EFFECT OF REAL INTEREST RATE, INCOME AND INFLATION ON SAVINGS IN KENYA

BY

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DECLARATION

DECLARATION BY THE CANDIDATE:

I hereby declare that this Thesis has not been presented for any degree award in any university or another institution of higher learning. The work herein is my original work and all sources of information have specifically been acknowledged by means of referencing.

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DEDICATION

This Thesis has been dedicated to The Almighty God for His providence of the gift of life that enables me to live one day at a time, my parents, the late Japheth Ochieng Onyango and late mama Hadah Atieno Ochieng, for instilling in me good principles and values that has kept me moving since my childhood, my wife Loureen Nuli for providing immense support throughout my studies and in undertaking this research work, my sons Japheth Ochieng and Jesse Murayi, for their sense of humor at those times when I was at my lowest ebb, my brothers and sisters for according me their love and inspirations and lastly, to all my friends and relatives whose interactions and support enabled me reach this far.

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ABSTRACT

One of the principal strategies of development necessary for any country's take off is the mobilization of domestic and foreign savings in order to generate sufficient investment to accelerate economic growth. According to the Kenya's economic blue print, VISION 2030, the government pledged to make the country become a globally competitive, middle income and a newly industrializing nation by the year 2030. This was to be achieved by ensuring that the GDP grew by 10% in the year 2012 and sustain the said growth, annually, up to the year 2030. The report acknowledges that this is only possible if the level of savings is increased from the current 20% of GDP, which the Ministry of Planning, in the year 2012, decried as being too low, to 30% of GDP by 2030. However, apart from suggesting a dedicated campaign and ensuring macro- economic stability, there were no clear-cut policy guidelines on which economic variables, if manipulated, would address the Savings problems in Kenya. The purpose of the study was to determine the effect of Real Interest Rates (RIR), Income and Inflation on savings in Kenya in order to provide a clue on the determinants of savings. The specific objectives were to: Determine the effect of RIR on Savings; assess the effect of income on Savings and analyze the effect of Inflation on Savings. The study was guided by the Life Cycle and the Permanent Income Hypothesis. The study adopted correlation research design. Time series data used was sourced from the World Bank from the year 1980 and 2012. Multivariate analysis, using Eviews statistical software, was used to show the empirical relationship between the Savings, Income, RIR and Inflation. The results showed that RIR have a significant positive effect on savings (coefficient =0.08076; p value = 0.0165), meaning that it is a major determinant of savings, income had a significant negative effect on savings (coefficient= -1.2125; p value = 0.0002) meaning that it results into decreased savings while inflation had an insignificant effect on savings (coefficient = 0.009; p value = 0.934) meaning that it does not affect savings in Kenya. The study concluded that RIR should be increase to boost savings in Kenya while income should be increased. The knowledge of these determinants of savings would equip the policy makers with tools to increase the levels of savings to the desired level.

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ABBREVIATIONS/ACRONYMS

ADF - Augmented Dickey Fuller

AG -Annual GDP Growth

AR - Auto Regression

CAB - Current Account Balance

CBK -Central Bank of Kenya

CBNAR - Central Bank of Nigeria

CBR - Central Bank Rate

CE - Cointegrating Equations

GCF - Gross Capital Formation

GDP - Gross Domestic Product

GDS - Gross Domestic Savings

GNI - Gross National Income

IR - Interest Rate

LCH - Life Cycle Hypothesis

LDC - Less Developed Countries

M2 - Money Supply

MPC - Monetary Policy Committee

OLS - Ordinary Least Square Method

PIH - Permanent Income Hypothesis

RIR- - Real Interest Rate

VIF - Vector Inflation Factor

WB -World Bank

OPERATIONAL DEFINITION OF TERMS

GDP growth (annual %): GDP is the sum of gross value added by all residents Producers in the economy plus any product taxes and minus subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Gross national income: Is the sum of Gross National Product and the terms of trade adjustment. Data are in current local currency.

Gross domestic income: Are the sum of GDP and the terms of trade adjustment. Data are inconstant local currency.

Gross domestic savings: These are calculated as GDP less final consumption expenditure (total consumption). Data are in current local Currency.

Gross fixed capital formation:(Fixed investment) includes land improvement (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

Current account balance: is the sum of net exports of goods, services, net income, and net current transfers.

Money and quasi money: comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This definition of money supply is frequently called M2; Data are in current local currency.

Real interest rate: is the lending interest rate adjusted for inflation as measured by the GDP deflator.

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NOTATIONS AND SYMBOLS

The following notations were used in the equations throughout the thesis:

β_i : The coefficients, where $i = 1,2,3...7$

ρ : Probabilities

ε, μ : Error terms

$t - i$: Number of lags, where $i = 1,2$

Δ : First difference operator

H_0 : Null hypothesis

H_1 : Alternative hypothesis

δ : Epsilon

$I(d)$: Order of integration, where $d = 1,2$

CHAPTER ONE

INTRODUCTION

This was a research study on the effect of real interest rate, income and inflation on savings in Kenya. This chapter explored the background of the study, problem statement, research objectives, hypothesis, the scope as well as the significance of the study.

1.1 Background of the study

Savings is the portion of income not spent on current expenditures. They are often undertaken because a person does not know what will happen in the future and hence a person saves to pay for unexpected events or emergencies. Without savings, unexpected events can become large financial burdens. Therefore, savings helps an individual or family become financially secure. Many observers of the current economic scene are concerned with the low rate of personal savings. The conclusion is that low rate of savings presents an important problem on two fronts; micro economists worry that individuals are not putting enough way to finance a satisfactory lifestyle in retirement while macro economists worry that low savings rate will produce too little to investment,(Kotlikoff, 1992).

According to Rostow (1960), the transition from underdevelopment to development, of any country, can be described in terms of a series of steps or stages through which all countries must proceed. These stages are the traditional society, the pre-conditions for take-off into self-sustaining growth, the take-off, the drive to maturity, and the age of high mass consumption. For any take off to take place, one of the principal strategy is the mobilization of domestic and foreign saving in order to generate sufficient investment to accelerate economic growth.

In Kenya's case, the importance of savings is anchored on Vision 2030. The essence of Vision 2030 is to provide an in-depth understanding of the country's development problems and the necessary strategies to achieve the established goals, on or before the year 2030. The two critical components in the Vision is the potential of the different sectors to make a wide economic impact and the feasibility of unlocking that potential for the benefits of economic growth, employment and poverty – reduction. These are to be achieved through the political, social and economic pillars.

According to the VISION 2030 – specifically in the economic pillar- one of the objectives is to increase the annual GDP growth rate to an average of 10% over the Vision's horizon and for this to happen, savings is envisaged to be increased to 30% of GDP from the year 2012 and also sustain the same rate up to the year 2030. If this goal is achieved, Kenya will be the 7th country in Africa to achieve such a high level of sustained growth after Algerian (53.23%), Equatorial Guinea (43.15%), Gabon (37.69%), Botswana (37.63%) and Lesotho (34.85%). Achieving the 10% growth rate, the report acknowledges, requires a dedicated campaign and continuity with the tradition of macro- economic stability, one of which is savings, (Government of the Republic of Kenya[GOK], 2007). It is widely acknowledged that if savings are invested wisely, then they are indeed an important factor towards the country's growth and development, (McGregor, 1998).

The subject of savings in Kenya is essential because as Mwega, Ngola and Mwangi (1990) observed, the bulk of the national savings in Kenya is mobilized by the private sector as opposed to the public sector. This is a major problem since most of the public sector utilization leads to a lot of financial wastages that can otherwise be converted into savings and help in spurring the economic growth of Kenya without necessarily having to resort to government borrowing that ultimately leads to a huge debt burden to the citizenry of this country.

According to Rutherford (2012), in his quote of literary works by Adam Smith, building up capital is an essential condition for economic progress. By saving some of what we produce instead of immediately consuming it, we can invest in new, dedicated, labor-saving equipment. The more we invest, the more efficient our production becomes. It is a virtuous circle and in summary, Macro -economic policy makers have placed a lot of emphasis on the importance of savings as a subject.

Research has found that there are a number of variables that interplay together in influencing the savings pattern or behavior. According to Finance (2013), these variables include and are not limited to inflation level, demographics of a nation, production levels (investments), the national income ratios, uncertainties, prices, percentage of children and old people in a country and interest rates.

Friedman, (1957) and Modigliani (1966) explained the determinants of savings and pointed out other variables that also affect the savings of the households. These include annual GDP growth rates, money supply, interest rates, inflation and dependency ratio. It is on the basis of this understanding that the study looked into what happens to aggregate savings when real interest rates, income and inflation are adjusted. This was looked at together with the annual GDP growth rate, current account balance, money supply and gross capital formation, all acting as control for variables. The choice of these controlled for variables was as a result of the many empirical literatures that, in one way or another, did incorporated them in their analysis. This study therefore adopted them as such. The choice of the independent variables namely the real interest rates, income and inflation was because of the mixed signals that they portend upon the savings levels according to the empirical literatures.

Keynes (1936) postulated that savings represent the difference between income and consumption registered during a period of time. Modern Oxford dictionary defines it as after tax income not spent or "deferred consumption", being income left over for the future consumption on capital investment or for precautionary and speculative motives.

According to Krieckhaus (2002), a higher level of national savings leads to a higher investment and consequently higher output. He acknowledged that Savings and investments have been believed to be very instrumental towards the growth of any country's economy world over. This is because people save in order to make investments. Foreign investors save in their own countries to invest in offshore countries. Citizens / inhabitants of a particular country also do domestic investments from their savings. In Kenya, private sector mobilizes the greatest savings, (Mwega, Ngola and Mwangi, 1990).

In consideration of interest rate, they are of two types, the *nominal interest rate,* defined as the return on each shilling kept in a bank account from one period to another e.g. if the savings account pays Kshs. 2 per year, for every Kshs. 100, the nominal interest rate on the savings account is 2% and *The Real interest* rate defined as the return that is measured in terms of goods and services rather than in terms of shillings. Most interest rates in economic transactions are specified in nominal terms. Real interest rates are what determine much of macro-economic

activities and the study looked at this in the context of its operational definition as the lending interest rate adjusted for inflation as measured by the GDP deflator.

As Modigliani (1966) observed, the response of savings to changes in interest rates is not straight forward. Some empirical studies have given varied results bordering positive (Balassa, 1988), negative (Eldmendorf, 1996) and others showing no relationship (Giovanni, 1983). According to Defina (1983), while quoting Rostow (1960), Mobilization of Savings is one of the principle strategies of development necessary for any country's take off. It is required in order to generate sufficient investment to accelerate growth.

Interest rate reform, a policy under financial sector liberalization, was meant to achieve efficiency in the financial sector and enhance financial deepening. In Nigeria, financial sector reforms began with the deregulation of interest rate in 1987 (Ikhide and Alonade, 2001). Prior to this period, the financial system operated under financial regulation and interest rates were said to be repressed.

According to McKinnon (1973) and Shaw (1973), financial repression arises mostly when a country imposes ceiling on deposits and lending nominal interest rates at a lower level relative to inflation.

