

**FACTORS INFLUENCING THE DEMAND FOR CREDIT BY THE  
PRIVATE SECTOR IN KENYA**

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**Declaration**

I declare that this research proposal is my original work and has never been presented to any other institution or examinations body for examination.

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**APPROVAL**

This research paper has been submitted for examination with my approval as University supervisor:

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Dr. Peter Muriu

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## **Abstract**

The main objective of this study was to determine the effects of selected macroeconomic variables on the demand for credit by the private sector in Kenya.

The study used annual time series data for the period 1980-2012. This was obtained from Kenya National Bureau of Statistics, World Development Indicators and supplemented by Central Bank data. The study used OLS method. The findings were as follows; public investment, short term interest rate, long term interest rate, employment and domestic debt have a positive effect on demand for credit by the private sector, whereas per capita GDP and exchange rate have a negative effect on demand for credit by the private sector.

The policy implication of these results is that the government should consider reducing taxes and cost of borrowing in order to improve productivity. In addition, the government should devise strategies aimed at improving the competitiveness of her currency. The choice of monetary policy should consider the impact on exchange rate in order to ensure stability in the interest rate. Finally the policy makers should create fiscal space in the government budget to finance greater public investments. This can be achieved by broadening the tax base, reducing exemptions and simplifying the tax system so as to include elements in the informal sector not currently captured by the tax system. They should also strengthen and give a face-lift the strategies to improve efficiency and quality of public investment management processes.

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## **List of acronyms**

<b>ASCAS</b>	-Accumulating Savings and Credit Association
<b>ADF</b>	- Augmented Dickey Fuller
<b>AIC</b>	- Akaike Information Criterion
<b>BCPS</b>	- Bank Credit to the Private Sector
<b>CBK</b>	-Central Bank of Kenya
<b>CEE</b>	- Central and Eastern Europe
<b>CIS</b>	- Credit Information Sharing
<b>DTMs</b>	- Deposit Taking Microfinance
<b>DW</b>	- Durban Watson
<b>EAC</b>	- East Africa Countries
<b>ECM</b>	- Error Correction Model
<b>ECT</b>	- Error Correction Term
<b>GDP</b>	- Gross Domestic Product
<b>KNBS</b>	- Kenya National Bureau of Statistics
<b>MDG</b>	- Millennium Development Goals
<b>MFI</b> s	-Microfinance Institutions
<b>MTP</b>	- Medium Term Plan
<b>NESC</b>	- National Economic and Social Council
<b>OECD</b>	- Organization for Economic Co-operation and Development
<b>OLS</b>	- Ordinary Least Squares
<b>SACCOs</b>	-Savings and Credit Cooperative Organizations
<b>SAP</b>	- Structural Adjustment Programs
<b>SME</b>	- Small and Medium Enterprises
<b>UN</b>	- United Nations
<b>USAID</b>	- United States of America International Development
<b>VAR</b>	- Vector Autoregression
<b>VECM</b>	- Vector Error Correction Model



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the study

The development of a well-functioning financial system is important in accelerating economic growth. Kenya's Vision 2030 identifies the financial Services sector as one of the country's core growth pillars through financing overall investment needs (Republic of Kenya, 2007). Furthermore, the First Medium Term plan (MTP\_1) 2008-2012 states that, a vibrant and globally competitive financial sector ensures macroeconomic stability, promote private sector development, which in turn will generate employment opportunities and reduce poverty (Republic of Kenya, 2008)

Access to credit has been used as one of the poverty alleviation strategies as this gained momentum upon the adoption of Millennium Development Goals (MDGs) by the UN Millennium Summit held in 2000. In this regard, credit has been used as an economic tool over time with the aim of addressing poverty challenges. For sustainable economic growth to be achieved, improved access to finance is necessary to reduce income inequality and therefore enabling low-income households, to escape from poverty (Ayenew and Zewdie, 2010).

The decision of the consumers to enter the debt market in any country is dependent on demand as well as supply factors (Chen and Chivakul, 2008). On the side of demand, the desire of consumers to borrow determines their probability of engagement in the credit market. On the other hand of supply, the decision on whether and how much to lend depends on the repayment capacity of the borrowers (Ibid). This study will focus on the demand side (credit demand), even though the observed credit developments result from the interaction of both supply and demand.

However, as a market in promises, the information regarding the reliability and solvency of the borrower drives the financial system (USAID, 2008). Imperfect information on interest rates charges in a loans market has direct impact on the riskiness of loans especially with regard to borrowers' adverse selection or investment actions (Stiglitz and Weiss, 1981). Therefore, such information

asymmetries limit the efficiency and effectiveness of the financial sector hence the need for government intervention to regulate the sector.

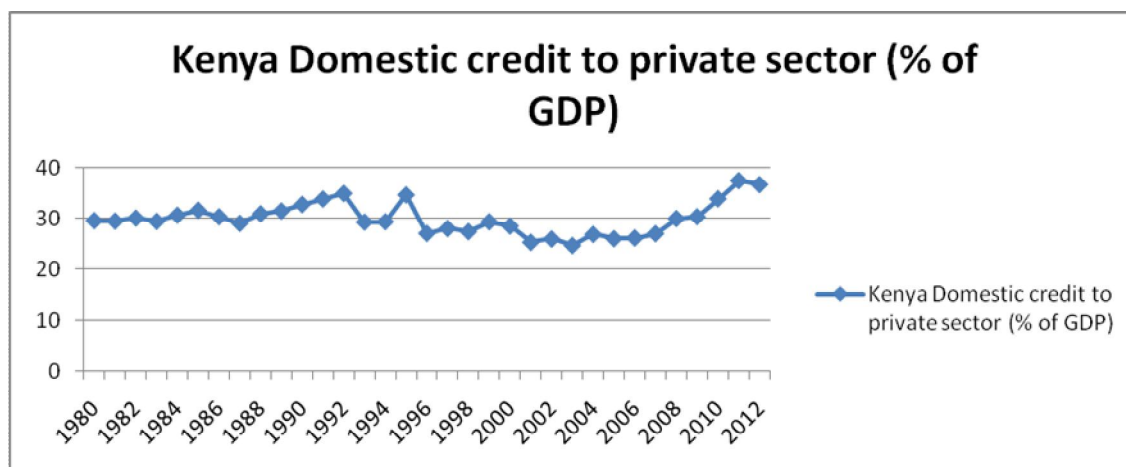
Overview of financial sector development in Kenya, as at 31<sup>st</sup> December, 2012, the Kenyan banking system comprised 43 commercial banks, 1 mortgage finance company, 112 Forex bureaus, 8 Deposit Taking Microfinance (DTM) institutions and 2 credit reference bureaus and 5 representative offices of foreign banks, all regulated and supervised by Central Bank Kenya (Republic of Kenya, 2013). Out of the 43 commercial banks, 13 are foreign banks and 30 are local locally owned. From the local banks 27 are privately owned while 3 are publicly owned. The number of banks operating abroad is 10 with a total of 223 branches (Zajc, 2013).

Microfinance sector has also played a significant role in the evolution of Kenya's financial services by presenting a healthy competition to commercial banks resulting in promotion of livelihoods through access to finance services, facilitating enhanced economic growth in line with Vision 2030 (Republic of Kenya, 2012).

The reviewed regulatory and supervisory framework in Kenya provides a platform for competition within the existing banking system as well as encouraging the new entrants. In addition, the existence of the unbanked population has led to the introduction of innovative and cost-effective financial services. Furthermore, Kenya offering financial services abroad, exports its ideas to the neighbouring countries making it a leader among other EAC countries.

The Kenyan banking sector recorded an expansion in total credit by 8.4% to Ksh 1,765.5 billion in 2012 up from Ksh 1,628.0 billion in 2011 (Republic of Kenya, 2013). The public sector credit increased by 33.6% in 2012, with the central government including commercial bank's investment in government securities reversing the trend from a decline of 9.4% in 2011 to an increase of 30.9% in 2012. The increase was occasioned partly by the financing need in preparation for the 2013 general elections (ibid). Growth in the share of commercial banks credit given to the private sector recorded a decline from 73.5% in 2011 to 55.2% in 2012. The decline was in line with efforts to lower inflation at the beginning of the year (Republic of Kenya, 2013). The trend of private sector over the period 1980-2012 is explained in figure 1.1.

**Figure 1.1: Trend of Kenya's domestic credit to the private sector (% of GDP) (1980-2012)**



**Source: World Development Indicators.**

Figure 1.1 shows that Kenya's private sector credit increased in 1982-1992 from 29.48% to 34.84% except in 1987 when there was a decline from 30.83% to 28.95%. The period between 1993 and 1999 experience fluctuations ranging from approximately 26%- 29% except 1995 with an outstanding percentage of 34.55%. The increase was attributed to implementation of structural adjustment programs (SAP) through successful monetary and fiscal policy initiatives (1993-1995) that stabilized prices, interest rates and foreign exchange (Gouled and Adde, 1996).

Private sector credit experienced a decline from 28.43% in 2000 to 24.60% in 2003 as a result of uncertainty surrounding the 2002 elections, increased inflation from 1.9% in 2002 to 9.8% in 2003 due to increase in food prices and a reduction in the cash ratio in 2003 ( CBK, 2003; Mwega, 2010). Generally, there was an increase in Private sector credit in 2004 to 2012 except reduction in 2005 and 2012. The shortfall in 2012 was due to tight monetary policy implemented since the fourth quarter of 2011 to the first half of 2012 to address inflationary pressures and stabilize the exchange rate; and uncertainty of the outcome of March 4, 2013 general election (Republic of Kenya, 2012). The shortfall in credit to the private sector poses a risk to recovery of economic growth, with indirect effect on financial sector stability especially when non-performing loans rises.

