THE RELATIONSHIP BETWEEN SELECTED MACROECONOMIC VARIABLES AND PRIVATE SECTOR CREDIT IN KENYA

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DECLARATION

I the undersigned, declare that this project is my original work and has not been presented for a degree award in any other university.

Signed…….. Date……..

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This research project has been submitted for examination with my approval as the student supervisor.

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DEDICATION

This work is dedicated to the memory of my father, my mother and all my family members. Were it not for their continued support, understanding and constant encouragement, this study would not have been successful.

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It has been an exciting and instructive study period in the University of Nairobi and the researcher feels privileged to have had the opportunity to carry out this study as a demonstration of knowledge gained during the study period. With these acknowledgments, it would be impossible not to remember those who in one-way or another, directly or indirectly, have played a role in the realization of this research project. The researcher would like thank them all equally. First, the researcher is indebted to the all-powerful GOD for all the blessings throughout the study. The researcher is deeply obliged to the supervisor **Prof. Josiah Aduda** for his exemplary guidance and support without whose help; this project would not have been a success. Finally, yet importantly, the researcher takes this opportunity to express deep gratitude to the lasting memory of the loving family, and friends who are a constant source of motivation and for their never-ending support and encouragement during this project.

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ABSTRACT

The main purpose of the study was to evaluate the relationship between selected macroeconomic variables and private sector credit in Kenya. The study was guided by the following specific objectives: to evaluate the effect of GDP per capital; interest rate; inflation rates and exchange rate on private sector credit in Kenya. The study employed an explanatory research design. The target population of the study comprised of time series data for Kenya on Gross Domestic Product (GDP), aggregate private sector credit (CR), inflation (IFLN) and interest rate (IR). The study used time series data from 1990 to 2011. There were 120 observations that were sampled for the purpose of the study. The study made use of secondary data. The main source of the main data was the World Bank data base through the official World Bank website and supported by data from the Central Bank of Kenya data base at the research department. The study used Autoregressive Distributed Lag (ARDL) model to establish the long run relationship between aggregate private sector credit and GDP in Kenya. The study established that inflation exceeds some critical level then it hampers economic growth, otherwise inflation has a favorable impact on growth. The relationship between selected macroeconomic variables and the private sector credit in Kenya. The dependent variable was private sector credit while inflations, interest rates and the gross domestic product were independent variables. The independent variables were found to be statistically significant in explaining the level of credit in the private sector. The study concludes that emerging market credit booms have not, on average, resulted in higher inflation partly reflecting the high degree of trade openness in these economies but rather have led to a deterioration of the current accounted nominal exchange rate appreciation. The study recommends that a further in-depth study on the effect of other macroeconomic variables that were not taken into account in this study. A similar study should be conducted over a longer period of time for example twenty years to try and see the behaviour of the selected macro - economic variables and private sector credit over such a longer period in the private sector.

CHAPTER ONE
INTRODUCTION

1.1 background of the study

In many developed and developing countries, private sector credit has played a critical role towards economic growth and development by providing resources for investment by the private sector (Barth & Calari, 2006: Levine, 1997, Levine & Renelt, 1992, King & Levine 1993) One of the cited outcomes of financial reform is the possibility of private sector credit expansion. Kenya embarked on structural and macroeconomic reforms in all sectors of the economy as early as 1990s, as a means of establishing the framework for an environment conducive to higher economic growth. However despite these reforms, Kenya's economy performed poorly during the period 1990-2001 due to various factors, and managed to grow at minimal average of 2% between 1990- 1996 and 1.04% over the entire 1997-2001 period. Also during this period, the country suffered from declining levels of private investment, low savings and excessive government domestic borrowing.

Although the Government is currently spearheading the formulation of a Private Sector Development Strategy (PSDS), preceded by an action plan on quick fixreforms, which is being prepared in partnership with private sector stakeholders and development partners, Little however has been done to put into place sufficient and specific interventions to spur the private sector activities since the Economic Recovery Strategy was issued. Until a comprehensive reform program including a research into the macroeconomic factor that influence borrowing ability of the private sector is prepared and implemented, it will not be possible for the private sector to drive the economic revival agenda. The sector will also find it impossible to contribute

toward achievement of the Millennium Development Goals (vision 2030). Sectoral loans and advances made out by commercial banks, accounts for more than 90 % of the total domestic credit during the last 19 years. Despite agriculture being widely recognized as the backbone of Kenya's economy, credit for agricultural sector declined over the period, from 9.2 % in 1995 to about 4.2% of total private credit by May 2014. It is against this background that this study has been prepared, with the objective of providing sound information on the structure of the private sector in Kenya and the relationship of private sector credit with macroeconomic variables.

1.1.1 Privates Sector Credit

Private sector credit basically refers to the extension of loan facilities to the private enterprises and private households. It is the extension of money from the lender to the borrower. Spencer (1977) noted that credit implies a promise by one party to pay another for money borrowed or goods and services received. Credit therefore cannot be divorced from the banking sector as banks serve as a conduit for funds to be received in form of deposits from the surplus units of the economy and passed on to the deficit units who need funds for productive purposes.

The private sector plays a critical role in the overall macro-economic development in any country. Private investment forms a significant portion of a country's Gross Domestic Product (GDP). If investments grow, GDP also grows. Over the years the government of Kenya has been formulating programs to help stimulate private investments in the country. Since the public sector can only employ a limited number of people, with unemployment rate standing at about 40% in Kenya. The private sector remains a potential source for employment both in Kenya and even in the developed world.

Understanding the factors that affect the private sector credit will go a long way in helping solve some of the economic challenges in developing countries. Private investment stimulates demand for goods and services according to demand management theories of Keynes (1946) as well as increasing employment opportunities. While all governments appreciate the need for private sector development, knowledge about factors that influence this crucial sector remains scanty. Very few people have any basic insight as what to consider before investing in a commercial undertaking in Kenya. There are numerous factors that affect private investments, both which are quantitative and qualitative. Qualitative variables include real GDP, real interest rate, inflation, public investments, public debt, exchange rate, levels of savings, foreign exchange reserves, deposit rates, broad money supply as ratio of GDP, openness of the economy (trade policy), foreign direct investments, foreign aid, etc. Non-quantitative variables include corruption, governance, efficiency of contracts, markets and others.