The resulting low or negative interest rate discourages savings mobilization and channeling of the mobilized savings through the financial system. This has a negative impact on the quantity and quality of investments and hence the economic growth. Therefore, the expectation of interest rate reform was that it would encourage domestic savings and making loanable funds available in the banking institutions. But the criticism has been that the "tunnel-like" structure of interest rate (Ojo, 1976), in Nigeria is capable of discouraging savings and retarding growth in view of the empirical link between savings, investment and economic growth.

The critical question is therefore whether real interest rate has any positive effect on economic growth. In the study of the effect of interest rate on savings, different authors have given conflicting results. In the study conducted by Fry (1978; 1980), he found out that interest rates

elasticity was significant in seven Asian countries. Mackinnon (1973) and Shaw (1973) concluded that private savings are significantly and positively related to interest rate elasticity in LDCs. Mwenga *et.al* (1990), found that the real interest rates on deposit has an insignificant impact on the real savings rate in Kenya. Giovanni (1983) estimated regressions similar to Fry's (1980), coming up with contrasting results. Using data from the 1960s and 1970s for seven Asian countries, he found no real interest rate effect on savings.

Inflation is the general rise in an economy's price level over time. Formally, an economy's rate of inflation is defined as the percentage increase in the price level from one period of time to another. Inflation is a situation where the volume of money chasing the available goods and services in an economy is too much, resulting in a persistent rise in the general price levels. Therefore, unless there is a corresponding rise in income levels, savings, which is a major source of capital accumulation of household and entrepreneurs, will seriously be depleted, (Labonte, 2011). For this reason, stakeholders and policy makers are concerned about the costs and consequences of high inflation.

Gokal and Hanif (2004) argued that inflation may also reduce a country's international competitiveness by making its exports relatively more expensive thereby decreasing the levels of exports thus impacting on the balance of payment.

Globally, inflation is one of the most fundamental macro-economic variables that cut across the economies of both the developed and developing countries of the world. Owing to its consequences, it is a concept that attracts the attention of stakeholders in an economy and regulatory authorities in particular. In order to stabilize the prices of goods and services and encourage private savings, monetary authorities usually find themselves adopting inflation targeting policies. According to the Central Bank of Nigeria annual report for 2010 [CBNAR] 2010), the consumer prices rose generally for food and oil. In the emerging market economies and developing countries, inflation rose by 1% to 6.2% relative to the rates in 2009.

There is also a consensus in theory that moderate inflation could reasonably impact positively on an economy generally. Oruba, (2009) argued that moderate inflation can increase the level of

investment leading to faster growth in the economy. This is because inflation, moderate or not, tends to lower the value of returns on monetary assets, particularly the cash assets and this explains the preference of investors shifting their investments to real capital projects rather than holding their assets in cash susceptible to inflation.

The levels of income and wealth also affect savings. According to Keynes (1936), the per capita income is hypothesized to have a positive effect on the savings rate because richer people can afford the luxury of savings to assure their future consumption. The poor people are more likely to be at their biological or social minimum level of consumption. This does not mean zero savings by the poor in all the years. They will attempt to cushion themselves against fluctuations in current income. They will have relatively smaller cushions and will more frequently find themselves with zero wealth and no opportunity to borrow in order to sustain consumption when income is low (Deaton, 1989). All the empirical studies mentioned earlier find a strong positive effect of the current income level on the savings rate. Temporary fluctuations in income should also primarily affect savings.

1.2 Statement of the Problem

One of the growth objectives underpinning the Vision 2030 require that the rate of growth of the economy (GDP) rise from 6.1% achieved in 2006 to 10% by 2012/13 and sustain that growth up to the year 2030. Such a growth will lift Kenya as a country, from the low-income category to the middle-income category. To achieve these growth targets, continued implementation of prudent fiscal, monetary and exchange rate policies are necessary. These policies include: maintaining the levels of Inflation and Current Account Deficit to less than 5% of GDP; raising level of investments from 20% of GDP to 31.3% of GDP and that of savings from 15.6% to 30% of the GDP. Such continued low savings (15.6% of GDP) has been a great concern to the macroeconomic policy makers as it affects the overall economic growth, (GoK, 2007). However, this target was and is still very ambitious and if achieved, Kenya will be the 7th county in Africa to have attained the said target after Algerian (53.23%), Equatorial Guinea (43.15%), Gabon (37.69%), Botswana (37.63%) and Lesotho (34.85%).

In setting this gross savings target to equal to 30% of GDP, there was no clear-cut policy guidelines put in place to address the determinants of savings and how they would relate to

savings in Kenya. In the absence of a clear knowledge as to the factor that promote/ retard savings, it would not be possible to recommend policy guidelines to achieve the desired level of savings growth. The study therefore singled out real interest rates, income and inflation and looked at their effect on savings in Kenya while holding current account balances, annual GDP growth, money supply, capital formation as the control variables.

1.3 Objectives of the study

The broad objective of this study was to investigate The Effect of Real Interest Rate, Income and Inflation on the Aggregate Savings in Kenya.

Specific objectives were:-

i. To determine the effect of Real Interest Rates on Aggregate Savings in Kenya.
ii. To assess the effect of income on Aggregate Savings in Kenya.
iii. To analyze the effect of inflation on Aggregate Savings in Kenya.

1.4 Hypotheses

$H_0 : \beta_7 > 0$, Real interest rate has a positive effect on the aggregate savings in Kenya.
$H_1 : \beta_7 < 0$, real interest rate has a negative effect on the aggregate savings in Kenya.
Where β_7 = the probability of the coefficient of interest rate.

$H_0 : \beta_4 > 0$, Income has a positive effect on aggregate savings levels in Kenya.
$H_1 : \beta_4 < 0$, income has a negative effect on aggregate savings levels in Kenya.
Where β_4 = the coefficient of income.

$H_0 : \beta_5 > 0$, Inflation has appositive effect on the aggregate savings levels in Kenya.
$H_1 : \beta_5 = 0$, Inflation has a negative effect on the aggregate savings levels in Kenya.
Where β_5 = the coefficient of inflation.

1.5 Scope of the Study

The study limited itself to Kenya's savings scenario and other cases within the rest of the world were only used as reference points and used secondary data from the World Bank, however, other information from the central bank of Kenya and other government of Kenya sources were only used as references. The study confined itself to real interest rate, inflation and income and their relationship on savings while taking cognizance of other variables like Current Account Balances, Annual GDP growth, Money Supply, and Investments as control variables. The study

period was from 1981 up to 2012. This period was chosen because of the Structural Adjustment Programmes (SAPs) initiated by the World Bank and IMF at that time.

1.6 Significance of the study

The study on savings was essential since as a country, Kenya is considered by the neighboring East African countries like Uganda, Tanzania, Rwanda and Burundi as the main economic hub yet it is still in the league of the developing nations. Before independence in 1963, her GDP was at USD 1.2 billion, the same as that of Sri Lanka at that time (World Bank, 2013) but 50 years down the line, no mean achievement in terms of growth and development has been realized. According to the World Bank economic indicators, (world bank 2013), in the years 1973, 1983, 1993 and 2003, the Sri Lanka's GDP was USD 2.9 billion, 5.2 billion, 10.3 billion and 18.9 billion respectively while that for Kenya was 2.5 billion, 6 billion, 5.8 billion and 14.9 billion in the respective years. As can be noted, Sri Lanka almost doubled the Kenya's GDP in 1993. According to Lakshman and Tisdel (2000), this was because of the development policy of the period that continued to rely heavily on public investments. The monetary policies of the period led to a substantial increase in interest rates and a corresponding expansion of fixed deposits and other financial savings, thus widening the base for government's domestic borrowing. It is therefore believed that should Kenya be able to position herself properly in terms of savings, she then can be able to regain her development track.

With perpetual fluctuation in the level of interest rates, inflation and income levels in Kenya over the last 30 years (see appendix 2), it was not clear what changes in these variables would have upon the levels of aggregate savings. The study therefore attempted to provide an insight on what dynamics these variations in the independent variables would have upon the aggregate savings. It has also provided recommendation that may help inform policy decisions on savings and provide academic institution with rich economic solutions regarding the effect of real interest rate, inflation and income on savings.

1.7 Conceptual Framework

This conceptual framework was based on Singhal (2008). He postulated a relationship between savings and the changes in GDP and rates of interest in India and by modifying this, the framework in Figure 1.1 was constructed. This took into account the three economic variables

(namely real interest rates, inflation and income) that were arrived at based on the different literatures analyzed. Money and quasi money, current account balances, capital formation and annual GDP growth rate were used as control variables in this study. The interaction between the variables was diagrammatically represented as below:-

Independent variables

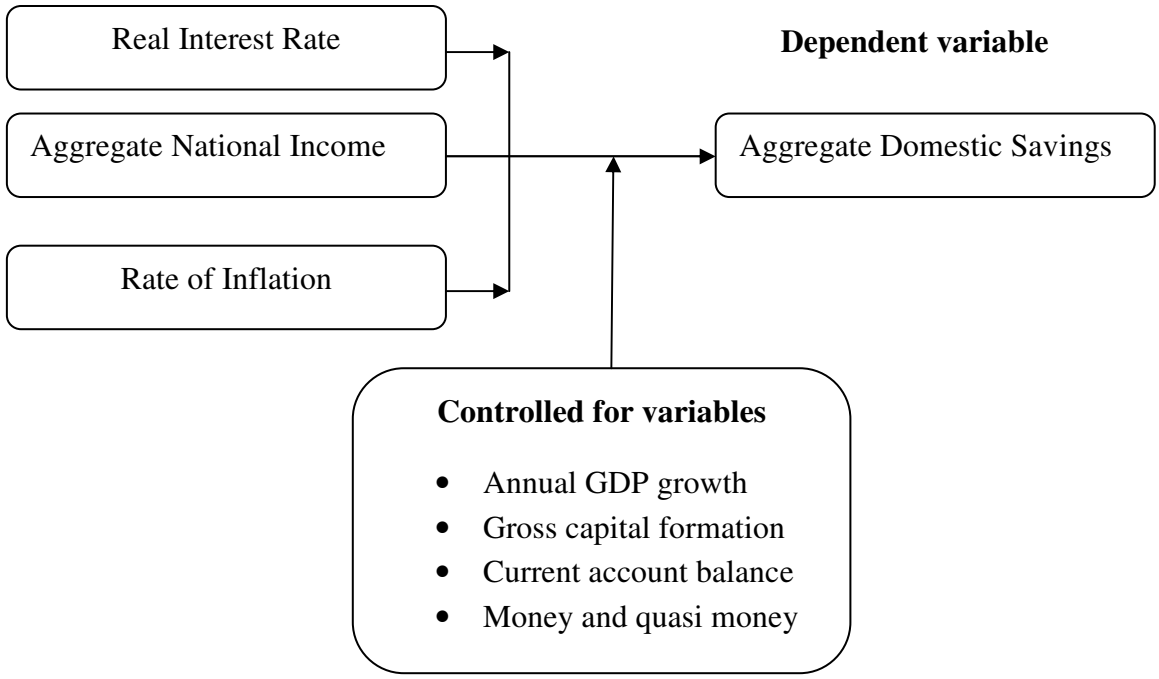

Fig 1.1: Conceptual Framework: Real Interest Rates, Income and Inflation on savings. Source: Modified from Singhal (2008).