Over the last 33 years, the highest percentage of private sector credit recorded was 37.36% in 2011, while its lowest percentage was 24.60% in 2003. The increased demand in 2011 is attributed to an increased growth that started in 2010 as result of the prevailing monetary policy regime at the time (Republic of Kenya, 2012). Theoretically, the adoption of new innovations and policy developments

in the financial sector is expected to create a conducive environment for borrowers hence increase in the demand for credit by the of private sector. Though the sector has realized changes since the initiation of reforms, the demand has not been satisfied as depicted by fluctuations and especially the decline in demand in 2012. This study therefore seeks to determine other factors responsible for such behavior.

Among the Policies put forward by the government to enhance access to credit in the financial sector include; Licensing of Deposit Taking Microfinance Institutions to serve rural and peri-urban areas which are underserved by the mainstream banking sector, adoption of agent banking, mobile phone technology innovations expected to create new opportunities (CBK, 2009)

In addition, the use of credit information sharing (CIS) mechanism that was initiated in the year 2010 enables banks to share credit information on their customers to facilitate better assessment of the risks associated with prospective borrowers. The CIS mechanism has been extended to include DTMs and Savings and Credit Cooperative Societies (SACCO)<sup>1</sup>.

## **1.2 Problem Statement**

Private sector in Kenya over the years has substantially contributed to the country's economic development process. The sector has also been resilient despite the various external and internal economic shocks experienced by the country in contributing significantly to diversification of export markets and range of export products.

In addition to internal financing of investments, the private sector also go for debt financing especially for huge investments that exceeds internal financing. Credit plays a vital role in business financing as it provides both short-term and long-term investment capital. It is also vital in financing household's purchases of consumer capital goods such as homes, cars and appliances which the current income may not be able to finance (Joseph 2010).

The current supervisory and regulatory reforms, the on-going structural changes in the financial sector and the expected strong economic growth in the country due to improved infrastructure which

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<sup>1</sup> Unlocking access to affordable credit; second East African regional credit information sharing conference, Hilton Hotel, Nairobi. <http://ciskenya.co.ke> accessed on 28/09/2013.

spurs up investments, together, are anticipated to transform the existing business models, improve competition, efficiency and further increase the demand for credit.

Despite the increased number of financial institutions, credit rationing through interest rates has excluded most people especially the disadvantaged individuals as they cannot bear high cost of borrowings. As a result, most individuals rely on the informal credit facilities from ASCAs and money lenders to enable them smooth their consumption behavior. A number of studies have analysed the relationship between demand for credit and real output, Interest rates, Inflation and exchange rate as explanatory variables (Calza et al, 2001, Calza et al, 2003, Hofmann, 2001, Kiss, Nagy & Vonnak, 2006, Guo and Stepanyan, 2011). However the effects of public investment and employment have not been established in the Kenyan case.

This study therefore is carried out specifically to establish the effect of public investment and employment on the demand for credit by private sector in Kenya, taking the dependent variable as the total amount of domestic credit borrowed by the private sector in Kenya in a given period of time. The findings of this study will make a contribution to debate on financial service sector and therefore inform policy on promotion of access to credit in Kenya as the country implements the vision 2030. This is so because availability of accessible and affordable credit will provide opportunity for private sector development, thereby creating employment and generating income.

### **1.3 Objectives of the study**

The main objective of this study is to determine the determinants of demand for credit by the private sector in Kenya.

#### **Specific objectives**

- i. To determine the effect of GDP per capita on the demand for credit by the private sector;
- ii. To determine the effect of Public investment on the demand for credit by the private sector;
- iii. To determine the effect of Short term interest rate on the demand for credit by the private sector;
- iv. To determine the effect of Long term interest rate on the demand for credit by the private sector;
- v. To determine the effect of Exchange rate on the demand for credit by the private sector;
- vi. To determine the effect of employment on the demand for credit by the private sector;

- vii. To determine the effect of Domestic debt on the demand for credit by the private sector;
- viii. To make policy recommendations based on the findings of the study.

#### **1.4 Significance of the study**

As outlined in the First Medium Term plan (MTP-1) 2008 – 2012, access to affordable credit is a major milestone in achieving vision 2030 which is intended to transform Kenya into a middle-income country by 2030, through hastening Kenyan economic growth and development (Republic of Kenya, 2008). The MTP underscored the importance of the financial sector in accelerating economic growth, ensuring macroeconomic stability as well as promoting private sector development, which in turn will generate employment opportunities and reduce poverty. It also encourages Foreign Direct Investment (FDI), while safeguarding the Kenyan economy from external shocks and propelling the country into a leading financial hub in Eastern and Southern Africa (Republic of Kenya, 2011).

Private sector development and investment are critical for economic growth. In parallel with public sector efforts, private investment especially in competitive markets has tremendous potential to contribute to growth. Private sector investments are the engine of growth in productivity, job creation and income (World Bank, n.d). And with government playing a complementary role in regulating, funding and service provision, private initiative can help provide the basic services and conditions that empower the economy to achieve higher levels of development (World Bank, n.d).

Policies that are aimed at promoting economic development would benefit by establishing the factors influencing the demand for credit in the economy. Indeed, the Kenya's National Economic and Social Council (NESC) highlights access to finances as a priority intervention strategy to tackle the high unemployment rate in the country (NESC, 2010). This study will therefore provide useful information on the economic forces and their magnitude of influence on demand for credit by the private sector in Kenya. From the findings, policy makers will be able to prepare alternative policies which will aid in increasing accessibility to credit in Kenya and therefore promote entrepreneurship, employment and income generation. In addition the study will contribute to the discourse on demand for credit in an economy.

## **1.5 Organization of the study**

The rest of this study is organized as follows. Following this introduction, chapter two is the literature review that provides theoretical basis to demand for credit, empirical literature and overview of the literature. Chapter three presents the methodology to be used in the study, model specification, data sources and variables used in the study. Chapter four presents analysis and discussion of the results while chapter five presents summary of the main findings, conclusion and recommendations of the study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter provides information gathered from selected literature and articles on credit and the demand for credit by the private sector which is the main objective of this study. The factors considered include GDP per capita growth rate, Public investment, Long term interest rates, Short term interest rates, Exchange rates, Employment and Domestic debt.

#### **2.2 Theoretical literature**

Credit is an important commodity to both public and private sector aiding economic performance of the key sectors, improving the welfare of the poor in their micro-economic activities.

##### **2.2.1 Life Cycle Model - Franco Modigliani (1966)**

Life Cycle Model hypothesized “that consumption and saving decisions of households at each point of time reflect a more or less conscious attempt at achieving the preferred distribution of consumption over the life cycle, subject to the constraint imposed by the resources accruing to the household over its lifetime” (Modigliani, 1966). According to this Model, households make decisions on consumption based on both their available resources over time and on their current status. The theory further argues that individuals accumulate wealth at the initial stages of their working period which will eventually be used to support their future consumption (Ibid).

In developing countries, savings are low compared to developed countries. As a result, little is available for investment to build on assets that will aid in smoothing consumption at an acceptable level even in future. According to this hypothesis, consumers are expected to smooth their consumption patterns over their life time to maximize utility despite the fluctuating income (Soman & Cheema, 2002). Consumers can smooth their consumption by using the saving from past income or investment in the future or use future income in the present if only they have access to consumer credit in exchange for repayment in the future. With availability of credits, the transitory income



shocks will be smoothed away by borrowing and saving hence consumption patterns will remain unaffected (Morduch, 1995).

According to Soman & Cheema (2002), "... consumers are unable to correctly value their future incomes, and that they lack the cognitive capability to solve the intertemporal optimization problem required by the life-cycle hypothesis". As a result, information on credit limit helps individuals to make inter-temporal choice. For example, if consumers can access larger amounts of credit, then they are likely to conclude that their future incomes will be high and therefore are motivated to borrow more. On the other hand, consumers who access lower amounts of credit are may conclude that their future incomes will be low and therefore their spending will be equally low (ibid). The credit acquired from financial institutions aids consumption smoothing as well as promoting investment plans.

### **2.2.2 Permanent income hypothesis – Friedman (1957)**

Permanent income hypothesis is a theory of consumption where consumer's consumption behavior is mainly explained by the variations in permanent income expectations rather than variations in temporary income. It assumes that households have opportunity to borrow (perfect capital markets). The theory argued that, consumer's current consumption depends on expected consumption in the future period which the later depends on the characteristics of individuals (Hall, 1978).

The hypothesis also argues that individual's real wealth strongly influences consumption and not his current real disposable income (Hall, 1978). Furthermore, transitory or temporary changes in income have little effect on consumer spending behavior, whereas permanent changes can have large effects on consumer spending behavior (Hall, 1978). Friedman in his study found that, measured income and consumption are composed of permanent and transitory elements (Friedman, 1957). Furthermore, permanent income expectations have different impact on the consumption of different households; low income earners will have a higher propensity to consume compared to high income earners (Ibid).Therefore with availability of information regarding the current and future earnings, credit plays a major role in smoothing consumption especially with the low income population.

### **2.2.3 Pecking Order Theory - Myers (1984)**

Pecking Order Theory seeks to explain how companies prioritize their financing sources, as well as how the business makes financial decisions. The theory argues that adverse selection implies that retained earnings are better than debt and debt is better than equity. Myers postulates that a firm is said to follow a pecking order if it prefers internal to external financing and debt to equity if external financing is used (Myers, 1984). Myers proposed a “pecking order” in securities in which insiders are better off issuing safe securities such as debt when the market recognizes their informational superiority

The theory was popularized by Myers and Majluf (1984) when they argued that equity is a less preferred means to raise capital. The theory assumes that management acts in the interests of existing stockholders and are passive, and do not adjust their portfolios in response to the firm’s issue-invest decision, except possibly to buy a predetermined fraction of any new issue. With this assumption about management’s objective, firms will prefer debt to equity if they need external funds (ibid).

### **2.2.4 Credit channel theory – Bernanke & Gertler (1995)**

Credit channel theory is a theory of transmission mechanism of monetary policy. This can be clearly explained by the bank lending channel and the balance sheet channel (Bernanke and Gertler, 1995.). According to Thornton (1994), “both of these channels are based on lending problems associated with asymmetric information and control. The cost of acquiring information and controlling borrowers’ behavior drives a wedge between the cost of internal and external finance”.