Since the 1970s, in Kenya, private investment as a percentage of GDP has been teetering between 7% and 16% (World Bank, Economic Surveys).This percentage hit an all-time low in 2000 to stand at 7.47% due to various factors, both political and economic, while it stood at 14.2% in 1978 due to the coffee boom that was experienced that year. By the end of 2003, it had started picking up and reached 15.46% in 2007. The decline in private investments in 1980s could be attributed to financial liberalization and other structural adjustment programs that were introduced in the 1980s. Kenya has been pursuing the Vision 2030 objectives since 2003. To help the country realize this vision, one of the challenges was to increase investments by at least 22% of GDP per annum up to 2014 and thereafter, private investments are expected to grow by at least 24% per annum for the remaining period between 2014 and 2030.

This is not an easy task. It calls for concerted efforts in mobilizing and allocating resources in line with the realization of this objective. Equally important is the growth in public sector investment, which has risen from 2.49% of GDP in 2005 to 6.08% in 2010 (GOK, Economic Surveys). This can only be achieved by raising development expenditure, increasing revenue collection, increased donor-funded development projects and prudent borrowing (both domestic and foreign) in order to improve infrastructure (GOK, 2008). Therefore Bank's credit to the private sector would be a very good stimulus for economic development in a developing country likeKenya. The functioning of financial markets is very important for economic growth (Dushku, 2010). Against this background, this study seeks to examine the recent developments in loans to the private sector and discusses the effect of the macroeconomic variables on such credit.

1.1.2 Macroeconomic Variables

It is imperative to give a brief background of the macroeconomic environment over the past years for the research topic to be more clear. With the right policy prescriptions, domestic private investments can significantly increase and add onto the national income. Kenya's GDP growth rate plummeted in the mid-1970s to 1.5% in 1975 and rose to 7.9% in 1978. This could be attributed to the coffee boom that year.

The economy shrank in 1984 to 1.6%.afterward, it stabilized again to stay between 4% and 6% up to 1990. In 1991, it dipped to 1.4%, only for it to hit an all-time low of -1.08% in 1992 and -0.09% in 1993 following the introduction of multi-party politics. A similar dismal performance of 0.29% was also recorded in 1997 following another general election. The economy managed to revive in the next two years, only to dip again in 2000 and 2002 at 0.59% and 0.29% respectively. The year 2002 was also another election year.

It started picking up again from the year 2003 at 2.78% and rose steadily to 6.99% in 2007 when the country was gearing up for another general election. In 2008, however, it shrank again to 1.53%, the major reason being the post-election violence. (GOK, 2009). After post elections violence, things started looking up, in 2009 the economy grew by at least 3% .The economy has more or less been static at a growth rate of between 4% and 5% up to 2012, it grew up to 5.7% in 2013 and slowed down to 5.3% in 2014 (World Bank, Economic Survey, 2014)

Table 1 Kenya's Real GDP in US Dollars

Year	1980	1990	2000	2005	2010	2012	2013	2014
GDP (Million USD)	12.18	11.94	12.32	19.37	32.12	40.69	55.24	53.4

Source: World Bank National Accounts Data ,& GOK, Economic Survey, various issues

The above figure shows that Kenya recorded steady and increasing growth from the first decade since independence up to the Gulf war (1990-91)and the Iraqi Invasion (2003), the economy declined and continued shrinking (Blanchard, 2007). The situation was worsened by droughts in 1992, 1994, 2000 and 2004, and the subsequent freezing of aid and grants in 1992 and 1997 (Ronge and Kimuyu, 1997). All these factors led to an increased import bill given few exports. This resulted in unfavorable balance of payments, current account deficits, accelerating inflation and exchange rate depreciation (Njeru and Randa, 2001). Other factors related to the macro environment that contributed to the decline were, inflation, lending rate, the level of bank credit to Government, Kenya shilling has depreciated relative to international currencies and constant increases in wages and salaries.

While the overall inflation rate had closed at 10% in 2003, there was a volatile trend over 2004, with an increase to 10.23% in January 2004, declining thereafter to the lowest rate during the year of 8% in July, then rising to close at 11.62% in December. Although some factors responsible for this volatility may have been beyond the economy's control, such as increases in price of imported oil, there are many factors which could have been arrested, such as increases in salaries of teachers and members of parliament. There is need for a stable inflation rate as a factor that determines macroeconomic stability, and therefore which has an influence on the trend of private sector investment.

There was a steady decline in the overdraft lending rate from 14.13% in October 2003 to the lowest rate in 2004 of 10.72% in July 2004. Thereafter, the trend was unstable, with slight increases and decreases all the way up to December 2004, which closed with a 12.69%. On the 91 days treasury bills, the rate increased from the lowest rate of 1% in October 2003, to 8.04% in December 2004. Overall, there was instability in the average lending rate in the whole of 2004, which reflects badly on the level of economic stability, and which may have resulted into withholding of especially foreign investments.

The positive note is that the level of bank credit to Government declined in 2004, though by a small margin of about 2%, compared to 2003, where bank credit to Government to finance its budget deficit had increased by 23.1%. The result of the slight decline in bank credit to Government and to a decline in the percentage of Government expenditure to GDP, from 25.96% in April 2004 to 24.86% in November 2004. This had a positive effect on level of bank credit to private sector, which increased by about 23.6% in 2004, with some of the growth sectors like

manufacturing, transport, business support services, agriculture, real estate and trade taking s substantial share of funds available. It is important to have a stable interest rate, and therefore the need for the Government to keep a tight control on its level of borrowing from the banking sector. Overtime, the Kenya shilling has depreciated relative to international currencies, from 72.93 to the US$ in 1999 to about 78 to the dollar over 2004. However during the year 2004, the rate was unstable, hitting an 81 rate in December. It has thereafter come down, which shows its level of instability, and which therefore makes it quite unpredictable to investors. It is therefore necessary for the Government to maintain good relations with international lenders in order to arrest the instability of the shilling.