From this diagram, the direct relationship between real interest rate, aggregate national income, and inflation rate envisaged. Because savings is affected by many other variables (Modigliani, 1966), annual GDP growth, gross capital formation, current account balance and money and quasi money were used as control variables in the process of the interaction between the dependent and the independent variables. The essence of having control variables was geared towards ensuring the non existence of spurious result (Wooldridge, 2012). They were therefore injected into the frame work in order to improving the estimates between inflation, real interest rates, income and savings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter looked at the literature review based on the theoretical framework of Modigliani's Life Cycle Hypothesis and Friedman's Permanent Income Hypothesis. According to Mugenda and Mugenda (2003), the purpose of literature review is to minimize the chances of duplicating study efforts, show how the study enlarges or complement the existing body of knowledge, assess and evaluate the importance and significance of the present studies in order to shape and give direction to proposed research, identify gaps that others did not cover and to familiarize the researcher with prior methodological procedures in order to choose the best that promises to yield better results.

The literature review was undertaken for the purpose of equipping the researcher with what has been done on the subject of the relationships that exist between the dependent variable –savings- and the independent variable- real interest rates, inflation, current account balances, annual GDP growth, incomes, money supply and capital formation in Kenya.

The research looked at the studies already done in Kenya as well as other countries around the world- developed and developing. These studies gave useful information on the parameters of study but the effect of real interest rate, income and inflation on savings in Kenya was overemphasized given the importance accorded to them as a macroeconomic policy instruments.

2.2 Theoretical Framework

2.2.1 Life Cycle Hypothesis

This was developed by Franco Modigliani and Richard Brumberg in the early 1950s.This theory states that in a rational society, savings decisions should be based on some kind of optimizing behavior by which the levels of consumptions and savings are chosen so as to equalize the marginal benefits of alternative uses of income.

The model assumes that the amount allocated to consumption exhausts resources, there being no planned bequests but even in the absence of bequest, the model still accounts for a very substantial aggregate stock of wealth. Again, it assumes that the ability to earn (earning power), tends to decline before the termination of life.

Under these assumptions, a household must save in the earlier part of their life in order to accumulate wealth which will eventually be used to support consumption through dissaving in the later part of their life. In order to establish the implications of the life cycle model and the above assumptions, both as to the stability of the wealth – income and savings – income ratios, it is convenient to start out by considering "a stationary economy" in which both population and productivity are constant over time.

The basic proposition of the theory is that consumption expenditure is financed out of the lifetime income and accumulated wealth of self and begins at the point when one starts to earn a living (starts to work). Before then, an individual is a net dependant on others.

Given a reasonable guess about a typical length of earning life and retire life (say 40 years and 10 years respectively) and combining this guess with the simplest possible life pattern of earning and consumption- a constant rate of earning up to retirement, a constant rate of consumption through life, and a zero rate of return on net worth, one finds a stationary economy. At the same time, under these conditions, the aggregate rate of savings would be zero as the positive savings of the younger households, in their accumulative phase, would precisely offset by the dissaving of the retired households drawing down their earlier accumulation; thus wealth will remain constant in the aggregate as shown in the graph below.

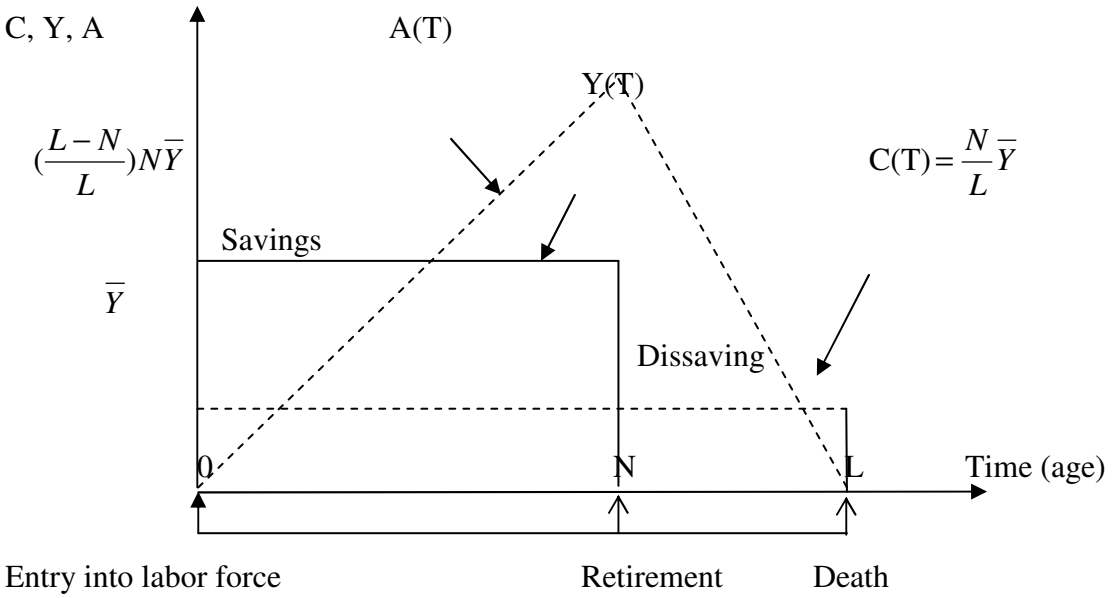

Fig. 2.1: Life Cycle Hypothesis
Source: Modigliani, (1966): Income, consumption, savings and wealth as a function of age.

Where; C is the consumption

A is the per capita net worth

Y is the income

From figure 2.1 above, mortality rate is assumed to be zero up to age L and 1 at age L (death). The solid curve Y (T) shows the per capita income from labour as a function of age which is assumed to be constant at the rate $\overline{Y}$ up to age N and zero over the rest of the life.

The dashed line C (T) $= (\frac{N}{L})\overline{Y}$, shows the rate of per capita consumption which is assumed to be constant throughout life; since life must exhaust income, the constant rate must be $(\frac{N}{L})\overline{Y}$.

The distance between line Y (T) and C (T) is the per capita savings. The dotted line A (T) shows per capita net worth, cumulated savings as a function of age. It starts at zero, rises linearly to a peak at the age of retirement, N, and then falls linearly back to zero at the age of L. In addition to showing the life history, the graph can also be interpreted as representing average income, consumption and net worth of the various age cohorts present at any given date *t*.

The area under Y (T) curve, under mortality assumption stated above implies the stationarity assumption that each age cohort (group) has the same size at age zero. The area under N ($\overline{Y}$) also represents aggregate income in the year *t*. The sum of the savings and dissavings is zero if bequests are neither made nor received. The area under A (T) is the aggregate net worth.

This theory, although looked at the savings of an individual, the study chose it because of its bearing upon the reality of life. Since the government is a legal entity and is made up of an accumulation of individual citizenry, the performance of an individual, with regards to their savings behavior, can be used to generalize how the government and, by extension, the entire economy may behave.

With reference to the study objectives, the hypothesis posits that consumption is one element that is influenced by the levels of interest rates, inflation and income, sometimes not directly. As income increases, consumption also increases in a direct manner though not at the same rate but as the levels of inflation increases, the real value of the disposable income reduces thereby reducing the consumption. Regarding the interest rate, the cost of borrowing becomes so high thereby discouraging people from borrowing and saving. People who already have loans will have less disposable income because they spend more on interest payments. Therefore other areas of consumption will fall (Modigliani, 1966).

The theory was however criticised since it assumes people will have an infinite life is reasonable, as people do not know when they die and usually want to leave as much wealth as they have left when they do die as bequest, again, it has been noted that top 20% give relatively much more of their wealth away as bequests and thus save more in order to do that. When income distribution gets more unequal there will be less consumption.

2.2.2 Permanent Income Hypothesis

This hypothesis was developed by Milton Friedman in 1957. The central idea behind this hypothesis is that people base consumption on what they consider their “normal” income. This income is determined by a consumer's assets; both physical (shares, bonds, property) and human (education and experience). These assets influence the consumer's ability to earn income and from these, the consumer can then make estimation of anticipated lifetime income and in doing

this, they attempt to maintain a fairly constant standard of living even though their incomes may vary considerably from month to month or year to year. As a result, increases or decreases in income that people see as temporary have little effect on their consumption spending. As in LCH, people smooth out fluctuations in income so that they save during periods of high income and dissave during periods of low income. The theory assumes that on average, people would base their idea of normal permanent income on what had happened over the past several years. Thus, if they computed permanent income, it would be an average of the previous incomes.

The permanent income hypothesis (PIH) introduces lags into the consumption function and suggests that an increase in income should not immediately increase consumption spending by very much, but with time, it should have a greater effect. The element of lags in the PIH was the reason why the study looked into it since people react very differently to variables like the real interest rates, inflation and the levels of income. An individual's past income greatly influences his current consumption levels.

2.3 Empirical literature review

2.3.1 Effect of Real Interest Rate on Savings

Interest rates affect savings through the interaction between income and substitution effect. If the substitution effect of higher interest rate is greater than the income effect, savings will increase. If the income effect is greater than the substitution effect, then savings will reduce. In conclusion, the theory of consumer choice says that an increase in interest rate could neither encourage nor discourage savings (Gans, King & Libich, 2014).

While reviewing the available evidence on the effects of interest rates on savings in developing counties, Balassa (1988) concluded that there is positive effect of interest rates on savings. However, he acknowledged that the result were not conclusive as there were considerable errors in the estimation of domestic investment and foreign savings. He also did not have data on personal savings and as a result, he included business and government savings which did not respond to interest rates. Given the error possibilities of the times series data, Balassa combined cross section and time series observations together in the analysis of interest rate.

In order to better understand the relationship, it is important to know that there are two types of interest rates that affect the choice to save money: The *nominal* interest rate and *the real interest rate* offered by the central bank. In the study of UK, Madigan and Nelson (2002) said that Federal Reserve lowers the nominal interest rate to encourage commercial banks to loan money, thereby stimulating the economy. When interest rates are low, spending money is more appealing than saving it. The interest rate offered by the bank also affects consumers i.e. when the bank promises consumers a high interest rate, the amount deposited in savings yields a greater return.

Higher interest rates also make it more attractive to save money in the UK, as opposed to other countries. Therefore, higher rates will cause 'hot money flows' and may cause the value of the £ to rise. (Pettinger, 2013).

In India, (Loayza & Shankar, 2000) studied the evolution of the private saving rate in India during 1960-95. Their study was based on the World Bank savings data base. The reasons for studying private saving in India was because India's saving performance surpassed that of other developing countries with comparable per capita income but given the Indian government's ambitious growth targets, and the need in the present global environment to generate investable resources by and large internally, the design of policies aimed at enhancing saving acquired great significance. With this in mind they assessed the extent to which an increase in public saving is offset by a reduction in private saving (effectively testing for Ricardian equivalence) hence investigated whether an increase in rates of return in financial markets (rates of interest) lead to a rise in private saving rates. They concluded that the real interest rate is positively associated with private saving rates once these are adjusted for inflation-related capital losses and augmented to include consumer durables, (coefficients =0.24, t= 5.9). In this study, focus will be on the aggregate savings of all the sectors in the economy as opposed to the private savings of individuals.