According to this hypothesis, monetary policy actions induce changes in interest rates and prices, affecting the borrowers’ balance sheets (Thornton, 1994). Monetary policy not only affects the interest rates but also the size of external premium (Bernanke and Gertler, 1995). The size of external finance premium is determined by the borrower’s financial position, but existence of imperfect information in the credit markets amplifies it more resulting in a deadweight costs associated with the Principal-Agent problem existing between lenders and borrowers (Ibid). According to the “credit view”, a change in monetary policy that raises or lowers open-market interest rates tends to change the external finance premium in the same direction (Thornton, 1994). As a result of the effect of tightened monetary policy on the external finance premium, the cost of borrowing increases, while real GDP declines. Eventually, borrowings also decline due to high premiums for external finance.

### 2.3 Empirical Literature

Hofmann (2001) analyzed the determinants of credit to the private non-bank sector as a function of real GDP, interest rates and property prices for a sample of 16 industrialized countries using quarterly data over the period 1980Q1 – 1998Q4, based on a co-integrating VAR. Co-integration results indicated that long-run relationship between real credit and the explanatory variables only exists when real residential and real commercial property prices are added to the model (Ibid). Further, the results showed that real GDP and real property prices have a positive and significant effect on real credit. The increased credit demand arises as a result of increase in both consumption and investment. On the other hand real credit is negatively related to real interest rate.

Guo and Stepanyan (2011) analyzed the determinants of bank credit in 38 emerging markets over the period 2001:Q1 to 2010:Q2, and further decomposed their analysis into pre- and post-crisis periods. The explanatory variables considered were; “Foreign liabilities, domestic deposits, real GDP growth, inflation, deposit rates, exchange rate, US federal funds rate, US M2 and non-performing loans” (Guo and Stepanyan, 2011). The study found that domestic deposits, liabilities to non-residents, exchange rate and GDP growth have a positive effect on private credit. On the other hand, inflation, deposit rate and the Federal funds rate have a negative effect on real private credit. Furthermore, the study found that for most of the countries in Asia, domestic deposits and real GDP growth were the main determinants of bank credit in both the pre-crisis and post-crisis periods. They also found that there exist a large variation in the credit growth rate in the countries within the sample, particularly in the pre-crisis period, and a contrasting trend in credit growth between the two periods.

Kiss, Nagy and Vonnak (2006) analyzed the equilibrium level of private credit/ GDP ratio of Euro-zone countries. The explanatory variables considered were GDP per capita, the real interest rate and inflation. Panel error-correction model was used to explain the evolution of credit aggregates in Euro-zone countries since 1980. The results reflected a positive relationship between PPP- based per capita GDP and private credit/ GDP ratio, whereas, real interest rate and inflation depicted a negative relationship with private credit/ GDP ratio. The results were consistent with the results of previous studies on credit demand in the Euro-zone.

Tasic’ and Valev (n.d) carried out a study to investigate a new data set on the maturity of bank credit to the private sector in 74 countries over the period 1990 to 2005. The objective of the study was to;

first, determine the factors causing the differences in credit maturity across countries, and secondly, to investigate whether credit maturity has an effect on economic growth. The study found that real GDP per capita growth is positively related to the maturity of domestic bank credit to the private sector, indicating that faster growing countries experience more long-term credit. However, the significance of GDP per capita occurred as manufacturing share of output was controlled (Ibid).

Egert, Backé, and Zumer (2006) carried out an investigation on the determinants of domestic credit to the private sector as a percentage of GDP in 11 Central and Eastern Europe (CEE) countries to the equilibrium level of private credit-to-GDP ratio. Based on dynamic panels, the study analyzed the equilibrium level using quarterly data for transition economies, developed small and large Organization for Economic Co-operation and Development (OECD) countries and emerging markets economies. The model captured both demand and supply factors of private credit. The study incorporated small open OECD and emerging markets economies to solve the problems of undershooting and biasness in estimation equations for transition economies.

The study by Egert, Backé, and Zumer (2006) further observed that major determinants of credit growth in the CEE-5 were; (1) credit to the public sector, (2) nominal interest rates, (3) the inflation rate and (4) the spread between lending and deposit rates. In this study the GDP per capita entered the estimated equations in a robust manner for the Baltic and Southeastern European countries. The study findings showed that the estimated coefficients for transition economies were much higher than those obtained for OECD and emerging market economies. This testifies to the bias caused by the initial undershooting of private credit to GDP in most countries. Furthermore, house prices led to increase in private credit only in countries with high house price inflation (Ibid).

Christensen (2004) emphasized the crowding out of the private sector by the domestic debt. According to his study, as government borrows from the domestic market it taps into the savings that would have been available for borrowing by the private sector. In this regard a rise in the interest rates, if flexible, negatively affects investment by the private sector. The results also showed that a rise in domestic interest rates if flexible, affects private sector investment negatively. Christensen further cross-referenced his finding with the observation by Fischer and Easterly, (1990) that even where interest rates are controlled, domestic borrowing can lead to credit rationing and crowding out of private sector investment (Christensen, 2004)

Cottarelli, Dell' Ariccia and Vladkova-Hollar (2003) carried out a study on Bank Credit to the Private Sector (BCPS) in 24 countries, using annual data for 1973-1996. The variables of interest were GDP per capita, public debt to GDP ratio, inflation, financial liberalization and accounting. Using a random effects GLS estimation procedure, the study found that GDP per capita, financial liberalization and accounting positively affect the BCPS, while inflation and Public debt to GDP ratio negatively affect BCPS.

Amanoo, Acquah and Asmah (2003) examined empirically the "...relationship between interest rates and the demand for credit as well as interest rates and loan repayment by the poor and the SMEs in a rural region of Ghana". Regression analysis based on ordinary least squares procedure was used to establish the relationship. The results indicated that interest rates negatively affect the demand for credit. In addition interest rates also have negative effect on loan repayment. The study further observed that this relationship is brought about by SMEs' aversion to acquiring credit due to high interest rates (Ibid).

Calza, Gartner and Sousa (2001) carried out a study on aggregate demand for credit in the euro area. In the study the authors used real GDP and real weighted short-term and long-term interest rates as explanatory variables. The study found long-run relationship between loans to the private sector and interest rates and GDP. The approach implicitly assumed that the demand for credit by corporations and households responds in the same direction to an improvement in economic activity or to changes in the level of interest rates. The demand for total loans was estimated using OLS method.

As regards the estimated results, long term real loans are positively related to real GDP and negatively related to real short-term interest rates and long-term interest rates. This suggests that the model employed describes a demand phenomenon.

Thereafter in another study, Calza, Manrique and Sousa (2003) added a new variable on cost of loans based on weighted average bank lending rates to estimate the results on loan overhang/ shortfall with respect to the future changes in inflation. The study found that shocks in loans provide vital information on future behaviour in inflation (Ibid).

Abuka and Egesa (2007) empirically investigated the determinants of private credit in the EAC region using an East African panel data set. The model employed the ratio of private credit to GDP as a dependent variable whereas GDP per capita, bank credit to government as a share of GDP,

lending rate, inflation, degree of financial liberalization measured by the spread between lending and deposit rates, urbanization, infrastructure and the structure of the economy are the explanatory variables (Ibid). The study found that in general, credit to the public sector is negatively and significantly related to the private sector credit. Specifically, crowding-out effect of public sector credit on private credit was observed in Rwanda, Uganda and Tanzania whereas crowding-in effect experienced in Kenya and Burundi. Moreover, GDP and nominal lending rate are positively and significantly related to the private sector credit. The study observed that when Tanzania is excluded, nominal interest rates have no significant effect on private credit while increase in urban population has a positive effect on private credit.

Additionally, excluding Burundi, access to more arable land per person has a positive effect on private credit. Infrastructure poses a positive effect on private credit whereas the effect of financial sector liberalization and inflation on private credit remained ambiguous.

Wangai and Messah (2011) analyzed factors that influence the demand for credit among the small-scale entrepreneurs in Meru Central District. To achieve this, the researchers employed both descriptive statistics and logistic regression models. While holding other factors constant the study found that there is always demand for additional finances to meet household utilities. However the study observed that the entrepreneurs with low levels of income demand less credit due to limited resources available to them through their low savings. To satisfy their numerous needs, low income earners may complement their financing with those from the informal sector such as ASCAs. Furthermore, the study also observed that with high levels of income, the entrepreneurs also increase savings which allow them accumulate assets that can be used as security for loans (Ibid). This is confirmed by Gattin-Turkalj, et al (2007) who also found that loans are positively related to the real GDP and negatively related to the real interest rates.

## **2.4 Overview of the literature**

From the literature review, several studies on demand for credit by the private sector have been done by various researchers. Studies reviewed show that different writers have used different variables and different methods of analysis. As regards quantitative variables influencing demand for credit, most reviewed studies have included an economic activity variable (such as real GDP) and financing costs (such as interest rates or bank lending rates) as the main determinants. Some of the empirical studies found that higher economic growth facilitates the private sector to accommodate higher levels of

debts and therefore able to finance higher consumption and investments through credit. On the other hand, interest rate is found to be negatively related to demand for credit.

However, most of the reviewed studies that have used quantitative variables are outside Kenya. The challenge is that the results may not adequately address the Kenyan economic situation. It is therefore important to carry out a study based in Kenya in order to come up with the actual issues especially on the factors influencing the Demand for credit by the private sector in Kenya.

In addition to GDP and Interest rate, this study will include other variables such as; Public investment, Employment, Exchange rates, and Domestic debt. These variables are expected to have either positive or negative influence on the Demand for credit by the private sector in Kenya.

## CHAPTER THREE

### METHODOLOGY

#### 3.1 Introduction

This chapter outlines the methodological approach used to analyze the demand for credit by the private sector. Data sources and estimation issues are also presented.

