  
EBT)  
D(LINF)  
D(LLR)  
D(LM2)  
D(LOP  
ENNES  
S)  
D(LPS  
CE)

## Diagnostic Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.689648	Prob. F(2,43)	0.5072
Obs*R-squared	1.616146	Prob. Chi-Square(2)	0.4457

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 08/04/18 Time: 11:38

Sample: 1 52

Included observations: 52

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDEBT	-0.023502	0.183330	-0.128197	0.8986
LINF	-0.009312	0.411411	-0.022634	0.9820
LLR	-0.037638	1.235558	-0.030462	0.9758
LM2	0.030337	0.246423	0.123111	0.9026
LOPENNESS	-2.71E-05	0.000272	-0.099434	0.9213
LPSCE	-0.022189	0.660324	-0.033603	0.9733
C	0.047535	1.429575	0.033251	0.9736
RESID(-1)	-0.102835	0.169772	-0.605726	0.5479
RESID(-2)	0.138956	0.161126	0.862411	0.3932

R-squared	0.031080	Mean dependent var	5.55E-16
Adjusted R-squared	-0.149185	S.D. dependent var	0.468009
S.E. of regression	0.501706	Akaike info criterion	1.614504
Sum squared resid	10.82347	Schwarz criterion	1.952220
Log likelihood	-32.97711	Hannan-Quinn criter.	1.743976
F-statistic	0.172412	Durbin-Watson stat	1.945376
Prob(F-statistic)	0.993501		

## Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.682001	Prob. F(6,45)	0.1475
Obs*R-squared	9.525597	Prob. Chi-Square(6)	0.1461
Scaled explained SS	14.95025	Prob. Chi-Square(6)	0.0206

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 08/04/18 Time: 11:39

Sample: 1 52

Included observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.893054	1.214264	1.559013	0.1260
LGDEBT	0.302887	0.154563	1.959633	0.0563
LINF	0.105093	0.349786	0.300449	0.7652
LLR	-0.395478	1.024395	-0.386060	0.7013
LM2	-0.149168	0.188412	-0.791714	0.4327
LOPENNESS	0.000273	0.000231	1.183444	0.2428
LPSCE	-1.237359	0.558387	-2.215954	0.0318

R-squared	0.183185	Mean dependent var	0.214820
Adjusted R-squared	0.074276	S.D. dependent var	0.444095
S.E. of regression	0.427284	Akaike info criterion	1.261913
Sum squared resid	8.215720	Schwarz criterion	1.524581
Log likelihood	-25.80975	Hannan-Quinn criter.	1.362614
F-statistic	1.682001	Durbin-Watson stat	2.325315
Prob(F-statistic)	0.147470		

## Normality test