The key area of concern is the constant increases in wages and salaries that are not productivity driven. For example, real wages rose risen by about 250% in private sector and 228% in the public sector between 1999 and 2013, as a result of regular increases in the minimum wages announced every year by the Minister for Labor, but not as a result of increased productivity in either of the sectors. There is need therefore to enact and implement an incentive-driven policy on wage increases aimed at spurring increases in labor productivity.

1.1.3 Private Sector Credit and Economic Variables

Different scholars view G.D.P differently depending on the prevailing economic condition at the time. A review of previous literature shows that most of the studies carried out in the Kenyan context on credit issues have largely concentrated on the individual borrowers. A lot of studies have focused on Bank specific factors that affect credit in commercial banks.

There are limited studies in Kenya so far that have looked at the effect of Macroeconomic factors on private sector credit in Kenyan. Furthermore, a close scrutiny of all the study variables shows that there is a disparity between the different findings of the different variables and hence the study aims at filling this gap Most of the scholars are in agreement that G.D.P is an increase in the level of national income and output of an economy. Dewett (2005) referred G.D.P as an increase in the net national product in a given period of time. He further explained G.D.P as quantitative change in economic variables, normally persisting over successive periods. He added that the determinants of economic growth are availability of natural resources, the rate of capital formation, capital-output ratio, technological progress, dynamic entrepreneurship and other factors.

Serven and Solimano (1993) argue that there are many factors that affect private investment and access to credit in developing countries, key among them being GDP growth, real exchange rate, public investment, real interest rates, public debt and uncertainties. They argue that the stringent monetary and credit policies adopted in stabilization packages affect private investment by raising the real cost of credit as well as interest rates. Such packages increase the opportunity cost of retained earnings and they raise the user cost of capital hence reducing investment. This indicates that GDP have an effect on private sector credit though there is very little evidence in the Kenyan case.

This study therefore seeks to examine how GDP affects private sector credit in Kenya. Ali and Daly, (2010) and Nkusu (2011), found that GDP per capita had an inverse relationship to credit in their respective studies while Beck, et al., (2013), found a positive relationship between GDP and private sector credit, the current study seeks to establish whether these findings will hold for

private sector credit. In the case of lending interest rates, Warue (2013), Beck, et al., (2013) and Souto, et al., (2009) found a positive relationship between lending interest rates while Park & Zhang, (2012) found that lending interest rates had an inverse relationship to credit. This again provides a contradictory result which calls for further study with a focus on private sector. In the case of Inflation rate, Mileris (2012) and Renou (2011) in their respective studies found that Inflation rate had a positive relationship with credit, while Warue (2013) in the study found a negative relationship between inflation rate and credit. This also calls for further study to eliminate the contradiction.

1.2 Problem Statement

Studies have been conducted and confirmed that private investment is a key driver of any economy. However, access to credit by private sector in Kenya remains low due to the many restrictions in the country. But to realize the Vision 2030, private investments are expected to grow by at least 24% of G.D.P each year leading to the year 2030. This therefore calls for an effective and supportive macroeconomic environment to enable private sector firm's access credit. It is therefore, imperative that the various macroeconomic that impact on the effective access of private sector to credit be analyzed.

The research findings of this study will help in addressing the existing knowledge gap in literature of the effects of macroeconomic variables on credit to the private sector in Kenya. It will also be a valuable addition to the existing knowledge and provide a platform for further research which was useful to scholars. An understanding of the Effects of the macroeconomic variables on credit risk in the Kenyan banking system is important to the senior management and investors of financial institutions in Kenya. The study findings will enable managers and investors make timely decisions on how to avoid risk, transfer risks, risk reduction (mitigating

risk) or retain the risk in a bid to maximize returns. On the policy front, the study findings are also important to the government, regulatory bodies and to the commercial banks themselves. It will help the regulators to know exactly how credit risk is affected by macroeconomic variables and how to strengthen the financial industry in terms of policies.

1.3 Objectives of the Study

The main objective of this study is to evaluate the relationship between selected macroeconomic variables and private sector credit in Kenya

1.4 Specific Objectives

i. To evaluate the effect of GDP per capital on private sector credit in Kenya.
ii. To determine the effect of interest rate on the private sector credit in Kenya.
iii. To determine the effect of inflation rates on private sector credit in Kenya.
iv. To determine the effect of Exchange rate on private sector credit in Kenya.

1.5 Research questions

i. Does GDP per capita affect private sector credit in Kenya?
ii. To what extent does lending interest rate influence the private sector credit in Kenya?
iii. To what extent does inflation rates affects private sector credit in Kenya?
iv. How do Exchange rates movements affects private sector credit in Kenya?

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the theoretical and empirical literature on the subject of the impact of private sector credit on economic growth. The literature covers both the independent and dependent variables of the study and explains the nature of the relationship among these variables as established by earlier theories and empirical research. The relationships between the variables as established in the literature are used to develop a conceptual framework.

2.2 Review of the Theories

2.2.1 The Theory of Private Sector Credit and Gross Domestic product.

Although the literature regarding the role of financial development on economic growth has grown rapidly in recent times, studies that examine access to credit by the private sector and how it is affected by specific macro-economic factors, is not widely available. There are various theoretical propositions on financial intermediation and economic growth relationship that have been advanced overtime. Some theories are traceable to the earlier Schumpeterian hypothesis which is categorized into supply-leading and demand following hypotheses. While supply-leading hypothesis suggested that financial institutions serve as a useful tool for increasing the productive capacity of the economy, the latter assumed bank lending as not a direct cause for economic growth but rather stated that the growth of the real sector increases demand for financial services which stimulates the financial sector. Nnanna et.al (2004) held that there is a strong relationship between financial development of any country and its economic performance

with agreement that the scarcity of long-term finances in developing countries is the major obstacle to higher investment and output growth in these economies. Adeniyi (2006) showed that economies with efficient financial system are found to grow faster while those with inefficient financial system bear the risk of failure, stagnation or even negative growth.