#### 3.2 Theoretical framework

This study describes the private sector to include both individuals and private enterprises. The individuals through employment earn income which helps them meet their consumption demand and maximize utility. Deviation from the consumption equilibrium as a result of constrained income pushes consumers to borrow in order to restore the equilibrium by smoothing consumption. On the other hand, private enterprises venture in investment projects aimed at maximizing profits. These investments are internally funded out of investment returns, but externally funded through borrowings during adverse business fluctuations to smooth business cycles back to the equilibrium.

Most studies investigating the demand for credit by the private sector employ a set of explanatory variables as identified in the empirical literature. A number of these studies include GDP per capita or real GDP, real or nominal interest and inflation rate.

Guo and Stepanyan (2011) extended the list by adding foreign liabilities, domestic deposits, deposit rates, exchange rate, non-performing loans, US federal funds rate, US M2. Specifically, exchange rate turned out to be an important variable, because it indicates that private credit growth based on domestic currency is more vulnerable to shocks arising from the foreign currency loans. Other studies have used additional variables capturing factors that drive the private credit-to-GDP ratio (Egert, Backé and Zumer, 2006). In this regard, the variables in question indicate the level of financial liberalization, quality as well as implementation of accounting standards. In addition, public debt was used to analyze the crowding-out/in effect of the private sector (Ibid).

Unlike other previous studies, Calza et al. (2001) used short term interest rates, long term interest rates and GDP as explanatory variables. According to them the importance of either short term or long term rates depends on the amount of loans borrowed either in fixed or variable interest rates.



The economic specification to be estimated for the demand for credit by the private sector will rely on explanatory variables used in previous studies, but also extends them.

**3.3 Model Specification**

This study will adopt Calza et al. (2001) model with modification to capture other macroeconomic variables. The adoption of the model is informed by its incorporation of real GDP, short term and long term interest rates as the determinants of aggregate demand for credit to the private sector; secondly it considers the long-run effects of the determinants on aggregate demand for credit to the private sector.

The adopted model takes two assumptions that: the relationship indicates a demand (and not supply) function; and that the effect originates from explanatory variables to the total amount of credit to the private sector.

In addition to the macroeconomic variables considered by Calza et al. (2001), the study will include other variables such as; public investment, employment, exchange rate and domestic debt. The relationship can be expressed as follows:

$$DCPS = f (GDPPGR, PUBINV, SINTR, LINTR, EXR, EMP, DDEB, \epsilon_t) \dots\dots\dots (1)$$

Where,

DCPS: Demand for credit by the private sector (% of GDP)

GDPPGR: GDP per capita growth rate

PUBINV: Public Investment

SINTR: Real short-term Interest rate (Treasury bill)

LINTR: Real long-term interest rate (Bonds)

EXR: Exchange rate

EMP: Employment

DDEB: Domestic debt

This study adopts a multiplicative model specified as follows:

$$DCPS = \beta_0 GDPPGR^{\beta_1} * PUBINV^{\beta_2} * SINTR^{\beta_3} * LINTR^{\beta_4} * SAV * EXR^{\beta_5} * EMP^{\beta_6} * DDEB^{\beta_7} + \varepsilon_t \dots \dots \dots (2)$$

However, for purposes of interpretation of the  $\beta$  coefficients, natural logarithms of the variables in the equation are taken (except Demand for credit by the private sector, Gdp per capita growth rate, Short term and Long term interest rates). Estimation of the model is done so as to determine the percentage changes in the dependent variable as a result of 1% change in

the explanatory variables. The equation therefore becomes:

$$DCPS = \beta_0 + \beta_1 GDPPGR + \beta_2 LN PUBINV + \beta_3 SINTR + \beta_4 LINTR + \beta_5 LN EXR + \beta_6 LN EMP + \beta_7 LN DDEB + \varepsilon_t \dots \dots \dots (3)$$

Where,

DCPS: Demand for credit by the private sector (% of GDP)

GDPPGR: GDP per capita growth rate

LN PUBINV: Logarithm of public investment

SINTR: Real S-T Interest rate

LINTR: Real L-T interest rate

LN EXR: Logarithm of exchange rate

LN EMP: Logarithm of employment

LN DDEB: Logarithm of domestic debt

$\beta_0$ : intercept

$\beta_1 - \beta_7$ : parameters

$\varepsilon_t$  : error term. Captures all relevant variables not included in the model.

### **3.4 Definition and measurement of Variables**

#### **3.4.1 GDP per capita growth rate**

An economy that exhibits an increasing growth is favoured by investors who foresee increased profits in the future. Output growth increases consumption demand and savings coming into the financial system which will allow it to extend credit. According to Harrod-Domar, natural rate of growth depends on the increase in labour force in the absence of technological change, while warranted rate of growth depends on the savings and investment habits of households and firms. Under the standard neoclassical conditions, output is produced by labour and capital (Solow, 1956). Part of this output is consumed and the rest is saved and invested. The increase in capital stock increases net investment which stimulates the demand for credit. Therefore GDP is expected to have a positive coefficient ( $\beta_1 > 0$ ).

#### **3.4.2 Public investment**

Investment takes place when we purchase new capital equipment or other assets that make for future productivity. Public investment through amenities such as communication, transports, healthcare, education, energy and other facilities increases demand for credit by increasing private returns. According to the poverty impact of public investment theory, public investment and private investment are complements. Increase in public capital stock raises the productivity of factors of production and hence aggregate output (Anderson, de Renzio, and Levy, 2006). In a situation of competitive labour markets and inelastic labour supply, high productivity push up real wages, savings and investments (Ibid). Increase in investment, calls for more demand for credit especially if the return to private investment is high. Public investment is therefore expected to positively influence demand for credit ( $\beta_2 > 0$ ).

#### **3.4.3 Short-term interest rate**

This is the interest rates on debt with a maturity period of less than one year, issued by a national government through the central bank of Kenya as a primary instrument for regulating money supply and raising funds through open market operations i.e Treasury Bills.

According to the expectations theory of the term structure of interest rates states that the yields on financial assets of different maturities (terms) are related primarily by market expectations of future yields (Russell, 1992). When short-term interest rates are relatively high, the yield curve is often downward-sloping; when short-term rates are relatively low, the curve is often steeply upward-sloping (ibid).

Treasury products are sold to the highest bidder whether at the initial auction or on the secondary market. When the demand for treasury bills (TBILLS) is high, investors bid at or above the face value. In this case, the yield will be low but in return for lower risk. Treasury rates fall during the recession phase of the business cycle and as a result, will drive bank lending rates, and all other interest rates down. With low bank lending interest rate, investors are enticed to go for credit to finance their investments. Therefore short-term interest rate is expected to negatively influence the demand for credit ( $\beta_3 < 0$ ).

### **3.4.3 Long-term interest rate**

Long-term rates are the rates associated with bonds with a maturity of ten years. Buying term securities expose lenders to uncertainties about future returns. According to the expectations theory, the interest risk on securities tends to increase with their terms (Russell, 1992). If the risk capital loss on securities tends to increase in proportion to their remaining terms, lenders demand more interest compensation on long term securities than on short term securities (ibid). This will tend to make the yield curve upward-sloping.

In addition, the face value of a long-term loan compared to that of a short-term loan, is more vulnerable to the effects of inflation. Therefore, the longer the borrower has to repay the loan, the more interest the lender should receive. High interest rate increases the cost of borrowing, which discourages borrowers and eventually lowers investments. Long term interest rate therefore is expected to affect the demand for credit by the private sector negatively ( $\beta_4 < 0$ ).

### **3.4.6 Exchange rate**

Exchange rate is the price of the domestic currency for another of a different country. It is an important variable determining the capital account since Kenya is overly dependent on imported capital and intermediate imported inputs. The rate of exchange between currencies keep changing

from time to time due to the need for international payments in respect to trade among countries, movement of capital and interest rate repayment. Exchange rate appreciation increases the return on investment production for export, while exchange rate depreciation reduces the return on investment which therefore affects the demand for credit.

Bank lending may also be controlled by the pegged or floating exchange rates. During restriction of credit, pegged exchange rate with exchange controls over all private capital flows to be used in order to reduce the tendency of unsatisfied borrowers to turn to foreign sources of capital (Black, 1984). A floating exchange rate would generate substantial upward pressure on the exchange rate during restrictive periods, followed by downward pressure during expansionary periods. Therefore the expected influence of exchange rate is positive ( $\beta_5 > 0$ ).

### **3.4.7 Employment**

The main driver of employment is the pace of economic growth driven by the level of investment. According to the general theory of employment, interest and money; when employment increases, aggregate real income also increases (Keynes, 1936). When aggregate real income is increased, aggregate consumption is increased, but at a lower rate than income. The excess of consumption is devoted to investment when employment is at the given level. Given the propensity to consume, the equilibrium level of employment depends on the amount of current investment (ibid). Investment allow the entrepreneur acquire assets which can be used as collateral to borrow loans. Therefore the employment is expected to have a positive influence on the demand for credit ( $B_6 > 0$ )

### **3.4.8 Domestic debt**

Domestic debt is a fundamental tool used by the governments in both developed and less developed countries to finance internal and external gaps. In Kenya domestic debt is defined as the central government debt incurred internally through borrowing in the local currency from residents. Government domestic borrowing comprises of government securities (treasury bills, treasury bonds and long-term stocks), overdraft at the Central Bank of Kenya and advances from commercial banks. (Maana, Owino and Mutai, 2008)

If the government borrows heavily from the domestic market, a shortage of funds arises prompted by increased demand for investible funds. This drives interest rates up leading to the reduction of private

borrowing and hence limiting private investment and therefore crowding-out of private sector arises (Drazen, 1996). Domestic borrowing is therefore expected to have a negative effect on the demand for credit by the private investors as a result of higher interest rates ( $\beta_7 < 0$ ).