According to Obamuyi (2009), investigated the relationship between interest rates and economic growth in Nigeria, using time series analysis and annual data from 1970 - 2006. The co-integration and error correction model were used to capture both the long-run and short-run

dynamics of the variables in the model. He concluded that there is a long run relationship between interest rate and economic growth. His trend analysis of interest rate policy discussion was done along pre- reform (1970- 1986) and post reform (1987- 2006) periods. In order to compare the structures of interest rate between the sub periods, he combined deposit rate, lending rate and minimum re discount rate to see how the correlation among these three variables change as the interest rates reform sets in. The pre – reform (1970-1986) was considered as the period of financial repression and was characterized by a highly regulated monetary policy environment in which direct deposits, interest rate ceiling and restrictive monetary expansion were the rule rather than the exception. In his analysis, The results of the Augmented Dickey-Fuller (ADF) unit root test showed that only the GDP and inflation variables were stationary at levels, while the other variables(real lending interest rate, real deposit interest rate, financial deepening, ratio of gross domestic savings to GDP and a dummy variable) were stationary at first difference(integrated of order one). However, what was not known was whether these variables were differenced once to make them all integrate at the same order.

For the reform period, (Soyibo & Olayiwola, 2000) said that deposits and lending rates were allowed to be determined by the market forces. As a result, interest rates reform in Nigeria, the nominal deposits and lending rates rose from 9.5% and 12% in 1986 to 14% and 19.2% in 1987. By 1990, the deposit and lending rates had risen to 18.8% and 27.7% respectively. The government intervened in 1991 and pegged the deposit and lending rates at 14% and 21% respectively. Unfortunately, between 1997 and 2006, the lending rate did not show a significant trend in reduction, with an average of 22%, despite the declining deposit rate, averaging 5%. He concluded that the implication of this "tunnel- like" structure of interest rate and the low deposit rate are that savings will likely be discouraged and this will negatively affect funds mobilization by the banks. This will in turn affect the amount of funds available for investment which eventually will retard the economic growth.

According to Defina (1983) savings is crucial to any growing economy because it makes resources available for the product ion of physical capital and for the research and development needed to fuel economic growth and enhance our standard of living. In order to understand what influences savings, economists developed behavioral models of the "typical" individual.

Although these models generally focus on spending behavior, savings behavior is described simultaneously. The reason is that once a person's spending is determined, his savings can be calculated simply as his unspent income and this reflects that spending and savings are opposite side of income. He pointed out that people generally have some idea of what their earnings will be during future periods of their life. In measuring human wealth, individuals try to judge how much their future streams of earnings is worth today. A crucial element in this determination is the level of interest rates. The lower the interest rate, the greater the lump sum payment that is required to march the future earnings stream i.e. the human wealth and interest rates are inversely related.

The changes in the level of interest rates affect personal savings differently. According to Eldmendorf (1996), a reduction in the budget deficit would probably cause interest rates to decline. If personal savings declined as a result, the overall increase in the national savings would be less than the reduction in the budget deficit. Alternatively, Contractionary monetary policy generally causes interest rates to rise. If personal savings increases as a result, the corresponding fall in consumer spending helps to slow economy. He pointed out that economists' understanding of the response of savings to changes in interest rates is quite limited, despite the large volume of research on the topic.

According to Desroches and Francis (2007), the world real interest rate has been affected by a number of key variables that change relatively slowly over time. These variables include labour force growth, which affects investment demand, and the age structure of the world economy, which affects savings.

Different models of consumer behavior imply different magnitudes for the interest elasticity of savings and even the signs. Each model describes the behavior of some people and it is not clear which model best characterizes the behavior of the average saver with any confidence. Despite the uncertainty, the models that likely describe the behavior of the people who account for most of aggregate savings imply positive interest elasticity. He concludes that the short run interest elasticity of savings is probably positive.

According to the Kenya banker (2013), Central Bank of Kenya (CBK) always lowers its bench mark lending rate, to give more hopes that lenders (commercial banks) will follow suit although they are always reluctant and offer credit to their customers at a reduced rate. Many lenders even up to date have not lowered their lending rates and are still lending at exorbitant rates thus fleecing Kenyans. On the 10th Jan 2013 Monetary Policy Committee (MPC) cut the Central Bank Rate (CBR) from 11% to 9.5%, to tame inflation which declined from 3.25% in November to 3.20% in December, 2012 and the same time tame the exchange rate of the Kenyan shilling.

Accordingly, every economy is influenced / driven by interest rates forces; when these rates are high people tend to avoid taking credit facilities from lenders as it is tough to pay back. In Kenya, if the rates have gone down, the opposite will be true. Lower rates in any economy are very beneficial to citizens of that subject economy. As interest rates go down Kenyans are more likely to take loans in order to make purchases for things like houses, cars etc. Kenyan in business class too may also perceive that less risk is involved in taking these loans and invest as they will have to pay less to the bank.

When people do not have to spend as much money on bank payments, they have more disposable income to put toward things they want to purchase. These effects, although certainly not direct, are enough to stimulate the market when interest rates are low; on the other hand low-interest rates are very beneficial to lenders who see less of a return on their loans than when the interest rates are high. This to banks means that they may find themselves in a situation whereby they will have to lower interest rates accrued on deposits too in order to maintain stability in profitability. However, Interest rates do not have a major effect on how much people save as an increase in disposable income means that Kenyans will more likely be able to spend than save.

2.3.2 Extent to which Income affects Savings

Carroll and Weil (1994), in the study of 38 fast-growing East Asian countries and using granger causality test, pointed out that as income increases, the amounts saved also tends to go up but pointed out that as income increases, savings also increases subsequently assuming that expenses decreases or remain constant. He chose these countries because of their availability of data. By using the co -integration approach, Loayza and Shankar (2000), confirmed that savings are positively related to the per capita income in India.

According to Goda, Manchester and Sojouner (2013), conducted an experiment and tested the effect of retirement income projections on savings decisions of 17,000 University of Minnesota employees in USA, the results showed that the "income treatment" had statistical significant effect on the likelihood that workers would change their contribution as the level of their incomes changes. However, this study used primary data. As stated above, savings and incomes have a strong positive relationship and Rostow (1970) found that developing countries needed higher savings rates to grow faster and justifies the importance of savings for economic growth.

According to Malinen (2011), in the study of Canada, Finland, France, the Netherlands, Norway, Sweden, Switzerland, United Kingdom and the United States, he mentioned that the effect of income inequality on savings remains an open empirical question. This is because empirical cross- country studies have produced controversial results on the effect of income inequalities on savings. However, in his study, he used the possible cointegration between included variables (Gross national savings and total expenditure of private consumption , the GDP per capita and the interest rate) using the panel trace cointegration test. The databases came from AMECO, IMF, and the World Bank.

In one of the most recent panel econometric studies, (Leigh & Posso, 2009) using an empirical evidence on the relationship between top-end inequality and the savings rate, as our measure of inequality top incomes data for 11 developed nations: Australia, Canada, France, Germany, Ireland, the Netherlands, Spain, Sweden, Switzerland, the U.K., and the U.S, estimated the effect of the income share of the top 1% of the percentage value of gross savings of the GDP and found no statistically significant effect of income inequality on national savings. This study incorporated all the incomes of all the individual residence of Kenya. Again, the countries that he performed the study have very little resemblance to Kenya, economically.

Schmidt- Hebbel and Serven (2000), in the study empirical evidence from macro data on the links between the distribution of personal income and aggregate saving, controlling for relevant saving determinants, using the annual cross-country time-series data for the 1965–1994 period from the World Bank macroeconomic and social databases, found no statistically significant effect on the percentage value of savings of the GDP using several different measures of income

inequality. The results were concluded using Gini coefficient and instead of using the gross domestic savings and gross domestic product, (Schmidt- Hebbel & Serven 2000) used gross national savings and gross national product. However, Smith (2001), found a statistically robust positive effect on the percentage value of savings of the GDP.

Nwachukwu and Odigie (2011) examined the determinants of private saving in Nigeria during the period 1970-2007 using the ECM procedure. The results of the analysis show that the saving rate rises with both the growth rate of disposable income and the real interest rate on bank deposits. However, the use of ECM validates the existence of a long run relationship through the significance of the error term. The coefficients of the variables contained in the ECM represent the short run relationship. To this end, the probabilities of the coefficients may be significant while others may not as a result, ECM may not be the correct model to show which variables are may clearly determine any given dependent variable.

Chaturvedi, Kumar and Dholakia (2009) in the study based on the developing countries pursuing the policies to achieve rapid growth from the south-east and south Asia region(Bangladesh, China, Hong Kong, India, Korea, Malaysia, Maldives, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, and Thailand), found that at higher growth rate of income, the saving rate is higher. Their study period spanned 15 years from 1989 to 2003 and The figures for per capita real GDP and its growth were taken from Penn World Tables, while all the other data, excluding dependency ratio and adult literacy rate, were taken from the Asian Development Bank. In this study, all the figures for real interest rate, savings, income and inflation were all from the World Bank which covered a period of 32 years from 1980 to 1912. The use of data from different sources has a potential to mislead because of the different base lines that the various countries use. The period they chose (15 years) also had potential of giving biased results in time series data. Their R – square results were 0.9708.

According to Ireri(2011), in a survey conducted by Ipsos synovate on a sample of 2000 adults countrywide showed that only half of Kenyans put money aside as savings. The study observed that Kenya will not attain its ambitious growth targets going forward if its people do not live within their means and save regularly.

The effect of change in non- human wealth or net worth of savings is relatively straight forward. Both theoretically and empirically, it has been shown that increases in net worth should be expected to depress current savings, though the magnitude of the effect would depend on the reason for the change in net worth. Finally, most economists believe that uncertainty of labor or non- labor income acts as a stimulant to savings.

2.3.3 Extent to which Rates of Inflation affects Savings

Inflation is defined as the continuous and sustainable rise in general price level of goods and services in a nation's economy. It could plausibly affect the overall propensity to save through changes in the real national income, the real value of non- human wealth, real return on assets and the distribution of wealth. From theoretical literatures, it is a generally accepted phenomenon that high inflation in an economy has dire consequences and particular on the stability of process of goods and services. Unless there is a corresponding rise in income level, savings, a major source of capital formation of households and entrepreneurs, will be seriously depleted. Orubu (2009) argued that moderate inflation can increase the level of investments leading to a faster overall growth in the economy.

According to Igbatayo and Agbada (2012), in their investigation of the relationship between Inflation, Savings and Output in Nigeria, employing Vector Autoregression (VAR) approach, in their analysis, they expressed the variables in percentages but used Total private Savings as the basic source of capital accumulation for investments and economic activities. The data used were secondary data sourced from the official publications and reports of the Central Bank of Nigeria [CBN] 2007 and 2010 Statistical Bulletin and 2010 Annual report. The data are annual data covering the period 1970 to 2010 for all variables used for the empirical estimation. Their OLS estimation was quite impressive. The coefficient of determination is high at 0.905. This indicates that over 90 percent of the variations in output for the estimation period were captured by the explanatory variables. The model also had high overall significance with an F-statistic value of 152.3 while their DW stood at 0.52. From their conclusion, they said that inflation is one of the most fundamental macroeconomic variables that transcend the economies of both the developed and developing countries of the world. Owing to its consequences, it is a concept that attracts the attention of stakeholders in an economy and regulatory authorities in particular. In their study,

they concluded that inflation may not have stimulated nor sufficiently responded to output growth or savings in Nigeria over the period of analysis.