Theoretical literature exploring the nature of the correlation between the private sector credit and economic growth suggests that the financial system could impact positively on real economic performance by affecting the composition of savings (Bencivenga& Smith, 1991), According to Ngai (2005), bank credit to private sector is the most important source of financing for firms, especially in countries where capital markets are not fully developed. Josephine (2009) concluded that bank credit is one of the important aspects of financial intermediation that provide funds to economic entities that can put them to the most productive investment.

While emphasizing on the relevance of bank credit to business firms, Plamen & Khamis (2009) argued that credit availability enables firms to undertake investments that they could not have otherwise made out of their own funds. The scholars emphasized the macroeconomic impact of higher credit availability and demonstrated that as credit availability increases, consumption and investment demand also increases resulting to the subsequent rise in the level of output and employment.

2.2.2 The Theory of Economic Growth

Some of these existing growth models are Schumpeterian Theory, Marxian Theory, Two-Gap Model, Harrod-Domar Theory of Growth, Neo-Classical Model of Growth, and Endogenous Growth Theory. However, there has been no consensus as to which strategy will achieve the best

success. This is because there are fundamental factors that are prerequisite for meaningful economic growth. For example, the achievement of sustained growth requires minimum levels of skills and literacy on the part of the population and a shift from personal or family organization to large scale units.

2.2.3: Neo-Classical Model of Growth

The neo-classical model of growth was first devised by Robert Solow. The model believes that a sustained increase in capital investment increases the growth rate only temporarily. This is because the ratio of capital to labour goes up (there is more capital available for each worker to use) but the marginal product of additional units of capital is assumed to decline and the economy eventually moves back to a long-term growth path, with real GDP growing at the same rate as the workforce plus a factor to reflect improving productivity. A steady-state growth path is reached when output, capital and labour are all growing at the same rate, so output per worker and capital per worker are constant.

Neo-classical economists believe that to raise an economy's long term trend rate of growth requires an increase in the labour supply and an improvement in the productivity of labour and capital. Differences in the rate of technological change are said to explain much of the variation in economic growth between developed countries. The neo-classical model treats productivity improvements as an exogenous variable meaning that productivity is assumed to be independent of capital investment (IMF, 2001). According to Nnanna, Englama, &Odoko (2004), based on Solow's analysis of the American data from 1909 to 1949, he observed that 87.5% of economic growth within the period was attributable to technological change and 12.5% to the increased use of capital. The result of the growth model was that private sector credit from financial

institutions had only minor influence on the rate of investment in physical capital and the changes in investment are viewed as having only minor effects on economic growth.

2.2.4 Endogenous Growth Theory

Endogenous growth theory or new growth theory was developed in the 1980s by Romer (1986) and Lucas (1988) among other economists as a response to criticism of the neo-classical growth model. The endogenous growth theory holds that policy measures can have an impact on the long-run growth rate of an economy. The growth model is one in which the long-run growth rate is determined by variables within the model, not an exogenous rate of technological progress as in a neoclassical growth model. Jhingan (2006) explained that the endogenous growth model emphasizes technical progress resulting from the rate of investment, the size of the capital stock and the stock of human capital. In an endogenous growth model, Nnanna, Englama, and Odoko (2004) observed that financial development can affect growth in three ways, which are: raising the efficiency of financial intermediation, increasing the social marginal productivity of capital and influencing the private savings rate. This means that a financial institution can affect economic growth by efficiently carrying out its functions, among which is the provision of credit.

2.2.5 The Theory of Inflation and Economic Growth

Inflation is a persistent rise in the general price level over a period of time. It is measured by the consumer price index and the implicit price deflator for gross national product. Inflation is categorized as creeping, suppressed, hyperinflation and stagflation. Classical Theory of Inflation says that money is the asset which is utilized by people to purchase goods and services on a regular basis. Money is the mode of exchange in every economy at the present day. Inflation occurs in an economy when the overall price level increases and the demand of goods and

services increase. Inflation is determined by the quantity theory of money that asserts that the quantity of money available determines the price level and that the growth rate in the quantity of money determines the inflation rate. This therefore have a bearing on private sector credit.

Many scholars have carried out research to establish the impact of inflation on economic growth and came up with several different economic theories to ascertain consensus on economic growth and inflation relationship. Gokal&Hanif (2004) assert that the classical economics emphasizes the need for incentives to save for investment to boost a country's economic growth. The aggregate demand and aggregate supply framework advocated by the Keynesian theory provided a comprehensive model linking inflation to economic growth. On the other hand, monetarism reemphasized the critical role of monetary growth in determining inflation whereas the Neoclassical and Endogenous growth theories sought to account for the effects of inflation on economic growth. Such theories are based on the inflation levels and the impact on the nation's economy.

The advocates of such theories reached a number of conclusions regarding the relationship between economic growth and inflation. The early theories relating to inflation and economic growth were built on the premise of cyclical observations. Inflation will stay in a particular level until it is disturbed so that it moves to another level at which it settles. Theories therefore sought to account for the movement and seek to identify the positive correlation between inflation and economic growth so that when growth increased, inflation increases as well.

The relationship between inflation and growth remains theoretically controversial. Originating in the Latin American context in the 1950s, the issue has generated an enduring debate between

structuralists and monetarists. The structuralists believe that inflation is essential for economic growth, whereas the monetarists see inflation as detrimental to economic progress. There are two aspects to this debate namely; the nature of the relationship if one exists and, the direction of causality. Friedman (1973: 41) summarized the inconclusive nature of the relationship between inflation and economic growth as follows; historically, all combinations have occurred: inflation with and without development, no inflation with and without development" Earlier works (for example, TunWai, 1959) failed to establish any meaningful relationship between inflation and economic growth. A more recent work by Paul, Kearney &Chowdhury (1997) involving 70 countries (of which 48 are developing economies) for the period 1960-1989 found no causal relationship between inflation and economic growth.