**Table 3.1: Summary of variables and measurement**

Variable	Notation	Predicted Effect	Definition
Private sector credit	DCPS	-	Total amount of credit borrowed by the private sector
GDP per capita growth rate	GDPPGR	Positive	Measure of the size of an economy adjusted for price changes and inflation. It measures in constant local prices the output of final goods and services and incomes within an economy
Public Investment	PUBINV	Positive	Central government development expenditure ( actual values)
S-T interest rates	SINTR	Negative	Short term market interest rates on 91-day treasury bill
L-T Interest rate	LINTR	Negative	Long term market interest rates on bond
Exchange rate	EXR	Positive	Measure of competitiveness of the local currency against the major trading currencies (weighted exchange rate index)
Employment	EMP	Positive	Total number of employed persons (both in the modern and informal sectors)
Domestic debt	DDEB	Negative	Central government debt incurred internally through borrowing in the local currency from residents

### 3.5 Data Sources

To achieve the objectives of this study, secondary annual time series covering the period 1980-2012 was used. Data on the dependent variable (Demand for credit by the private sector) and explanatory variables; Gdp per capita growth rate, Public investment, Short term interest rate, Long term interest rate, Exchange rate, Employment and Domestic debt) was obtained from various issues of economic survey published by Kenya National Bureau of Statistics, World Development Indicators and supplemented by database of the Central Bank of Kenya.

### 3.6 Estimation and testing

Time series properties of the variables and their co-integration characteristics are tested before the estimation of Equations 3. To explain the effects of determinants on demand for credit by the private sector in Kenya, the study shall use the ordinary least squares model (OLS).

### **3.6.1 Stationarity testing**

Given that most macroeconomic time-series data are non-stationary, estimates of such variables will lead to spurious regression and their economic interpretation will not be meaningful. With this regard, Unit root tests are used to test for stationary or order of integration of each series of the variables. To carry out this, Augmented Dickey Fuller (ADF) test (Dickey and Fuller, 1979) were carried out.

### **3.6.2 Co-integration Tests**

Cointegration tests are conducted in case of non-stationarity of the series to ensure long run relationships. The long run equilibrium relationship among the variables will be tested by least squares method. Augmented Dickey Fuller (ADF) test will be used to test for the stationarity of the residual to determine if the long run model is spurious or not. Estimation of the short run model will be done where the residual obtained from the long run estimation will be taken as the valid error-correction term which is then built into an error-correction model (ECM).

### **3.6.3 Residual Diagnostic Tests**

Residual diagnostic tests on the model results will include tests for normality to check whether the error term is normally distributed, Heteroskedasticity to check whether the variance of the residuals is constant, serial correlation to check whether the error terms from different time periods are correlated.

## CHAPTER FOUR

### EMPIRICAL RESULTS AND DISCUSSION

This chapter presents the findings of the study. The Demand for credit by the private sector was modeled against GDP per capita growth rate, Public investment, Short term interest rate, Long term interest rate, Exchange rate, Employment and Domestic debt as determinants.

#### 4.1 Descriptive statistics

Summary of descriptive statistics of the variables under study are presented in Table 4.1. Data exploration is very important before engaging in any econometric analysis of a model. The regression analysis is only applied if the data being used meets all the assumptions set *a priori*. The normality assumption is very critical in any analysis. A number of techniques can be used to establish the normality of a variable. The most common is the Jarque-Bera statistic or a comparison of mean and media values. Where the mean and the median are the same, then there exists a normal distribution.

**Table 4.1: Summary statistics**

	DCPS	GDPPGR	LNPUBIN V	SINTR	LINTR	LNEXR	LNEMP	LNDEB
<b>Mean</b>	29.85920	0.380633	24.10974	-0.007152	0.084970	5.703028	16.42536	24.09342
<b>Median</b>	29.40222	0.652169	24.00648	-0.007	0.050000	6.039850	16.66703	24.14668
<b>Maximum</b>	37.37988	4.173919	26.85442	0.193000	0.315000	6.625711	18.19735	27.36780
<b>Minimum</b>	24.60027	-3.968771	22.21850	-0.116	-0.063	4.576771	13.99014	15.78178
<b>Std. Dev.</b>	3.228386	2.122383	1.284022	0.070860	0.093660	0.777936	1.387431	2.929197
<b>Skewness</b>	0.589609	-0.164147	0.425750	0.594556	0.784675	-0.299604	-0.64215	-1.8298
<b>Kurtosis</b>	2.84	2.05	2.30	3.64	2.71	1.36	2.18	6.06
<b>Jarque-Bera</b>	1.946028	1.401048	1.671590	2.509041	3.498616	4.179218	3.199202	31.25061
<b>Probability</b>	0.377942	0.496325	0.433530	0.285213	0.173894	0.123736	0.201977	0.000000
<b>Sum</b>	985.3537	12.56087	795.6215	-0.236	2.804000	188.1999	542.0369	795.0829
<b>Sum Sq. Dev.</b>	333.5193	144.1443	52.7588	0.1607	0.2807	19.3659	61.5989	274.5662
<b>Obs</b>	33	33	33	33	33	33	33	33



Results in Table 4.1 indicate that the Jarque-Bera test statistic tested the null hypothesis that the distribution of the variables was not significantly different from normal. The resultant p values from the test were higher than the conventional p value of 0.05 for seven variables only (Demand for credit by the private sector, Gdp per capita growth rate, Public investment, Short term interest rate, Long term interest rate, Exchange, and Employment). This indicates that there was a high probability that the null hypothesis was true. It therefore implies that the seven variables were normally distributed at 5 % level while only Domestic debt was not normally distributed.

Mean is a measure of central tendency and is useful in describing the data. However it is affected by extreme values making it less reliable representative of the data. Across the variables, mean values are less inflated indicating normal distribution of the data.

Variability of the data can be measured by Standard deviation and range. Standard deviation measures dispersion of the data from the mean. The smaller the standard deviation, the closer the scores are closer and the larger the standard deviation the more the scores are spread out. From the results, the deviations fall between 0.07 and 3.23. This is an indication that the series are normally distributed. Range measures the difference between the maximum and the minimum data. Like standard deviation, the larger the range, the more the data are spread out and the smaller the range the closer the data. The range lies between 0.31 and 12.78 implying that the data are fairly distributed.

Graphical illustrations in Figure A (in the appendix) present the behavior of the variables described in the descriptive statistics over time. The nature of the time series under study varies. Results in Figure A indicate that all variables with the exception of per capita GDP and Short term interest rate are trending and therefore non-stationary. This has implications on the type of unit root testing.

## **4.2 Correlation**

Correlation is an important technique in measuring the strength of the relationship between two variables. Two variables are said to be correlated if they move together. Correlation matrix is based on the correlation coefficient ranging between -1 and +1. Whereas correlation coefficient of -1 shows a perfect negative linear relationship between variables, +1 shows a perfect positive linear

relationship, and 0 means there is no linear relationship between variables. Multicollinearity is said to occur if the correlation coefficient between two variables is above 0.8.

Table 4.2 shows pairwise correlations amongst all the variables of interest. The results indicate that Gdp per capita growth rate, Long term interest rate, Employment and Exchange rate are negatively correlated with Demand for credit by the private sector (-0.0793, -0.045, -0.2065 and -0.5574 respectively). Public investment, Short term interest rate and Domestic debt are positively correlated with Demand for credit by the private sector (0.0540, 0.1269 and 0.1259 respectively). The low correlations show that there is no multicollinearity and therefore all the variables can be included in the model.

**Table 4.2 Pair-wise Pearson Coefficient of Correlation**

	DCPS	GDPPGR	LINTR	LNDDEB	LNEMP	LNEXR	LNPUBINV	SINTR
DCPS	1	-0.0793	-0.0450	0.0540	-0.2065	-0.5574	0.1269	0.1259
GDPPGR	-0.0793	1	-0.0631	0.2202	-0.0620	-0.0271	0.3256	0.3107
LINTR	-0.0450	-0.0631	1	0.2174	0.5584	0.4009	0.1104	0.4439
LNDDEB	0.0540	0.2202	0.2174	1	0.5454	0.4582	0.7514	0.1496
LNEMP	-0.2065	-0.0620	0.5584	0.5454	1	0.7359	0.4070	0.1171
LNEXR	-0.5574	-0.0271	0.4009	0.4582	0.7359	1	0.3839	0.0462
LNPUBINV	0.1269	0.3256	0.1104	0.7514	0.4070	0.3839	1	0.0286
SINTR	0.12593	0.31074	0.4439	0.1496	0.1171	0.0462	0.0286	1

### 4.3 Stationarity test

As an essential step of multiple linear regressions, Augmented Dickey - Fuller (ADF) (1979, 1981) test has been applied. It is based on the simple logic that non-stationary process has infinite memory as it does not show decay in a shock that takes place in the process. Unit root test was done to check on the stationarity of the variables used in the model. Decision rule is based on the null hypothesis that the variable has a unit root (non stationary) against alternative hypothesis that the variable has no unit root (stationary). Test for individual variable stationarity helps to establish whether the variables are I(0) or I(1). To ascertain this, the study utilized the Augmented Dickey Fuller Test. Decision is reached by comparing the ADF test statistic with critical values at 5% level. The results in Table 4.3 indicate that the series: Demand for credit by the private sector, Public investment, Long term interest rate, Exchange rate, Employment and Domestic debt are non-stationary while Gdp per capita and Short term interest rate are stationary at levels. Analysis of non stationary variables yields spurious regression results. This therefore calls for first differencing of the non-stationary variables. Hypothesis testing in economic analysis seeks to establish the significance of the beta coefficients in

explaining the dependent variables. In this case, the beta coefficients generated from regressing private sector credit on non stationary variables will lead to wrong inferences. This is because the hypothesis test (t-statistic) is a function of the beta coefficient and the standard errors.