According to fiscal strategic paper 2010-2012, Federal Government of Nigeria [GoN] 2012), it highlights the high dependence of Nigeria on oil revenue means that volatility in the international price of oil has the potential, if it is not mitigated by fiscal policy, to be translated into volatile Government expenditure. The volatility of expenditure in Nigeria prior to 2004 contributed to an unstable macroeconomic environment; with high inflation and interest rates leading to weak private sector growth, unemployment and low per-capita GDP growth. This had a devastating impact on the living standards of the majority of the population who suffered due to price fluctuation. The general conclusion was that the benchmark price should be set below the long term trend price for oil to ensure that long term savings accrue to the Excess Crude Account (ECA). These savings protect the budget against negative oil price shocks, allow additional infrastructure spending and may in the future be invested through a sovereign wealth fund.

Mundell, (1963) was one of the first to articulate a mechanism relating inflation and output growth separate from the excess demand for commodities. His model suggests that an increase in inflation or inflation expectations immediately reduces people's wealth. This works on the premise that the rate of return on individual's real money balances falls. To accumulate the desired wealth, people save more by switching to assets, increasing their price, thus driving down the real interest rate. Greater savings means greater capital accumulation and faster output growth.

It has been observed that high rates of inflation tend to be associated with high rates of personal savings. Davidson and McKinnon (1982) in their study of Canada and USA using quarterly time series data concluded that the relationship between inflation and the savings rate is largely a statistical mirage. This is because in times of inflation, measured income and measured savings, even when deflated by the appropriate price index, tends to over-estimate the real income and real savings, as perceived by the consumers. Income, as measured in the national accounts, includes the interest payments on financial assets. The higher the rate of inflation, the higher is the fraction of these payments which is not really income at all; but simply an inflation premium and hence cannot be used to finance consumption if asset holders wish to maintain the real value

of their wealth. Thus measured savings, which is the difference between income and consumption, will tend to rise with the rate of inflation, Siegel (1979) and Jump (1980). In this study, annual time series data was used.

According to Deaton (1989), no consumer is ever aware at any time of the prices which prevail for all goods and services that he or she sometimes purchases and since consumer price indices are always published after a delay and not relevant to the individual consumer anyway, it is possible to mistake an increase in the general price level for an increase in some relative prices. Such a mistake will cause consumers to respond to what they perceive to be increased relative prices by purchasing less off everything, intending to purchase more of substitute commodities at a later date. Thus unanticipated inflation will result in involuntary savings.

Heer and Suessmuth (2006) found that inflation did not unanimously decrease savings significantly in the US during the post war period. This result is puzzling as it contradicts the implications of most monetary general equilibrium models. Denhaan (1990), considered a shopping – time model where inflation distorted the allocation of time on shopping, leisure and labor. For higher inflation, the opportunity costs of money increases and the agents reallocates more time in shopping activities. As a consequence, savings decreases.

Fama, (1981) contends that a more plausible argument might be that high inflation facilitates the transfer of resources from the private sector which has a higher propensity to save to the government sector because inflation makes it easy for government to increase effective tax rate and thus served to depress overall savings/income ratio. Wachtel, (1977), found that uncertainty generated by inflation helped to explain the persistent rise in savings with price level increases. He said that inflation uncertainty yields a long run response of savings to inflation uncertainty that is positive but statistically insignificant.

2.4 The control for variables

Human behavior is usually too complicated to be studied with only two variables. Often it is important to consider sets of three or more variables (called **multivariate analysis**). Three or more variables are used when a study wants to discovered a relationship between two variables

and want to find out:- if the relationship might be due to some other factors, how or why these variables are related, or if the relationship is the same for different types of individuals. In each situation, a third variable to be considered is identified. This third variable is called the **control** or the **test variable**. It is possible to use several control variables simultaneously. The control variables are often chosen to guide the system in a desired direction (Kendrick, 2002).

By definition, control variable is kept constant through the study, hence can't be used in regression. As such the variables that were used in the study were statistically *controlled for*. Regression or ANOVA are run with such variables not only to wash their effect off predictor variables but mainly to check whether their own effect is significant. If it is significant then their inclusion in the model is fully warranted. If not, they might better be excluded from the model. If they are left in the model despite insignificance, the study risks to miss the effect of predictor variables due to decrease in Error term and *df*, - blocking factor decreases both Error and its *df*, and there appears a competitive situation. Significance of predictors may go down or up depending on "what wins" - fall of Error sum-of-squares or a fall of its *df*.

Based on the empirical literature, the variables that the study picked were the annual GDP growth rate, the current account balance, the capital formation (investments) and the money and quasi money (money supply).

2.4.1 Annual Growth Rate

Only a growing economy requires positive net savings to maintain a constant or increasing capital- labor ratio and it is only in a growing economy will utility – maximizing household behavior generate net savings, Modigliani (1966). Steady – state growth may be extensive (i.e. based on a proportional expansion of labor force and the capital stock) or intensive (i.e. based on labor – augmenting technical progress and increasing capital intensity) or a combination of the two. The implications of the different types of growth for the aggregate savings ratio may be quite different, depending on how individual households may want to borrow initially to transfer consumptions from the relatively prosperous future to the relatively poor present.

Jappelli and Pagano (1994), in order to analyze the relationship between savings and economic growth, they used the ordinary least square method (OLS). Their research proved that the higher

the domestic savings rate (share of domestic savings in GDP), the higher the economic growth rate.

Carrol and Weil (1994), basing on the data of five years average rates of economic growth in OECD member states and using Granger causality test, came to the conclusion that the rate of economic growth was the cause of savings in Granger sense.

Mohan, (2006), using the granger causality test, analyzed the relationship between economic growth and savings in four groups of countries with various levels of economic development in the 1960-2001 period. The results of this research turned out to be ambiguous and revealed that in 13 of the analyzed countries economic growth was the cause of economic growth, were obtained in two countries. Also in other two countries, no causal relationship between savings and economic growth was observed.

According to Misztal, (2010), the correlation coefficient between the GDP dynamics and savings rate in advanced economies proves the existence of essential and positive linear relation between these variables. On the other hand, the correlation coefficient between the GDP dynamics and savings rate in developing countries and emerging markets in the 1980-2010 period points at the existence of quite high positive linear relation between domestic savings and economic growth.

2.4.2 Current Account Balance

This is the difference between domestic savings and domestic investments.

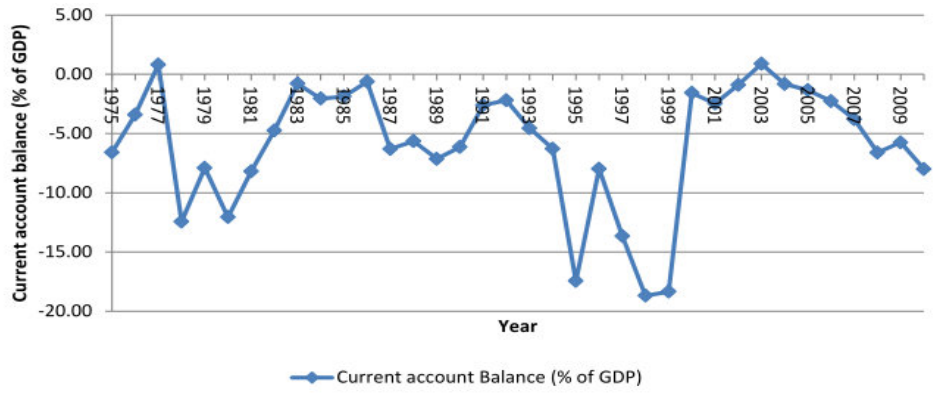

Fig. 2.2: Current Account Balance as a % of GDP
Source: World Bank (2011), International Financial Statistics

The Figure 2.2 above shows Kenya's current account balance between 1975 and 2010. It shows that Kenya faced perennial deficits that have also stayed below the threshold that economists would consider sustainable. Going by Summer (1996), the threshold of CAB as a percentage of GDP should be 5%, and anything below this raises doubt over the country's CAB sustainability. The first highest deficit occurred in 1979 and was caused by a severe drought combined with an oil shock which brought down the current account balance. In 1982, the country migrated from the fixed exchange rate regime to a crawling peg, which could have caused the spike in the deficit again. Aid inflows more than doubled during the 1980s (from 6 to 13% of GNI) and this could have contributed to the relative health of the current account during this period. There was a decline in the CAB starting 1995 attributable to the stoppage of aid by the IMF and World Bank and the subsequent loss of confidence by investors. This increased the current account deficit to 17.45% of GDP. In 1996, the World Bank and IMF approved a loan to Kenya, which was later withheld in 1997 leading to a deterioration of the CAB. This demonstrates how vulnerable Kenya's balance of payment account had become to foreign borrowing. In 1998, the current account deficit was 18.7% of GDP, which has been so far the CAB's worst performance. This was attributed to the withholding of aid and subsequent drought which affected the country.

Resumption of aid in 2000 improved the CAB, which continued building up towards a surplus in 2003. After this surplus, the account has continued to plummet to hit 8% of the GDP in the year

2010. Only two surpluses have been recorded in Kenya. One in 1977 which was attributed to the coffee boom and the other in 2003 which was attributed to decline in imports as receipts from exports increased. Much of this increase was attributed to exports of tea, horticulture and non-traditional commodities, particularly manufactured goods and raw materials. Kenya has not only operated with deficits exceeding 5% for most of the years in her history, but the current account deficits have also exhibited some volatility.

According to the World Bank (2012), Kenya is walking a tight rope with deficits at 13.7% of GDP and with imports growing by 20% compared to export growth at 10%.
Kenya's current account has been in deficit for many years but the economy has recorded a surplus only twice in the period 1975-2012 in the years 1977 and in 2003.

The primary indicator of a looming macroeconomic crisis is the current account deficit in the form of large actual or projected current account deficits, or for countries that have to make heavy debt repayments, insufficiently large surpluses. If a shock occurs to affect any of the current account deficit, short - term capital flows, and economic growth variables in a country with an emerging market, then other emerging markets will also be affected, (Akbas, Lebe & Oluyol, 2014).

According to Baharumshah, Lau and Fountas (2004), a sustainable current account represents a stable state in which the deficit generates no forces of its own to change its course. This means that large and persistent current account deficits tend to pose more difficult problems in the economy necessitating a policy response. Specifically, they tend to increase domestic relative to foreign interest rates, while simultaneously imposing an excessive burden on future generations as the accumulation of larger debt would imply increasing interest payments, and thus a lower standard of living. In the end, deficits provide a signal of macroeconomic imbalance, calling for devaluation and/or tighter macroeconomic policies.

Zhu, (2011), in his analysis on how China's family planning policy affects the demographic structure and the dependency ratios while employing the Cointegration Test and Granger Causality Test to examine the relationship between Chinese population dependency ratios and the national savings rate, as well as the relationship between relative productivity differences and

the national current account balance, concluded that there is a positive relationship between savings and the current account balances. High savings rate makes current account surplus possible.

According to Gichuki and Moyi (2013), attaining external balance is one of the most important macro-economic objectives of a nation. The health of a country's external balance is indicated by, among other variables, the current account.