Choi et al. (1996), Azariadas& Smith (1996) showed that only when inflation exceeds some critical level then it hampers economic growth, otherwise inflation has a favorable impact on growth. The authors explained this phenomenon using the so-called "adverse selection mechanism" in credit market. The brief idea is the following. There are two types of agents in the financial system: "natural borrowers" and "natural lenders". The latter have enough funds to invest but do not have access to projects, while the former have many projects but insufficient funds to undertake them. The financial system plays important role in order to ensure channel from lenders to borrowers. If inflation increases then it reduces real rate of return on assets.

2.2.6 The Theory of Interest Rates and Economic Growth

Interest rate is the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets. Interest rates are typically noted on an annual basis. The assets Interest rates play a critical role in allocating funds across financial markets. Term theory of

interest rates states that the difference in interest rates charged on different securities is the difference in their terms. Interest rate therefore is key in mobilizing savings which will subsequently be loaned out to the private sector for investment and consumption. In this regard, there is need for policy makers to strike a balance while formulating and executing the economy's monetary policy so that an optimal interest rate that is attractive to the savers and conducive for investors is achieved. Empirical evidence has showed both positive and causal relationship exists between interest rates and economic growth and their magnitude depends on the level of economic development in an economy.

2.3 Empirical Literature of Private Sector Credit and Economic Growth

Were, Nzomoi&Rutto (2012) investigated the impact of access to bank credit on the economic performance of key economic sectors (manufacturing, Agriculture, transport, communication, and service among others) using time-series sectoral panel data for Kenya, spanning the period from 1998 to 2010. They employed panel data estimation methodology to assess the impact of credit accessed by the different economic sectors on the economic performance. Their study focused on real GDP as the dependent variable and private sector credit as the only explanatory variable while employment level and interest rate were control variables in each sector.

They found a positive and significant impact of credit on sectoral gross domestic product measured as real value added. Their results also indicated that the magnitude of the impact is smaller once factors such as labor employed and past economic performance of the sectors are taken into account. However, the study did not investigate the impact of aggregate private sector credit on economic growth proxied by GDP constant prices.

King & Levine (1993) investigated the impact of financial development (proxied by private sector credit) on economic growth (proxied by real GDP). He conducted cross country analysis using data averaged for 10 years (1960-1989) period for 119 developed and developing countries. They employed ordinary least square regression model and panel data regression model to determine whether there is a relationship between the variables. They found that higher levels of financial development were positively associated with rising economic growth. The scholars further investigated the relationship between the level of financial development and the long-run growth.

They found out that the predetermined component of financial development is good for predicting long-run growth patterns. Better-functioning financial systems ease the external financing constraints that impede firm and industrial expansion. Thus, one channel through which financial development matters for growth is access to external capital, which enables industries and firms to expand.

Aliero, Abdullahi&Adamu (2013) investigated the relationship between private sector credit and economic growth, using secondary time series data for the period of thirty-seven years (1974-2010). Their study focused on real GDP as a dependent variable and banking private sector credit as independent variable in the regression. They wanted to ascertain the short and long run direction of causality between private sector credit and economic growth in Nigeria. The relationship between the variables was first established using a model of Shabri & Majid (2008), followed by Augmented Dickey-Fuller (ADF) test for unit root and Autoregressive Distributed

Lag (ARLD) bound F-test for co-integration. They found that a long run equilibrium relationship exists between private sector credit and economic growth.

They also found that there is no causal relationship between private sector credit and economic growth in Nigeria. This implied that while demand following hypothesis prevailed in the long run relationship between private sector credit and economic growth in Nigeria, non-causal impact between private sector and economic growth on the other hand indicates the prevalence of the Schumpeterian independent hypothesis on the Nigerian economy. Oluitan (2009) examines 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 focused to critically assess whether banks through their role of intermediation can be relied on to stimulate the growth of an economy and also determine the direction of causality between real output and bank credit to the private sector. The study used time-series data to test for co-integration to determine the long-run relationship between the variables, and Johensen based ECM & Engle /granger to determine the direction of causality between the variables. The study found that real output causes financial development, but not vice versa. It was also found that growth in the financial sector is highly dependent on economic growth.

Okwo, Mbajiaku & Ugwunta (2012) examined the effect of bank credit to private sector on economic growth in Nigeria using time series data for the period 1981 to 2010. They used correlation analysis and regression method to assess the relationship and the effect of credit to the private sector on economic growth. To ensure that spurious regression results were not obtained, the Augmented Dickey Fuller (ADF) test was used to ensure stationarity of the data,

while the ordinary least square method (OLS) were applied to ascertain the impact of bank credit to the private sector on economic growth. They found out that bank credit to private sectors has a statistical strong positive relationship with GDP. The y also found that bank credit to the private sector has statistically significant effect on economic growth.

Younus (2006) examined the relationship if any among economic growth (output), private sector credit and inflation in Bangladesh using time series data for the period 1990 to 2006. The objective of the study was to examine the response of economic growth due to changes in private sector credit. In addition, they wanted to establish the impact of private sector credit on the price level. Economic growth proxied by real GDP data was the dependent variable while inflation proxied by consumer price index data and private sector credit data were the explanatory variables. A VAR approach and Granger causality tests were methods used to estimate the model. They found out that private sector credit has no real effect on economic growth but is inflationary. Economic growth, however, has positive impact on real private sector credit growth reflecting higher credit demand emanating from increased economic activities. The results were 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. The findings concluded that the positive impact of financial development on economic growth is modest or negligible at this stage.

Omankhanlen (2012) investigated the role of banks in capital formation and economic growth in Nigeria using time series data for the period 1980-2009. The objective of the study was to determine the impact of selected banks activities indicators on Gross Fixed Capital Formation

(GFCF) and Gross Domestic Product. The study used two models and employed the ordinary least square method. Gross Fixed Capital formation (GFCF) was the dependent variable for one model while Gross Domestic Product (GDP) which is a measure of the nation's economic growth was the dependent variable for the other model. The explanatory variables for both models were commercial banks' deposit liability (BDL), maximum lending rate (MLR), commercial banks credit (CBC), and investment by banks in Nigeria (BINV).