**Table 4.3: Unit root tests**

	At levels				1 <sup>st</sup> difference				Order of integration
	Constant		Trend & Intercept		Constant		Trend & Intercept		
	t-stat	5% Critical value	t-stat	5% Critical value	t-stat	5% Critical value	t-stat	5% Critical value	
<b>DCPS</b>	-1.7027	-2.9571	-1.5615	-3.5578	-6.8910	-2.9604	-7.0114	-3.5629	<b>I(1)</b>
<b>GDPPGR</b>	-3.1496**	-2.9571	-	-	-	-	-	-	<b>I(0)</b>
<b>LN PUBIN V</b>	0.3312	-2.9571	-2.4889	-3.5578	-5.7480**	-2.9640	-5.8829**	-3.5684	<b>I(1)</b>
<b>SINTR</b>	-5.4975**	-2.9571	-	-	-	-	-	-	<b>I(0)</b>
<b>LINTR</b>	-1.7608	-2.9604	-1.6572	-3.5629	-11.818**	-2.9604	-	-3.5629	<b>I(1)</b>
							11.6664**		
<b>LNEXR</b>	-1.3795	-2.9571	-0.4386	-3.5578	-5.6462*	-2.9604	-6.1842**	-3.5628	<b>I(1)</b>
<b>LNEMP</b>	-1.8974	-2.9571	-1.3284	-3.5578	-5.4226**	-2.9604	-5.7196**	-3.5629	<b>I(1)</b>
<b>LNDDEB</b>	-2.9814	-2.9571	-3.2221	-3.5578	-5.8609**	-2.9604	-6.1098**	-3.5629	<b>I(1)</b>

Note: The 1%, 5% and 10% significant level is denoted by \*, \*\* and \*\*\* respectively.

From the results, all variables except GDP per capita and short term interest rate are non stationary at levels. Differencing is done to check if the non stationary variables will be made stationary. As indicated in the results, non stationary variables are integrated of order one (I (1)) meaning they become stationary after differencing once. The only problem associated with differencing variables is that there is loss of long run time series properties. However, the error correction model helps in recovering the lost properties through the error correction term generated from the short-run estimation.

#### 4.4 Co-integration test

Many time series are in an equilibrium relationship over time, what we call co-integration. Co-integration analysis is done on non-stationary time series variables to test stationary linear relationship between them. Co-integration exists between two non-stationary series if they possess the same order of integration and a linear combination of them becomes stationary. The results in Table 4.3 indicate that all variables are either I (0) or I (1).

Before running the co integration test, we need to determine the optimal lag length to use in running our models. A summary of optimal lag length selection is given in Table 4.4.

**Table 4.4: VAR Lag Length Selection**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-225.9075	NA	0.000494	15.09081	15.46087	15.21144
1	-90.29239	192.4860*	5.59e-06	10.47048	13.80103*	11.55615
2	-5.807671	76.30878	3.84e-06*	9.148882*	15.43992	11.19960*

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

According to AIC selection criterion, the lower the test statistic, the better the model. As a result this selection criterion recommends 2 lags as the optimal lag length. Adopting this criterion, this study uses optimum lag of 2. Since the test results show that the some series are integrated, we run a regression using Johansen co-integration test approach to establish the linear cointegration of variables. Test results given in Table 4.5.

**Table 4.5 Johansen Co-integration Test****Unrestricted Co-integration Rank Test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.879387	216.7577	159.5297	0.0000
At most 1 *	0.843048	151.1876	125.6154	0.0005
At most 2	0.654959	93.78141	95.75366	0.0678
At most 3	0.503723	60.79452	69.81889	0.2118
At most 4	0.447142	39.07529	47.85613	0.2573
At most 5	0.320095	20.70303	29.79707	0.3764
At most 6	0.242571	8.743184	15.49471	0.3897
At most 7	0.004204	0.130600	3.841466	0.7178

Trace test indicates 2 co-integrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

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

### Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.879387	65.57009	52.36261	0.0014
At most 1 *	0.843048	57.40620	46.23142	0.0022
At most 2	0.654959	32.98689	40.07757	0.2520
At most 3	0.503723	21.71923	33.87687	0.6293
At most 4	0.447142	18.37226	27.58434	0.4644
At most 5	0.320095	11.95985	21.13162	0.5516
At most 6	0.242571	8.612584	14.26460	0.3198
At most 7	0.004204	0.130600	3.841466	0.7178

Max-eigenvalue test indicates 2 co-integrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

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

According to the results shown in Table 4.5, trace statistic results indicate that the first null hypothesis is none to mean that no co-integration among the variables. Reported trace statistic is 216.76 which is greater than the corresponding critical value (159.53) and p-value of zero (0), less than 5% hence we reject the null hypothesis. The results also indicate that there is utmost one co-integrated equation with trace statistic of 151.19 greater than the corresponding critical value of 125.62 and p-value of 0.001. This means we reject the null hypothesis in that all the variables are co-integrated. The third hypothesis shows that there at most 2 co-integrating equation. The trace statistic is 93.78 less than critical value of 95.75 and p-value of 0.068 greater than 5%. From these we therefore accept the null hypothesis. The decision is that there are two co-integrating equations at 5% level or all variables have long run association.

Maximum Eigenvalue results on the other hand show the first null hypothesis that no co-integration among the variables. The Max-eigen statistic 65.57 is greater than the corresponding critical value 52.36 while p-value of 0.0014 is less than 5% hence we reject the null hypothesis. The results also indicate that there is utmost one co-integrated equation with Max-eigen statistic of 57.41, critical value of 46.23 and p-value of 0.002. As a result we reject the null hypothesis since the trace statistic is greater than the critical value and p-value is less than 5%. The third null hypothesis suggested at most 2 co-integrating equations with Max-eigen statistic of 32.99 being less than critical value of 40.078 and p-value of 0.25 greater than 5%. Therefore we accept the null hypothesis. The overall decision is that all the variables are co-integrated meaning that all the variables have a long-run relationship hence we run the Vector Error Correction Model (VECM).

From the results in Table 4.5 the variables are co-integrated then the system of equation is modified to allow for the co-integrating relationship between the differenced variables. Introducing the co-integrating relationships leads to a Vector Error Correction Model (VECM). The estimation results are presented in Table 4.6.

**Table 4.6: Vector Error Correction Estimates**

Cointegrating Eq:	CointEq1	CointEq2
DCPS(-1)	1.000000	0.000000
LNPUBINV(-1)	0.000000	1.000000
LINTR(-1)	263.1462 (26.3324) [ 9.99324]	25.31600 (2.32589) [ 10.8844]
LNEXR(-1)	-14.37479 (3.41952) [-4.20375]	-2.686223 (0.30204) [-8.89362]
LNEMP(-1)	-7.901045 (1.82948) [-4.31875]	-0.525202 (0.16159) [-3.25013]
LNDDEB(-1)	11.77684 (0.78245) [ 15.0513]	0.822027 (0.06911) [ 11.8941]
C	-127.4241	-22.24262

The results in Table 4.6 indicate two co-integrating equations; CointEq1 and CointEq2.

Hence the cointegrating model for DCPS is as follows:

$$D(\text{DCPS}) = C(1) * (\text{DCPS}(-1) + 263.146150563 * \text{LINTR}(-1) - 14.3747878547 * \text{LNEXR}(-1) - 7.90104542415 * \text{LNEMP}(-1) + 11.7768362209 * \text{LNDDEB}(-1) - 127.424079653) \dots\dots\dots (4)$$

#### 4.5 Empirical results and discussion

After establishing the linear combination of the variables, a regression model capturing all variables suggested by the study to be the main influencers of private sector credit was estimated to establish the effects of the selected macroeconomic variables on Demand for credit by the private sector. Estimation was done using OLS method and the results presented in Table 4.7.

**Table 4.7: Effects of the selected variables on Demand for credit by the Private sector**

Variable	Notation	Model	Notation	Model with ECM
<b>Constant</b>	C	15.9279* (1.5749)	C	0.378941 (0.762542)
<b>GDP per capita growth rate</b>	GDPPGR	-0.4737** (-2.0719)	GDPPGR	-0.239858 (-1.010233)
<b>Public investment</b>	LNPUBINV	1.1170** (2.1588)	D(LNPUBINV)	0.713977 (0.522088)
<b>Short term interest rate</b>	SINTR	8.9472* (1.2247)	SINTR	10.76165 (1.237638)
<b>Long term interest rate</b>	LINTR	1.8057* (0.2923)	D(LINTR)	0.473712 (0.075280)
<b>Exchange rate</b>	LNEXR	-3.9185*** (-4.9540)	D(LNEXR)	-2.108140 (-1.709613)
<b>Employment</b>	LNEMP	0.4553* (0.8607)	D(LNEMP)	0.146976 (0.195703)
<b>Domestic debt</b>	LNDDEB	0.0814* (0.3435)	D(LNDDEB)	-0.331539 (-0.968951)
<b>Error Correction Term (ECM)</b>			U(-1)	-0.457952* (-1.805206)
R-squared	0.593315	R-squared	0.317572	
Adjusted R-squared	0.479444	Adjusted R-squared	0.080206	
F-statistic	5.210387	F-statistic	1.337900	
Prob(F-statistic)	0.000925	Prob(F-statistic)	0.066887	
Durbin-Watson stat	1.003429	Durbin-Watson stat	1.880747	

**Note:** The 1%, 5% and 10% significant level is denoted by \*\*\*, \*\* and \* respectively. T-statistics given in parentheses.

A lagged error correction term (ECT) was fitted to the short-run model as an explanatory variable to establish the speed of adjustment towards the equilibrium per period. The residual was taken as valid error correction term; hence the model resulted into the error correction model (ECM). The coefficient of the residual is interpreted as the speed of adjustment or the amount of disequilibrium transmitted each period to demand for credit by the private sector.

From the Error Correction Model regression, the results showed that the coefficient of the error correction term (U (-1)) is -0.457952 which is less than one and significant at 10%. The significance implies that whenever there are deviations in the demand for private sector credit from an equilibrium path, the model corrects at the rate of 45.8% annually. The negative coefficient of ECT and a p- value of 0.0842 (8.4%) give validity that the dependent variable and the independent variables have a long run equilibrium relationship.

The goodness- of- fit ( $R^2$ ) for the short run model is 0.3176. This indicates that 31.8% of the variance in demand for credit by the private sector is explained by the variances of independent variables. The DW statistic of 1.8807 which is greater than  $R^2$  shows that the model is not spurious, therefore we

accept the model. From the estimation results, all the explanatory variables are insignificant meaning that in the short run there is no equilibrium.