2.4.3 Capital Formation (Investments)

Modigliani (1966) defined the investments as the expenditures made during the respective period of time for the purposes other than the procurement of consumption goods. This is the process of channeling loanable funds from savers to borrowers. The efficiency and the institutional characteristics of financial markets where this intermediation takes place are likely to influence the type and the volume of assets savers opt to hold when foregoing present consumption.

Chakrabati, (2006) found a significant and robust positive association between the ratio of gross domestic investment to gross domestic product (GDP) and the ratio of gross domestic savings to GDP. In addition, he found a significant lower saving – investment association for non-organization for economic co-operation and development (OECD) countries relative to OECD countries.

2.4.4 Money and Quasi money

These consist of money market funds, time deposits and saving deposits. According to Akhtar (2011) while conducting the loose monetary policy, in the short run, the federal bank increases money supply by purchasing treasurer bill and bonds to the market. This increase in money supply decreases the federal funds rate and consequently lowers the short run interest rate. Since the price of borrowing declines, more consumers and businesses are willing to borrow money from commercial banks and it will result in an increase in investment, GDP and employment. As investment and employment increases the savings level also increases.

2.5 Summary

The literatures on the related subjects reveal many gaps in the study of the effect of real interest rate, income and inflation on savings. As cited in Igbatayo and Agbada (2012), their investigation of the relationship between Inflation, Savings and Output in Nigeria, employing Vector Autoregression (VAR) approach, they used Total private Savings as the basic source of capital accumulation for investments and economic activities. The data used in their analysis were secondary data sourced from the official publications and reports of the Central Bank of Nigeria [CBN] 2007 and 2010 Statistical Bulletin and 2010 Annual report. This study used the aggregate national savings and instead of using various data sources, which may have weaknesses in so far as the base years, are concerned, one data source (World Bank data) was used to eliminate this possible problem. Davidson and McKinnon (1982) in their study of Canada and USA used quarterly time series data. The use of quarterly time series data may not produce enough data points to enable robust statistical testing hence, this study used annual time series data to enhance the analysis and improve on the data points. Obamuyi(2009) results of the Augmented Dickey-Fuller (ADF) unit root test showed that only the GDP and inflation variables were stationary at levels, while the other variables (real lending interest rate, real deposit interest rate, financial deepening, ratio of gross domestic savings to GDP and a dummy variable) were stationary at first difference(integrated of order one). What was not known, however, was whether these variables were differenced again once to make them all integrate of the same order. This study ensured that the variable, namely the savings, inflation, income, the real interest rate and the controlled for variables all integrated in the same order.

According to Goda, Manchester and Sojouner (2013), in their experiment on savings decisions of 17,000 University of Minnesota employees in USA, showed that the “income treatment” had statistical significant effect on the likelihood that workers would change their contribution as the level of their incomes changes. However, this study used primary data. Often, primary data is a perception and may not show trends. This study employed time series data that incorporates trends and hence is a better predictor than the primary data. Leigh and Posso (2009), conducted a study on countries with very little resemblance to Kenya, economically.

Nwachukwu and Odigie (2011) used of Error Correction Mechanism (ECM). This only validates the existence of a long run relationship through the significance of the error term. The coefficients of the variables contained in the ECM represent the short run relationship. ECM may not be the correct model to show which variables are may clearly determine any given dependent variable, instead, this study incorporated the ECM but again went further to estimate the over parameterized model and the parsimonious model.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter introduces the methodology and analytical techniques that were employed to estimate the effect of interest rate on savings, with current account balances, money supply, annual GDP growth, gross national income, inflation rates and capital formation acting as controls. This research was based purely on secondary data. The empirical analysis of this study was confined to the aggregate savings in Kenya and the focus of the study was to investigate the effect of real interest rate, income and inflation on savings and the relationship there in. Savings was measured by the aggregate national savings as given by the financial reports from the World Bank since 1981. Since some parameters could not be found for the year 2012- 2013, the study could not be very current hence the limiting of the period. Eviews software was used as the statistical analysis tool.

3.2 Research Design

According to Oso and Onen (2011), research design describes the pattern that the research intends to follow, the plan or the strategy for conducting the research. The study used correlation research design to determine the likely results. This is because the design is helpful in providing a rigorous and replicable procedure for understanding relationships as well as direction of association between quantifiable variables.

3.3 Area of Study

The study was undertaken within the Republic of Kenya, a sovereign state in East Africa. The country borders Indian Ocean to the south-east, Tanzania to the south, Uganda to the west, South Sudan to the north-west, Ethiopia to the north and Somali to the north-east. Kenya's latitude and longitude is 1° 00' N and 38° 00' E. it covers 581,309 km^2 (224,445 sq mi) and had a population of about 44 million by July 2012.The economy of Kenya is comparatively the largest, by GDP, in East and Central Africa and Agriculture and the service industry are the major economic drivers. A massive 22% of GDP still comes from the unreliable agricultural sector which employs 75% of the labor force (a consistent characteristic of under-developed economies that have not attained food security – an important catalyst of economic growth) and a significant

portion of the population (3.75 million) regularly starves and is heavily dependent on food aid, OCHA (2011). Industry and manufacturing is the smallest sector that accounts for 16% of the GDP. Accordingly, study chose the country because it is the entry and exit point, the engine, human resource, financial and service industry hub, and the technological and possibly key driver and policeman in the region. It provides the testing ground, the incubator, the laboratory and the talisman all rolled into one, and has the capacity, and the means, to rally the region together, (Gachie, 2014). Hence, her actions towards the realization of vision 2030 too important to be taken for granted.

3.4 Model Specification

The model that the study used was borrowed and modified from Singhai (2008). He looked at the impact on savings due to changes in GDP and rates of interest in India. He had one independent variable and two independent variables. The dependent variable was Gross Domestic savings while Gross domestic product and Rate of interest were the independent variables. His model equation was;

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \mu_t \quad \text{.....(3.1)}$$

Where;

$\beta_0 =$ Constant and is the intercept,

$Y_t =$ Gross domestic savings,

$X_{1t} =$ GDP,

$X_{2t} =$ Rate of interest,

β_1 & $\beta_2 =$ The coefficients of X_{2t} & X_{3t} respectively.

$\mu_t =$ The disturbance term.

The model that the study adopted was modified to take into account a set of seven independent economic variables as opposed to the two independent variables that formed the explanatory variables in Singhai's (2008) model. The additional five independent variables (inflation, money supply, capital formation, current account balances and gross national income) that the study adopted were taken from some other literature review. Since the model was based on time series data, appropriate time subscript was used. The general form of the function was as given below:-

$$GDS_t = f(RIR_t, GNI_t, IR_t, M2_{t,} CAB_{t,} AG_{t,} GCF_t, \varepsilon_t) \quad \text{..... (3.2)}$$

Where;

$GDS_t =$ The gross domestic savings at time t.

$RIR_t =$ The rate of interest at time t.

$GNI_t =$ The gross national domestic income at time t.

$IR_t =$ The rate of inflation at time t.

$M2_t =$ The money supply at time t.

$CAB_t =$ The current account balance at time t.

$AG_t =$ The annual GDP growth at time t.

$GCF_t =$ The gross capital formation at time t.

$\varepsilon_t =$ The error term at time t.

On the basis of the above variables, the following linear model was specified:-

$$GDS_t = \beta_o + \beta_1 GNI_t + \beta_2 RIR_t + \beta_3 IR_t + \beta_4 M2_t + \beta_5 CAB_t + \beta_6 GCF_t + \beta_7 AG_t + \varepsilon_t \quad \ldots (3.3)$$

3.4.1 Assumptions of the model:-

i. The error term has a zero mean i.e. $E(\varepsilon_i) = 0$.

ii. The error term has a constant variance $E(\varepsilon_i^2) = \sigma_\varepsilon^2$

iii. The error term is normally distributed i.e. $\varepsilon_i \sim N(0, \sigma^2)$

iv. The error term is independent of the explanatory variables

v. The error term of the different observations are independent i.e. $Cov(\varepsilon_i \varepsilon_j) = E(\varepsilon_i \varepsilon_j) = 0$; $i \neq j$

vi. ε is a real random variable i.e. they can assume zero, positive or negative values.

vii. All the variables are measured without errors.

viii. The relationship is correctly specified.

ix. The model is free from multicollinearity

3.5 Measurements of variables

The variables considered were measured in percentages with the GDP becoming the common denominator and then converted to decimals. The absolute aggregates of the data were in local

currency. Being that Interest and inflation rates are being given in percentages, they were also converted into decimals in order to preserve the measurement order.

3.6 Target Population

This study was conducted using Time series data and covered a period of 32 years i.e. from 1981 to 2012. The period (1981-2012) was chosen because it was marked by major developments in the Kenya's economy. These developments were triggered by the Structural Adjustments Programs advocated for by the Bretton Woods institutions in the mid-1980s.

3.7 Data and data Collection techniques

Data is anything given or admitted as a fact on which a research inference will be based. It is anything actual or assumed as a basis for reckoning/ estimation, (Oso and Onen, 2011).

3.7.1 Sources and type of data

The study utilized annual secondary time series data that covered the period covering the year 1981-2012. These historical data were obtained from the annual official Government Economic surveys, World Bank economic reports, as well as the Central Bank of Kenya annual financial reports but because of the problem of the base years that countries more often have, the information from the World Bank was considered as it gave a uniform measure.

3.7.2 Data collection procedure

The study used documents analysis. The information from the World Bank was compared with those from Government of Kenya economic surveys as well as from the Central Bank of Kenya. The relevant variables of interest were singled out, documented, analyzed and interpreted.

3.8 Data Analysis

The primary analytical technique that was applied for this study was the multivariate analysis comprising multiple regression and correlation. This was because the model comprised of more than two independent variables and an interplay between different independent variables also existed. The system of the equation was represented in a linear format indicated in equation (3.3) above. Before estimating the relationship between the variables, time series properties of data were investigated using the following tests:-

3.8.1 Stationarity test

A stochastic process (a collection of the random variables ordered in time) are said to be stationary it its mean and variance are constant over time and the value of the covariance between the two periods depend only on the distance between the two time periods,

(Gujarat, 2004). A test for stationarity (non stationarity) that has become widely popular over the past several years is the unit root test (Gujarat, 2004).

$Y_t = \rho(Y_{t-1} + \mu) \qquad -1 \le \rho \le 1$ ……..……. (3.4)

By subtracting Y_{t-1} from both sides, we get

$Y_t - Y_{t-1} = \rho(Y_{t-1}) - Y_{t-1} + \mu_t$ ……. (3.5)

$=(\rho - 1)Y_{t-1} + \mu_t$

This can alternatively be written as;

$\Delta Y_t = \delta Y_{t-1} + \mu_t$ …… (3.6)

Where $\delta = \rho - 1$ and

If $\rho = 1, \delta = 0$;

If $\rho < 1, \delta < 0$

Δ is the first difference operator.

μ_t is a white noise.

The hypothesis was:-

$H_0 : \delta = 0$, time series is non-stationary

$H_1 : \delta < 0$, time series is stationary

If the null hypothesis is rejected, it implies that $\rho < 1$ and that Y_t (the variable) is integrated of order zero, i.e. it is $I(0)$ and thus stationary. If the null hypothesis cannot be rejected then the Y_t series has a unit root i.e. it is non-stationary in levels. Augmented Dickey Fuller will be used.