The study found that commercial banks deposit liabilities is elastic to Gross Fixed Capital Formation. The positivity of the coefficient of the commercial banks deposit liabilities is in conformity to the economic a priori expectation of a positive impact of commercial banks' deposit liabilities on Gross Fixed Capital Formation. The study also found out that commercial banks credit (CBC) has a positive impact on Gross Fixed Capital Formation (GFCF).

2.4 Dependent and the Independent variables

Figure 2.1: Operationalization of Variables

	VARIABLE	**INDICATOR**	**MEASURE**
Dependent Variable	Private sector credit	Profitability	Annual profits
		Stock Market performance	Average Market Price per Share
Independent Variables	Inflation rate	Annual inflation rate fluctuation	Inflation Rate
			Consumer Price Index(CPI)
	Interest rate	Average Annual interest rate.	Central Bank rate(CBR)
	Gross Domestic product(GDP)	GDP Growth Rate	Annual GDP rate

This section dwells on conceptual framework, which examines the relationship between the dependent variable and independent variables of the study. Figure 2.2 depicts the conceptual framework of the study outlining the relationships between the dependent and independent variables of the system of the research model. Economic growth proxied by real Gross Domestic Product (GDP) is the dependent variable while the independent variables include the aggregate private sector credit and inflation. Hair *et al.*, (2009), post it that the moderator variable may have both contributory and contingent effects. It is hoped that inflation (INFLN), plays the same role in this study. The aggregate private sector credit impacts on economic growth as proxied by real GDP through investment and consumption. Other variables that make contributions to economic growth not specified in the model are captured in the error term as shown in the model specification.

2.5 Chapter Summary

The growth models relevant to this study are the Neo-Classical Model of Growth, and Endogenous Growth Theory, since these growth models explain the situation in developing economies such as Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology that was employed in this study. It encompasses the research design, target population, sample design, data collection methodologies, data analysis and presentation methods, model specification, ethical considerations and foreseen limitations of the study.

3.2 Research Design

The study employed the explanatory research design. The explanatory research design will seek to determine the correlation between the dependent and independent variables. This methodology was appropriate for this study owing to the quantitative nature of the data for the study.

3.3 Target Population

The target population for the study is time series data for Kenya on Gross Domestic Product (GDP), aggregate private sector credit (CR), inflation (IFLN) and interest rate (IR). The data for the study is expected to yearly spanning from the period 1990 to 2011. The data was sourced from the Central Bank of Kenya and World Bank bulletin and the year 2011 was the cutoff date as it gives the latest available data on aggregate private sector credit.

Correlation analysis and regression was use to assess relationship and the impact of credit to the private sector on inflation, interest rates and economic growth. Yearly frequency of data was chosen because it provides the adequate number of observations to meet the minimum of 30 observations required for the regression analysis technique adopted for the study.

3.4 Sample Design

The study used time series data from 1990 to 2011. There were 120 observations that were sampled for the purpose of the study.

3.5 Data Collection, Methods and Procedures

The source of the main data was the World Bank data base through the official World Bank website and supported by data from the Central Bank of Kenya data base at the research department. These was collected from the official websites in order to ensure that only data that are credible and that data collected covered all the variables of interest to the study.

The importance of sourcing data from official websites also ensures validity and reliability of the results. The data to be collected and analyzed is for the following variables; Real GDP to proxy Economic growth which was the dependent variable; Private sector credit (CR) which was the explanatory variable; Inflation (INFLN) as measured by the change in consumer price index and Interest Rate (IR), to be use purely as a control variables.

3.6 Data Analysis Methodology

The study used Autoregressive Distributed Lag (ARDL) model to establish the long run relationship between aggregate private sector credit and GDP in Kenya. As Gujarati, (2005) stated, most of macro econometric time-series data are associated with the problem of non-stationery as the data set may have time-varying mean or time-varying variance or suffer from both. In other words, time series data have a unit root with the exception of inflation and interest rate data to be used in this study.

The stationary property of the time-series data was examined by conducting unit root test in order to ascertain the stationary or otherwise of the series variables. To detect the presence or otherwise of unit root, the study considered a variable y that has a unit root represented by a first order Autoregressive (AR).

$$y_t = py_{t-1} + U_t \quad \ldots\ldots (1)$$

Where y_t is real GDP at time t, $U_t$is the error term assumed to be independently and identically distributed with zero mean and constant variance and also assumed to be serially uncorrelated. If the absolute value of the coefficient p is less than 1 ($|p| < 1$), then y_t is stationary. If on the other hand, the absolute values of the coefficient p is statistically equal to or greater than 1 ($|p| \geq 1$) then y_t is non-stationary and unit root exists (Gujarati, 2005).

Thus, the ARDL approach is expected to avoid problems resulting from non-stationary time series data.

$\delta_{j,}$ β_j, α_j = Parameters to be estimated

$_{t-1}$ = First lag values of the variables

U_t = Error term

3.7 Ethical Considerations

This study was conducted in line with the best practices required when conducting a research. The data to be collected will strictly be use for purposes of the study and not for any other purpose. All data was obtained with consent and prior approval of the relevant authorities wherever relevant and divulged to third parties. All information was kept private and treated with the confidentiality it deserved. In this regard, plagiarism and biasness will not be condoned in this study.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter presents findings in orientation to the conceptualizations from the annual time series data. The bondage between the variables in the study was estimated by the Ordinary Least Squares (OLS) method of analysis. The findings abridged from secondary data, are interpreted in relation to the research objectives.

4.2: Descriptive statistic

Descriptive Analysis Results

Table 4. 1: Summary of the Descriptive Analysis Results

	Mean	**Standard deviation**
Private sector credit	**0.6479**	**0.2969**
Inflation rate	**-.0967**	**1.2738**
Interest rate	**2.4571**	**0.2382**
GDP	**4.071**	**0.2382**

Source: Research findings

Table 4.1 shows that the average of efficiency for the commercial banks for the five years was 0.64789 with a standard deviation of 0.2969, the inflation rate was -.0967 with a standard deviation with a standard deviation of 1.2738, GDP growth rate 4.071 with a standard deviation of 0.2382, interest rate 2.4571 with a standard deviation of 0.2382 and exchange rate of Ksh against US dollar 85.3167 with a standard deviation of 2.8166.