In the long run, the adjusted R- squared assumes a value of 0.47944 suggesting that the data fits the statistical model well. This implies that 47.9% of the variation in the demand for private sector credit is explained by the listed explanatory variables. The F-statistic gives the joint significance of the model. The F statistic of 5.2104 with a p-value of zero indicates that jointly, the independent variables captured in the model significantly explain the changes in the demand for private sector credit. The Durbin-Watson test statistics states that the null hypothesis of the residual from an ordinary least squares regression is not autocorrelated. The results revealed a DW statistics of 1.0034 indicating that there is no problem of autocorrelation (the model is not spurious) and therefore we fail to reject the null hypothesis.

#### **4.6 Discussion of the results**

The results of the study show that per capita GDP has a negative and significant impact on demand for credit by the private sector in the long run. This was indicated by the regression coefficient of - 0.4737 and a P- value of 0.0487. The results imply that an increase in per capita GDP by one unit leads to a decrease in demand for credit by the private sector by 0.47. This is inconsistent with the studies done by Calza (2001) who found a positive relationship.

Also more importantly, the results of the study indicate a positive and significant relationship between the Demand for credit by the private sector and Public investment as expected. The regression coefficient of 1.1170 and a P- value 0.0407 implies that an increase in Public investment by one unit leads to an increase in demand for credit by 1.12. As a result, the increased public sector investment crowds in private sector investment and increased demand for credit by the private sector in the long run. This finding conforms to Chibuye (2013,).

From the results, Short term interest rate is positive different from our hypothesis and insignificant with the Demand for credit by the private sector. The finding is inconsistent with the results of Calza et al. (2001).



The results also show that Long term interest rate is positive and insignificant with the Demand for credit by the private sector. This is contrary with our hypothesis. The finding is inconsistent with the results of Calza et al. (2001).

Another finding is the negative effect of Exchange rate on the demand for credit by the private sector which is highly significant. This implies that an increase in Exchange rates by one unit lead to a decrease in demand for credit to the private sector by 3.92. This may be attributed to the fact that, most investment projects highly depend on local funding. The few investment projects that depend on imported inputs are affected by exchange rate fluctuations. Lower exchange rate increases returns on investment production, while higher exchange rate reduces returns on investment which therefore affects the demand for credit. This finding is however inconsistent with Guo and Stepanyan (2011).

Employment is positive which is in support for our hypothesis and insignificant with Demand for credit by the private sector. This is a new variable introduced to the model. As a result, in relation to the previous studies, the coefficients of other variables have changed suggesting that this variable is important in determining the Demand for credit by the private sector.

Domestic debt is positive and statistically insignificant with Demand for credit by the private sector different from the expected hypothesis. This may be due to the fact that the government invest the borrowings in productive sectors that boosts and attract private sector investment. Contrary to these findings, (Drazen, 1996) found a negative relationship between Domestic debt and private borrowings.

## **4.7 Post Estimation Tests**

### **4.7.1: Test for Autocorrelation**

Autocorrelation (sometimes called serial correlation) occurs when one of the Gauss-Markov assumptions fails and the error terms are correlated. This can be due to a variety of problems, but the main cause is when an important variable has been omitted from the regression. To test for first order autocorrelation, we use the Durbin-Watson (DW) d statistic. Serial correlation analysis is carried out to determine autocorrelation of errors in a regression model. Presence of serial correlation between the residuals of successive years invalidates the statistical test. This calls for a test to check whether

an important variable has been omitted from the model or a variable has been wrongly included in the model. Test results are given in Table 4.8.

**Table 4.8: Test for Autocorrelation using DW test**

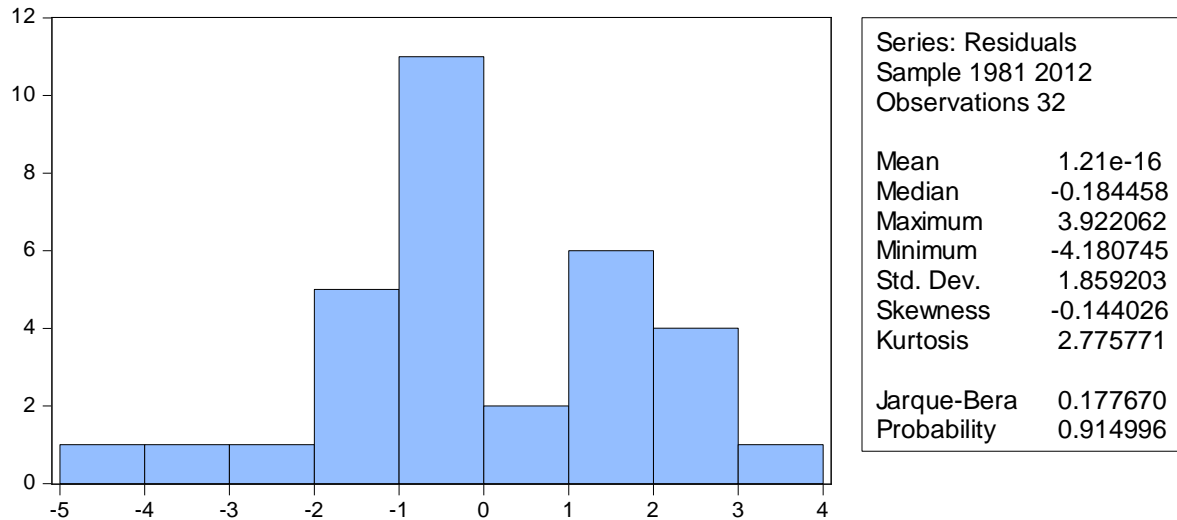
<b>Dependent Variable: RESID</b>			
F-statistic	0.1430	Prob. F(2,21)	0.8676
Obs*R-squared	0.4300	Prob. Chi-Square(2)	0.8065
Durbin-Watsostat	2.0145		

The null hypothesis states that the residuals of Error Correction Model (ECM) are serially uncorrelated. Based on the results in Table 4.8, the Observed R-squared is 0.43 and the corresponding Prob. Chi-Square of 0.8065 (80.7%). P-value is more than 5% significant level and therefore we accept the null hypothesis. The DW statistic assumes a value 2.0145 indicating that the residuals from OLS regression are not autocorrelated since the DW is approximately 2.

**4.7.2: Test for normality**

Test for normality is done to check whether the error term is normally distributed. The basic idea behind the Jarque-Bera test is that the normal distribution (with any mean or variance) has a skewness coefficient of zero, and a kurtosis coefficient of three-zero excess kurtosis. The results in Figure 4.1 indicate that skewness is -0.144, kurtosis is 2.7758 and Jarque-Bera test statistic is 0.1777.

**Figure 4.1: Graphical representation of normality Test**



The probability value for the Jarque-Bera test is 0.91 or 91% which is greater than 5 percent significant level. A sufficiently large value of Jarque-Bera test will lead us to reject the null hypothesis that the errors are normally distributed.

#### 4.7.3: Test for Heteroskedasticity

The key assumption with regression is that the variance of the error term is homoskedastic across all the observations. Presence of heteroskedasticity has a serious consequence on ordinary least squares estimators in that they become unbiased and consistent, but they are not efficient and the standard errors are inconsistent therefore invalidating statistical test. The results given in Table 4.9 indicate that the p value is 0.8432 i.e 84.32% which is non-significant at 5% level of significance. This is an indication that the errors are homoskedastic and independent of the regressors, therefore we accept the null hypothesis of constant variance.

**Table 4.9: Heteroskedasticity Test: Breusch-Pagan-Godfrey**

F-statistic	0.500584	Prob. F(8,23)	0.8432
Obs*R-squared	4.745456	Prob. Chi-Square(8)	0.7844
Scaled explained SS	2.176660	Prob. Chi-Square(8)	0.9751

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents a summary of findings, conclusions and recommendation of the study.

#### 5.1 Summary

The purpose of the study to determine the effects of per capita GDP, Public investment, Short term interest rate, Long term interest rate, Exchange rate, Employment and Domestic debt on the Demand for credit by the private sector in Kenya using OLS method. Descriptive findings indicate that all the variables were normally distributed except Domestic debt.

The ADF test was utilized to check for unit roots. The results indicated that per capita GDP and Short term interest rate were stationary at levels while demand for credit by the private sector, Public investment, Long term interest rate, Exchange rate, Employment and Domestic debt were stationary at first differences. Johansen co-integration test was used to establish the long run relationship of the variables. The results show that the variables have a long run relationship.

The long run results indicate that 59.3% of the variation in the demand for private sector credit is explained by the listed independent variables. Jointly, the independent variables captured in the model significantly explain the changes in the demand for private sector credit. Furthermore the study found that per capita GDP, public investment and exchange rate are important and significant in explaining Demand for credit by the private sector. short term interest rate, long term interest rate, employment and domestic debt were found important but statistically insignificant in explaining demand for credit by the private sector.

The short run results indicate that whenever there are deviations in the demand for credit by the private sector from an equilibrium path, the model corrects its previous deviations at a speed of 45.8% annually. Post estimation results indicate that there was no problem of Autocorrelation, Errors were not normally distributed and there was no problem of Heteroskedasticity.

## 5.2 Conclusions

The first objective of the study was to determine the effect of per capita GDP on Demand for credit by the private sector. The findings show that per capita GDP has a negative and significant effect on Demand for credit by the private sector. Taking per capita GDP as a proxy for income, the negative relation shows that credit is an abnormal good. Indication of the results is that with improvement in economy, households' income also increases and therefore they engage themselves in productive activities by utilizing returns from such activities.

The second objective was to determine the effect of public investment on demand for credit by the private sector. The results revealed a positive and significant relationship between the two variables. This is attributed to improved overall quality of life and business through expanded transport services, improved mobility, travel cost savings, reduced traffic congestion, and improved business productivity as a result of access to broader labour markets with more diverse skills, affordable education among others. As a result, more private investments are attracted to the government developed area. To meet the demands of the growing population in that area, private businesses have to seek for more external funding to expand and diversify their products.