3.8.2 Co-integration

The presence of time trends in a regression equation, especially the stochastic trend, is likely to result in a spurious regression. In such a regression, *the t – statistics* and R^2 may appear to be highly impressive and the estimators may turn out to be inconsistent and the inferential procedures rendered invalid and therefore misleading. A simple guide is if the $R^2 > DW$, then a

spurious regression is suspected. One approach that has sometimes been applied in addressing the problem is to difference the series once, sometimes more than once, (Mukras, 2012).

The problem with differencing variables in a regression analysis will lead to loss of long term properties of the variables (of unbiasedness and consistencies) as well as the long run behavior of the phenomenon under study. By nature, most economic time series data are non stationary and therefore, the concept of *Cointegration Series* helps to formulate a separate stationary series from the non stationary series (Mukras, 2012). Johansen technique was used to test for this.
The hypothesis for the co-integration test was stated thus;
Null hypothesis $H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$: (No Co-integration)
Alternative hypothesis $H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$: (Co-integration exists).

3.8.3 OLS estimation

Ordinary Least Squares (OLS) is a statistical technique which attempts to find the function which most closely approximates the data (a "best fit"). What regression does is to try to describe the relationship between two or more variables. Thus, in general terms, it is an approach of fitting a model to the observed data. This model is specified by an equation which relates the dependent and independent variables. In technical terms, the Least Squares method is used to fit a straight line through a set of data-points, so that the sum of the squared vertical distances (called *residuals*) from the actual data-points is minimized. It however not beneficial where the variables are highly correlated (Clock, 2009).

3.8.4 Error correction model

Time series variables move in changing variance over time i.e. they are not stationary. After cointegration, such variables move together harmoniously i.e. they become stationary/cointegrated. The principle question is; how can these variables each wandering aimlessly, each subject to random movement, manage to “move together” or “stick together” in their movements overtime? The answer is; when stochastically trending variables are cointegrated, then, as each one of them moves randomly, they will periodically be adjusting to each other’s location, or they will each be “correcting their individual locations with respect to each other such that the net result is that they “move together/stick together” in their movement

overtime. This adjustment process is what is referred to as "*Error Correction*" and the model containing the error is referred to as the *Error Correction Model* (ECM) and it is shown below:-

$$\Delta GDS_t = \beta_1 \Delta AG_{t-1} + \beta_2 \Delta CAB_{t-1} + \beta_3 \Delta GCF_{t-1} + \beta_4 \Delta GNI_{t-1} + \beta_5 \Delta IR_{t-1} + \beta_6 \Delta M2_{t-1}$$
$$+ \beta_7 \Delta RIR_{t-1} - \lambda ECM_{t-1} + \mu_t \quad \text{.....(3.7)}$$

Where;

ECM = Error Correction Term

$t-1$ = Variable lagged by one period

μ_t = White noise residual

λ = The speed of adjustment; $0 < \lambda < 1$

In the analysis of ECM, the rule of thumb is that the coefficient of the error term (λ) should be negative and significant.

3.8.5 Over-parameterized model

An over- parameterized model is a model that has more parameters than can be estimated by an OLS. In the research, the over- parameterized model comprised of a formation that involved the independent variables at level together with the variables at first difference. It meant that equation 3.6 and 3.7 were all put into one single equation.

3.8.6 Parsimonious model

A parsimonious model is a model that accomplishes a desired level of explanation or prediction with as few predictor variables as possible. F-statistics and the R^2 was used to evaluate the goodness of fit of the data at levels.

3.8.7 Normality test

This was used to test whether the disturbance term are normally distributed. A normal distribution of the error term implied that the sampling distribution of the endogenous and the exogenous variables were also normally distributed. **Jacque Bera** normality test was used and the results given as below:-

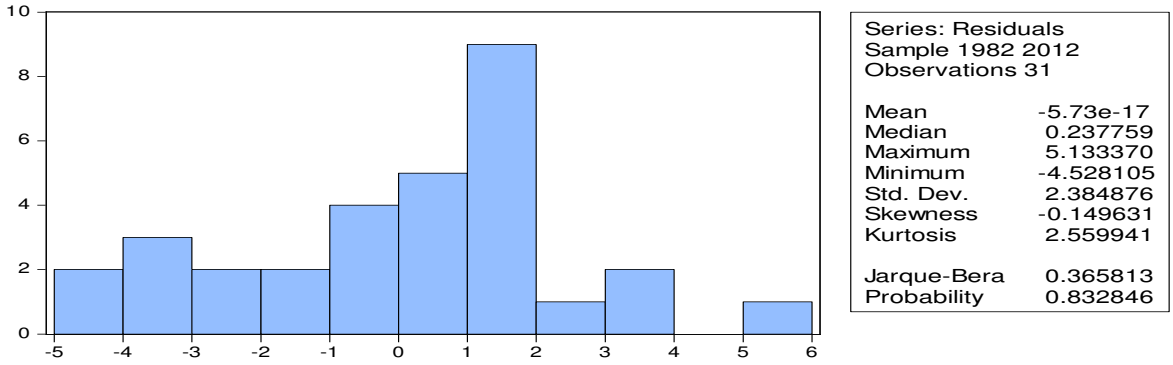

Fig 3.1: Normality of the error term

The null hypothesis was that the residuals are normally distributed. From the results above, the probability value of Jarque Bera was greater than 0.05 at 0.832846 meaning that we do not reject the null hypothesis of residuals being normally distributed.

3.8.8 Autocorrelation

This refers to a situation whereby an error term in one period is correlated with another error term in another period. This was used to measure whether the covariance and the correlations between different disturbances are no longer non-zero. This is because in time series data, there are tendencies for random shocks or disturbances that spill over from one time period to the next. This was done using ***Breusch- Geoffrey*** serial correlation test and the results shown below:

Table 3.1 Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.194232	Prob. F(2,21)	0.3227
Obs*R-squared	3.65765	Prob. Chi-Square(2)	0.2054

The null hypothesis of the regression equation was that there was no autocorrelation. The results showed that the probability of the observed chi- square (χ^2) was 0.2054, greater than 0.05, hence we accepted the null hypothesis of no autocorrelation between the residuals, otherwise should they exist, the first difference of the variables is undertaken taken to remove them.

3.8.9 Multicollinearity

This refers to a statistical phenomenon where two or more independent variables are highly correlated making it difficult to isolate the effect of one of the variables upon the dependent variable. Multicollinearity is a problem of degree. When the correlations among the independent regression variables are minor, the effects may not be serious. A higher degree of Multicollinearity may have an adverse effect on the regression results leading to unreliable regression estimates (although, unreliability does not mean that the estimates are poor) and its presence can be depicted by highly estimated standard errors and high R^2 (Gujarat, 2004). To detect Multicollinearity, correlation analysis among the independent variables was analyzed. The one with the highest P-value from the correlation matrix is to be dropped since as the P-value goes up, the level of significance goes down. The study used centered Variance Inflation Factor (VIF) and the results were shown below:

Table 3.2 Multicollinearity

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.267835	1.11919	NA
AG-1	0.287758	5.687603	5.68675
CAB-1	0.057871	1.568963	1.56889
GCF-1	0.185677	1.796197	1.79365
GNI-1	0.235864	5.595345	5.5952
IR-1	0.02928	9.640413	9.64035
M2-1	0.056549	1.440199	1.33024
RIR-1	0.039412	8.3112	8.30211

A centered VIF of say 6 means that the variance of the regression coefficient estimator is 6 times what it should be when no Collinearity exists. As a rule of thumb, Multicollinearity of less than 10 is not serious hence from the table above; there is no serious Multicollinearity of the coefficients as all the centered VIF are less than 10.

3.8.10 Heteroscedasticity

This refers to a situation where the disturbance variance is no longer constant. They tend to occur where there is a large variation in the size of the independent variable. Being that the study was time series, the variables were likely measured with a lot of errors but the errors could not be as

much as they would appear in a cross sectional data. This is because the data set spans a very long time period and the accuracy with which economic variables are measured may also vary considerably. ***White test*** was used to test for Heteroscedasticity and the results were tabled below**:**

Table 3.3: Heteroskedasticity Test: White

F-statistic	2.17983	Prob. F(7,23)	0.075
Obs*R-squared	12.3638	Prob. Chi-Square(7)	0.0892
Scaled explained SS	5.30837	Prob. Chi-Square(7)	0.6224

Table 3.4: Heteroscedasticity test: Statistical significance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.97601	1.92027	1.54978	0.1348
AG	-0.2896	0.32259	-0.8977	0.3786
CAB	0.30378	0.13663	2.22334	0.0363
GCF	0.2913	0.35074	0.83053	0.4148
GNI	0.38518	0.3381	1.13925	0.2663
IR	0.05	0.0349	1.43252	0.1654
M2	-0.0119	0.14748	-0.0806	0.9365
RIR	-0.0951	0.06812	-1.3967	0.1758

From the results, we accepted the null hypothesis of Homoscedasticity at 5% level since the coefficients of the variables have high probability values of greater than 0.05. With regards to the level of significance, all the coefficients of the independent variables were not statistically significant except CAB, the rule of thumb of *"half the t- statistics must be greater than the standard error,* was used.

3.9 Economic priori

This refers to the signs and sizes of the parameters of the variables that constitute the above economic relationships as determined by the known economic theories. The main aim of its inclusion was to attest whether the parameter estimates lives up to the priori expectations. The table was as below:-

Table 3.5 Economic priori table

Variables	Definitions	Sign
GDP annual growth	It is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	Positive
Gross Capital formation% of GDP	It consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	+ Keynes 1937
Gross National disposable income	It is the sum of GNP and the terms of trade adjustment. Data are in current local currency.	+ Loayza and Shankar (2000)
Inflation rate	It is the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.	– Denhaan (1990) + Siegel (1978)
Current account balance	It is the sum of net exports of goods, services, net income, and net current transfers.	+ if X>M, if X<M
Money and Quasi money (% of GDP)	It is the sum of currency outside banks, demand deposits other than those of the central government, and the time savings, and foreign currency deposits of resident sectors other than the central government.	+ Akhtar (2011)
Real interest rate	It is the lending interest rate adjusted for inflation as measured by the GDP deflator.	+Balassa (1988) -Eldmendorf (1996)

3.10 Data Presentation

Data was presented in the form of graphs, tables and mathematical equations for ease of understanding and analysis. Tables were used to guide readers in making quick comparison and ease understanding of the relationship between the variables.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction:

This chapter presents the regression results that exist between the structural relationships specified in chapter three. It analyses, comprehensively, the descriptive statistics and the time series properties of the GDS in relation to annual growth, current account balances, gross capital formation, inflation rates, money supply, GNI and real interest rates.

4.2 Description of the data

To begin the analysis, the graphical relationships of the variables were undertaken and results shown in fig 4.1 below.