4.3 Regression Results

The study conducted a cross-sectional multiple regression on several determinants over the period 2009 - 2013 and of the credit in the private sector. Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (private sector credit) that is explained by all the four independent variables (Inflation rate, interest rate, GDP).

Table 4. 2: Regression Analysis

Model	R	R square	Adjusted R square	Std. Error of estimate
1	.878	.771	.729	.146

Source: Research Findings

The four independent variables that were studied, explain only 72.9% of the private sector as represented by the adjusted R^2. This therefore means the three variables contribute to 72.9% of the financial performance in the private sector credit in Kenya, while other factors not studied in this research contributes 27.1% of the dependent variable (private sector credit). Therefore, further research should be conducted to investigate the other (27.1%) factors that affect private sector credit in Kenya.

Table 4.3: ANOVA

Model	Sum of squares	Df	Mean square	F	Sig.
Regression	3.4209	3	1.1403	.855	19.937
Residual	1.7334	27	0.0642		
Total	5.1543	30			

Source: Research Findings

From the ANOVA statistics in table 4.3, the processed data, which are the population parameters, had a significance level of 0.00051 which shows that the data is ideal for making a conclusion on the population's parameter. The F calculated at 5% Level of significance was 19.973. Since F calculated is greater than the F critical (value = 2.612), this shows that the overall model was significant i.e. there is a significant relationship between selected macroeconomic variables and private sector credit in Kenya.

Table 4.1: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.893	.433		8.336	.001
Inflation rate	-.032	.126	-.967	5.133	.002
Interest rate	.043	.378	.506	3.451	.004
GDP	.046	.078	.282	4.032	.006

a. Dependent Variable: private sector credit

From the model, when other factors (inflation rate, interest rate and the gross domestic product) are at zero, firms' performance was .893. Holding other factors constant, a unit increase in the inflation rate would lead to -0.032 (p=.002) decrease in the private sector credit. Also noted is that holding other factors constant, a unit increase in the interest rate would lead to a 0.043 (p=0.004) increase in the private sector credit. Table 4.4 also shows that holding other factors constant, a unit increase in the GDP would lead to a 0.046 (p=0.006) increase in private sector development. These results shows that when acting jointly, inflation rate, interest rate and the GDP all have a significant influence on the private sector credit.

4.4: 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 ain 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 4.2: Test for autocorrelation

F-statistic	0.1336	Prob. F(2,21)	0.8676
Obs*R-squared	0.4301	Prob. Chi-Square(2)	0.8065
Durbin-Watsostat	2.0145		

Source: Research Findings

The null hypothesis states that the residuals of Error Correction Model (ECM) are serially uncorrelated. Based on the results in Table 4.3, 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.

4.5: 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 4.3: 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

Source: Research Findings

4.6 Interpretation and discussion of the Findings

The study finding suggests a positive relationship between various variable of macroeconomic to the private sector and per capita income in the transition economies. However, it appears to be more and more dependent on the activities of other factors. Control the majority of assets and capital flows in the financial markets. Their entry has indeed boosted economic growth, enhanced competition and contributed to attract foreign direct investment. However, the lack of effective anti-trust legislation and mergers and acquisitions can lead to excessive concentration, while anticompetitive practices and abuse of dominant position may also occur

Increased credit availability eases liquidity constraints on households and firms, leading to higher consumption and investment. Given short-run supply constraints, this upward shift in credit financed domestic demand would tend to exert upward pressure on prices in asset, goods, and labour markets. Concurrently, demand for foreign goods both consumption and investment

will rise, causing a deterioration in the trade balance. Thus, if left unchecked, a rapid increase in credit can boost domestic prices and wages which at an unchanged nominal exchange rate could reduce international competitiveness and heighten external vulnerabilities. Indeed, in characterizing emerging market credit booms, that there is almost a 70 percent probability that a credit boom coincides with either a consumption or investment boom, and that credit booms are often associated with banking and currency crises. The same paper also concludes that emerging market credit booms have not, on average, resulted in higher inflation partly reflecting the high degree of trade openness in these economies but rather have led to a deterioration of the current accounted nominal exchange rate appreciation.

The impact of credit availability on consumption behaviour is a central issue in both theory and practice. The most stylized permanent income model assumes that households can use a combination of saving (internal finance) and borrowing (external finance) with consumption growth being governed by the real interest rate, the intertemporal elasticity of substitution and the discount factor. A standard caveat to this prediction comes from the possibility that some households may face unfavourable conditions for accessing external finance either because such finance is rationed or because the terms of access are not attractive. Yet, even though the availability of external finance plays a central role in theoretical thinking about consumption, evidence for its empirical importance remains quite limited.

From a macro-economic point of view, access to credit may play an important role in the monetary transmission mechanism. The conventional financial accelerator model, as discussed in

Moreover, the study results support the claim that the terms on which Households can access to external finance to smooth their consumption matter for consumption growth.The empirical literature to date has emphasized the link to business investment from changing credit conditions. The results reported here suggest that there is scope for a quantitatively significant direct channel from credit conditions onto household behaviour through the way in which risk is priced in the markets for secured household debt. Widening current account imbalances are a concern for policy-makers, and measures might be necessary to slow down the growth in credit to households and to allocate more resources to productive investments. At the same time, the financial infrastructure should be improved as creditors need protection through the enforcement of bankruptcy and insolvency legislation meeting international standards. In addition, improving corporate governance and providing better credit information might help banks channel resources towards the productive corporate sector. It is true that asset price booms and fast credit expansions have been associated with episodes of financial distress. Equally true, however, is the fact financial development (often measured by the credit-to-GDP ratio, the same variable used to measure credit booms) has been long identified as determinant of economic growth. Then, the issue for policy is to discriminate between good and bad booms and to devise strategies to contain the dangerous ones and minimize the associated risks. What matters is whether a boom leads to the build up of systemic risk, or whether it can deflate without major financial disruption.