The third objective was to determine the effect of short term interest rate on demand for credit by the private sector. The findings indicate that short term interest rate have positive and statically insignificant effect on demand for credit by the private sector. This means that an increase in short term interest rate increases the demand for Treasury Bills with the comfort that though the yield will be low, the risk involved will also be low. The high demand also increases the demand for credit.

The fourth objective was to determine the effect of long term interest rate on demand for credit by the private sector. From the findings, long term interest rate has positive and statically insignificant effect on demand for credit by the private sector. This is due to the perception that though treasury bonds are associated with a lot of risk, the returns are very high compared to short term securities. This increases the demand for credit to acquire such assets.

The fifth objective was to determine the effect of exchange rate on demand for credit by the private sector. From the findings, exchange rate has negative and statically significant effect on demand for credit by the private sector. This implies that exchange rate appreciation favours imports and reduces exports. Increased imports increases demand for foreign currency to pay for the goods and thus

depreciation of local currency. To reverse depreciation, the government should put in place mechanisms in favour of investment production for export.

The sixth objective was to determine the effect of employment on demand for credit by the private sector. The results showed that employment have positive and statically insignificant effect on demand for credit by the private sector. This is due to the fact that, as employment rate goes up, employees gain more ability to secure loans for huge investment at the current especially in relation to investment sectors anticipated to have high demand in the future.

Finally, the study found a positive and insignificant effect of domestic debt on demand for credit by the private sector. This means that as the government borrows heavily from the domestic market, the demand for credit goes up. This is attributed to the fact that the government invests her borrowings in productive sectors that boosts and attracts private sector investment thus increasing demand for credit.

### **5.3 Policy implications and Recommendations**

From the conclusions of the study, the Kenya Government should consider reducing taxes and cost of borrowing in order to improve the productivity. This will not only help reduce the cost of production but also the increases aggregate demand of the residents.

Moreover, the policy makers should create fiscal space in the government budget to finance greater public investments. This can be achieved by way of broadening the tax base, reducing exemptions and simplifying the tax system so as to include elements in the informal sector not currently captured by the tax system. In addition, public policy makers should also strengthen and give a face-lift the strategies to improve efficiency and quality of public investment management processes to help ensure that the potential benefits of public investment accrue within the shortest time possible.

The Kenyan government should devise strategies aimed at improving the competitiveness of her currency. This can be realized through measures aimed at maintaining inflation rate at an optimum level, improving competitiveness of Kenyan goods in the external market and increasing exports. In addition, the choice of monetary policy regime should put into consideration the impact exchange rate policy in order to ensure stability in the interest rate.

#### **5.4 Area for further studies**

This study determined the effect of public investment on demand for credit by the private sector among other factors included. The variable public investment was used as a general term covering all sectors of central government's development expenditures. The results of the study do not depict the specific contribution of each government sector towards the demand for credit by the private sector.

The study therefore recommends that further studies should be done on an individual public sector such as transport, agriculture, manufacturing and education among others to determine the extent to which each sector influences the demand for credit by the private sector. This will enable the government identify more productive sectors in order to allocate more funds to enhance growth and development of the country.

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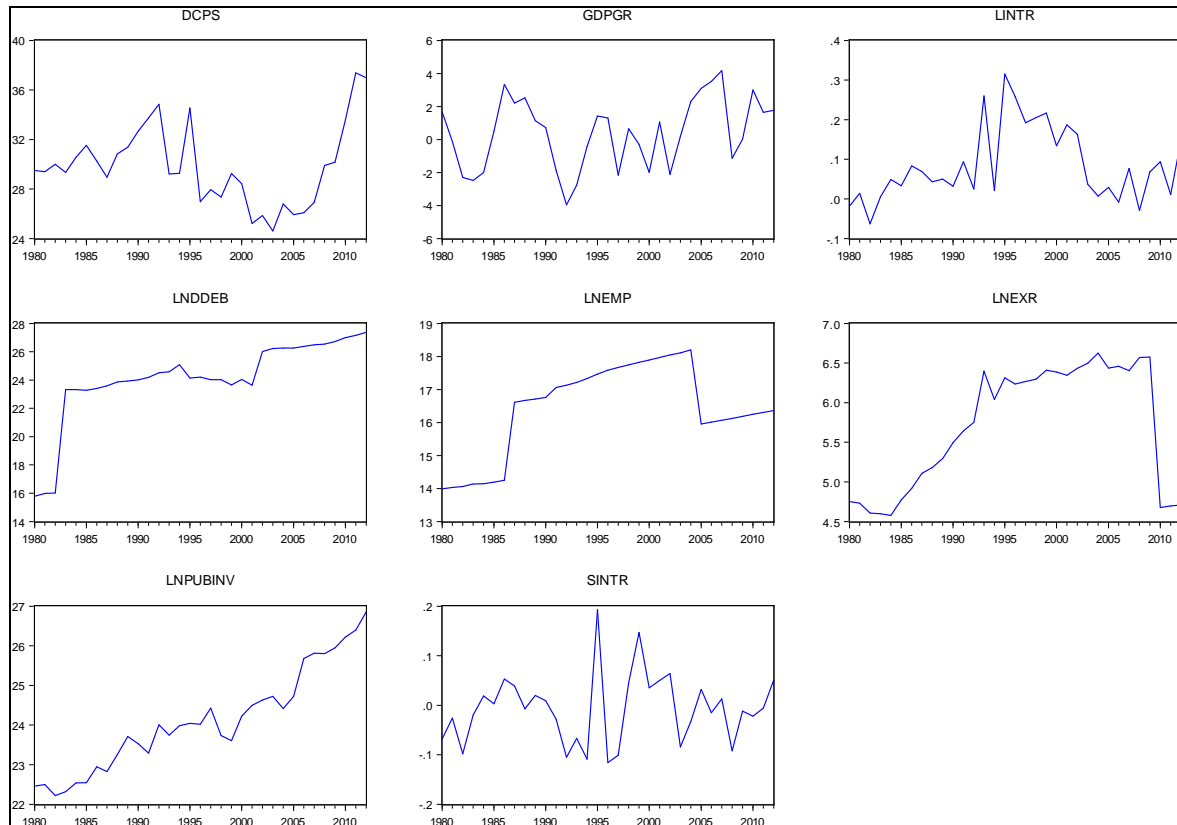
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## APPENDICES

### Appendix I

**Figure A: Stationarity graphs**



**Appendix II: Data used in the study**

	DCPS	GDPPGR	PUBINV	SINTR	LINTR	EXR	EMP	DDEB
1980	29.48394	1.655777	5.65E+09	-0.068	-0.018	115.89	1190800	7144000
1981	29.40222	-0.11469	5887200000	-0.026	0.014	113.43	1243700	8777200
1982	29.98922	-2.30107	4460400000	-0.098	-0.063	100	1272900	9087000
1983	29.34711	-2.4763	4925200000	-0.02	0.005	99.2	1377900	1.34E+10
1984	30.55453	-2.01063	6145800000	0.019	0.049	97.2	1385400	1.36E+10
1985	31.52554	0.493786	6182400000	0.003	0.033	118.3	1462000	1.28E+10
1986	30.25714	3.328777	9243600000	0.053	0.083	136.7	1537000	1.46E+10
1987	28.95267	2.198152	8172000000	0.039	0.069	165.3	16356000	1.75E+10

1988	30.8323	2.524258	1.2579E+10	-0.007	0.043	177.6	17314000	2.33E+10
1989	31.38105	1.13475	1.9787E+10	0.02	0.05	199	18071000	2.48E+10
1990	32.66793	0.72711	1.6563E+10	0.009	0.032	243.6	18990000	2.68E+10
1991	33.7477	-1.87059	1.3034E+10	-0.028	0.094	282.1	25571000	3.18E+10
1992	34.84057	-3.96877	2.6661E+10	-0.105	0.025	314.6	27534000	4.47E+10
1993	29.20755	-2.76233	2.0533E+10	-0.067	0.26	600	29976000	4.74E+10
1994	29.27054	-0.43266	2.6124E+10	-0.109	0.021	419.83	33562000	7.91E+10
1995	34.54683	1.423013	2.7597E+10	0.193	0.315	551.56	38586000	3.07E+10
1996	26.97199	1.30857	2.6961E+10	-0.116	0.258	510.72	43258000	3.28E+10
1997	27.94232	-2.15441	4.0609E+10	-0.101	0.192	527.18	46984000	2.74E+10
1998	27.33943	0.652169	2.025E+10	0.045	0.205	542.89	50967000	2.73E+10
1999	29.25741	-0.30053	1.7848E+10	0.147	0.217	607.18	54926000	1.87E+10
2000	28.43035	-1.99352	3.3056E+10	0.035	0.134	594.2	59116000	2.76E+10
2001	25.2196	1.062195	4.3562E+10	0.05	0.187	570.55	63669000	1.84E+10
2002	25.86324	-2.11659	4.9735E+10	0.064	0.163	622.53	68735000	2.01E+11
2003	24.60027	0.186537	5.4558E+10	-0.084	0.037	664.02	73394000	2.46E+11
2004	26.79153	2.29949	4.0141E+10	-0.033	0.007	754.24	79985000	2.55E+11
2005	25.93183	3.091881	5.4641E+10	0.032	0.029	623.71	8505000	2.54E+11
2006	26.07599	3.519506	1.4243E+11	-0.015	-0.008	639.61	8993400	2.86E+11
2007	26.92718	4.173919	1.629E+11	0.013	0.077	604.01	9478900	3.18E+11
2008	29.90402	-1.14645	1.6071E+11	-0.092	-0.029	712.85	10012500	3.35E+11
2009	30.15781	0.022858	1.8553E+11	-0.012	0.068	718.19	10703100	4.02E+11
2010	33.57347	2.998184	2.4416E+11	-0.022	0.094	107.29	11418600	5.34E+11
2011	37.37988	1.641189	2.9187E+11	-0.006	0.011	109.62	12077700	6.25E+11
2012	36.98053	1.767312	4.5997E+11	0.051	0.15	110.76	12737100	7.69E+11