The existence of a positive relationship between money and prices is well acknowledged in the economic literature. A large consensus can be found on both the direction and the dimension of the effect of an increase in the monetary aggregate on prices developments. The statement that in equilibrium monetary policy is neutral hinges on the quantity equation which in turn defines a

positive “one-to-one” relationship between monetary and price growth over a long-term horizon. The theoretical consensus on money neutrality is also supported by well documented empirical evidence, in both time-series and cross-countries analysis. The economic profession, however, highlights that, since money is not the sole cause of price developments in the short run and that a certain period of time must elapse before the “one-to-one” relation emerges, the neutrality may not to hold over shorter horizons. An econometric investigation based on probit regressions suggested that factors like contemporaneous large deviations of stock prices and housing price from trend developments and strong dynamics of credit to the private sector significantly increase the probability of turning an episode of excessive money growth into an outburst of inflation. In addition, as expected, also the magnitude of the episode positively contributes to the inflationary outcome, while the length of the period of strong money growth does not seem to matter for the inflationary outcome.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the data findings presented in the previous chapter, conclusions and recommendations there-to. The chapter is, thus, structured into summary of findings, conclusions, and recommendations of research findings and further research.

5.2 Summary

The purpose of the study to determine the effects of inflation, interest rate and the GDP on the private sector credit in Kenya using OLS method. Descriptive findings indicate that all the variables were normally distributed regression coefficients and the analysis of variance 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 indicated that 72.9% of the variation in the private sector credit is explained by the listed independent variables. Jointly, the independent variables captured in the model significantly explain the changes in private sector credit. Furthermore the study found that the inflation rate, interest rate and the GDP are important and significant in explaining credit by the private sector. Post estimation results indicate that there was no problem of Autocorrelation, Errors were not normally distributed and there was no problem of Heteroskedasticity.

The Observed R-squared was calculated to be 0.43 and the corresponding Prob. Chi - Square of 0.8065 (80.7%). P-value was more than 5% significant level and therefore we accepted the null

hypothesis. The DW statistic assumed a value 2.0145 indicating that the residuals from OLs regression are not autocorrelated since the DW is approximately 2. The results from the analysis indicated 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.

5.3: Conclusion

The study sought to examine the relationship between selected macroeconomic variables and the private sector credit in Kenya. In this study, the dependent variable was private sector credit while inflations, interest rates and the gross domestic product were independent variables. The independent variables were found to be statistically significant in explaining the level of credit in the private sector.

The study established that if inflation exceeds some critical level then it hampers economic growth, otherwise inflation has a favorable impact on growth. Authors have explained this phenomenon using the so-called "adverse selection mechanism" in credit market. The latter have enough funds to invest but do not have access to projects, while the former have many projects but insufficient funds to undertake them.

5.4: Limitations of the study

One of the limitations of this study was the time engaged in the collection, analysis and interpretation of data. The voluminous data required plenty of time to collate and check for quality. This is especially so because the required data was not available in one file, format or location and had to be collated from several different sources.

The cost of obtaining some of the data was also inhibitive with each yearly data set being sold separately. For some of the inputs, the data had to be purchased on a month by month basis making the cost even more prohibitive. Political instability, weak and poor institutional and macroeconomic environment and poor infrastructure have continued to drag the performance of the horticultural industry in Kenya thereby negatively affecting export earnings from this sector. The time taken to carry out this study was in no means sufficient for the amount of detail and analysis the study involved. With more time, detailed tests could be conducted to determine whether the same conclusions could have been derived with more variables included in the research model.

5.5: Recommendations for policy

This study recommends a further in-depth study on the effect of other macroeconomic variables that were not taken into account in this study. A similar study should be conducted over a longer period of time for example twenty years to try and see the behaviour of the selected macro - economic variables and private sector credit over such a longer period in the private sector.

Further research should be carried out on other economic sectors of the country and even the broader East African region to establish the effect of the macroeconomic variables from the different sectors under study and across the east African region. This study focused on three independent variables i.e. inflation rates, interest rates and the gross domestic product. This study recommends that another study be conducted with more independent variables that affect credit in the private sector.

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APPENDIX: Data used in the study

Year	GDP per capita	Inflation rate	Interest Rate
1981	29.4839	1.65578	5.65E+09
1982	29.4022	-0.1147	5887200000
1983	29.9892	-2.3011	4460400000
1984	29.3471	-2.476	4925200000
1985	30.5545	-2.0106	6145800000
1986	31.5255	0.49379	6182400000
1987	30.2571	3.32878	9243600000
1987	28.9527	2.19815	8172000000
1989	30.8323	2.52426	1.26E+10
1990	31.3811	1.13475	1.98E+10
1991	32.6679	0.72711	1.66E+10
1992	33.7477	-1.8706	1.30E+10
1993	34.8406	-3.9688	2.67E+10
1994	29.2076	-2.7623	2.05E+10
1995	29.2705	-0.4327	2.61E+10
1996	34.5468	1.42301	2.76E+10
1997	26.972	1.30857	2.6961E+10
1998	27.9423	-2.1544	4.06E+10
1999	27.3394	0.65217	2.03E+10
2000	29.2574	-0.3005	1.78E+10

2001	28.4304	-1.9935	3.31E+10
2002	25.2196	1.0622	4.36E+10
2003	25.8632	-2.1166	4.97E+10
2004	24.6003	0.18654	5.46E+10
2005	26.7915	2.29949	4.01E+10
2006	25.9318	3.09188	5.46E+10
2007	26.076	3.51951	1.42E+11
2008	26.9272	4.17392	1.63E+11
2009	29.904	-1.1465	1.61E+11
2010	30.1578	0.02286	1.86E+11
2012	33.5735	2.99818	2.44E+11
2013	37.3799	1.64119	2.92E+11
2014	36.9805	1.76731	4.60E+11