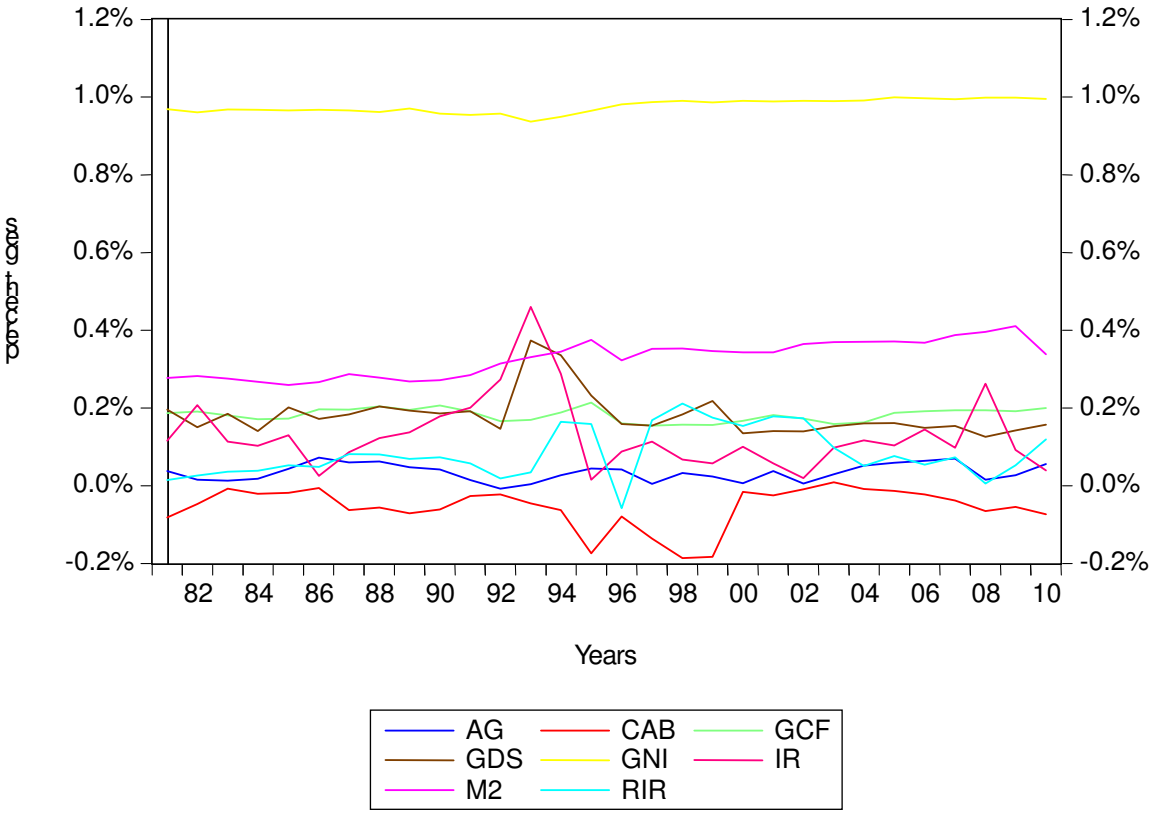

Fig. 4.1: Trend analysis of the variables

From graph 4.1 above, all the variables except the CAB were positive. The rate of interest also came down to -0.06 in 1996. The variables tend to indicate almost a flat graph except GDS, IR, RI and CAB.

Table 4.1 Descriptive Statistics

	GDS	AG	CAB	GCF	GNI	IR	M2	RIR
Mean	-0.54	0.03	-0.02	0.06	0.01	-0.02	0.68	0.23
Median	0.18	0.27	-0.1	0.23	-0.28	0.25	0.55	0.26
Maximum	6.05	3.18	5	2.51	5.57	30.77	5.94	22.66
Minimum	-7.16	-5.47	-5.5	-5.38	-4.92	-30.55	-6.44	-21.58
Std. Dev.	2.94	2.21	2.59	1.55	2.42	9.02	2.41	7.22
Skewness	-0.06	-0.46	-0.16	-1.24	-0.03	0.07	-0.22	0.15
Kurtosis	3.53	2.57	2.8	6.3	2.7	9.34	4.51	6.68
Jarque-Bera	0.39	1.35	0.18	22.02	0.12	51.94	3.21	17.61
Probability	0.82	0.51	0.91	0	0.94	0	0.2	0

*The std.dev, skew, JarqueBera, Prob and Kurtosis are taken at 2 decimal places

From table 4.1 above, the maximum level of saving as a percentage to the GDP is 6.05 while the minimum is -7.16. The maximum and minimum column represents the maximum and minimum values of the variables as percentages of GDP. The null hypothesis was that all the variables are normally distributed while alternative hypothesis was that the variables are not normally distributed. The probability values for JB on GDS, AG, CAB, GNI, and M2 are greater than 0.05, meaning that we accept the null hypothesis meaning that the variables are normal. On the other hand, the JB probability for GCF, IR, and RIR are less than 5% meaning that they are not normally distributed. Often, the kurtosis of a normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal hence has a thick/fat tail; if the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal hence has a thin tail. Following kurtosis method of determining thickness or the flatness of the distribution, the results indicates that GDS, GCF, IR, M2 and RIR are peaked while those for AG, CAB, and GNI are flat. GDS, AG, CAB, GCF, GNI and M2 are skewed to the left whereas IR and RIR are skewed to the left.

Table 4.2(a) Highs and Lows of the variables and the corresponding years

	GDS		IR		RIR		GCF		M2	
	high	low	High	Low	high	Low	high	Low	high	Low
YEAR	1993	2008	1993	1995	1998	1996	1995	1997	2009	1985
Percentages	37.32	12.6	46	1.6	21.1	-5.8	21.4	15.38	41	25.9

Table 4.2(b) Highs and Lows of the variables and the corresponding years

	CAB		GNI		AG	
	high	Low	high	low	high	Low
YEAR	2003	1998	2005	1993	1986	1992
Percentages	0.88	-18.7	100	93.7	7.1	-0.8

From table 4.2(a & b) above, according to the various Kenya's economic surveys, the reasons for the maximum and minimum values of the parameters were explained as below:-

GDS: They were higher in 1993 because of the growth in government deposits which had recorded zero balances since 1982, but grew gradually in 1993 to peak at K£1,914 million. These were balances in special current account which were set up to receive the proceeds of Treasury bill sales aimed mopping up excess liquidity. The decline in 2008 came as a result of the global financial crisis as well as the adverse effects of the domestic political crisis occasioned by post-election violence that erupted in January 2008 after the country held its parliamentary and presidential elections in December 2007. The disputed outcome of the electioneering process led to civil unrests that disrupted economic activity, blocked supply chains, loss of property and a drastic slowdown in the level of economic activities affecting investment and employment.

CAB: In 2003, 65% of the total exports covered the import bill and this was attributed to the general rise in both the import volumes and the import prices. This deteriorated in 1997 from K£211.2 million in 1996 to K£1,107.9 million. This was occasioned by the delay of the IMF's enhanced structural adjustment facility programme, which eroded international confidence in Kenya's economy.

RIR: They were high in 1993 due to high yields on treasury bills. As a result of this, all commercial bank's interest rates were reviewed upwards thus increasing the cost of investments. In 1996, they were low because the CBK urged banking institutions to lower interest rates to

facilitate economic growth and encouraging borrowers in the money market to bargain for lower rates. Moreover, the CBK accepted only lower interest rate on treasury bills.

GCF: This was high in 1995 due to increased government spending and investments from the private sector. It was low in 1997 because of result of the political uncertainties at the time. This was further aggravated by the reduced budgetary allocation, low activity in the construction sector and declines in donor funding. The private sector also faced stiff challenge in acquiring financing from lending institutions.

IR: These were high in 1993. The high inflationary pressures ascribed to the devaluation of the shilling and bad weather conditions. The shilling was officially devalued by 25% in March and 31% April and further 6% in May, 1993. As a result, there were significant price increases for most imported goods, and manufactured goods requiring imported raw materials. Further increases in fuel prices were announced in the year. Other factors included the high volume of money in the economy and further price decontrols. Prices were also pushed up by the widening of the Value Added Tax (VAT) base to encompass the retailing of motor vehicle spare parts and the hotel business. In 1995, the inflation rate declined because of the decline in consumer prices for food items, imported goods and goods manufactured using imported raw materials. The easing inflationary pressures can be ascribed to a number of factors, among them the appreciation of Kenya shillings against major currencies, improved economic and political environment, good weather, low excise duty, good measures to contain expansion in domestic money supply and reduction of duty on raw materials.

M2: It increased tremendously in 2009. This was as a result of the fiscal shocks (Government deposits) and commercial banks accumulated high excess reserves but were unable to lend them out, hence reserve money expanded faster than envisaged at the start of financial year 2009/10. Efforts by the Central Bank of Kenya to encourage expansion of bank credit to the private sector were hindered by inefficiencies in the transmission of monetary policy impulses from short term interest rates to long term (lending) interest rates. In 1985, the M2 declined because of the fall in the import prices.

AG: The economic slow- down in 1992 was attributed to prolonged drought, high inflations from19.6 in 1991 to 27.5 in 1992 which was as a result of drought, excessive growth in money

supply by an unprecedented 35%, massive depreciation of Kenya shilling and the liberalization policies pursued by the government, suspension of foreign aid by donors led to foreign exchange shortages during the first half year. In 1986, Kenya experienced a boom in its performance because of the severe drought in brazil that raised the world coffee prices and Kenya's coffee price rose by nearly 40%, the decline in oil prices by almost 37%, there was good weather and the favorable terms of trade that rose by 5%.

4.3 Correlation of the variables

To assess whether there exists a linear association between the variables, the study used a correlation coefficient to show how well the variables move together in a straight line fashion and the results are shown below:-

Table 4.3 Correlation Table

	GDS	IR	RI	GCF	M2	CAB	GNI	AG
GDS	1							
IR	0.56418 (0.001)*	1						
RIR	0.10626 (0.576)	-0.3615 (0.050)*	1					
GCF	0.06857 (0.718)	-0.0421 (0.824)	-0.1354 (0.477)	1				
M2	-0.1451 (0.444)	-0.0816 (0.669)	0.32151 (0.083)	-0.16177 (0.394)	1			
CAB	-0.2366 (0.208)	0.17095 (0.366)	-0.42969 (0.018)*	0.056066 (0.771)	-0.1675 (0.376)	1		
GNI	-0.6712 (0.000)*	-0.5589 (0.001)*	0.227518 (0.226)	-0.20536 (0.276)	0.67677 (0.000)*	-0.03557 (0.852)	1	
AG	-0.0782 (0.680)	-0.4376 (0.015)*	-0.07302 (0.701)	0.50007 (0.005)*	-0.0430 (0.821)	0.024419 (0.899)	0.2221 (0.239)	1

Note: probability values at 3 decimal places; *indicates significant correlation at 5% level

Key: GDS = gross domestic savings; AG = annual growth rate; CAB= Current Account Balance; GCF = gross capital formation; GNI is the gross national income; IR = inflation rate; M2 = money and quasi money; RIR= real interest rate

Results portrayed in table 4.3 above indicate the degree of correlation as well as the statistical significance represented by the probabilities. From the results, there is a strong and a significant positive correlation between GDS and IR at 0.56418 and a weak significant but negative

correlation between GDS and GNI at 0.6712, symbolizing movement in the same direction and in opposite direction respectively, in a linear manner. There is also a strong significant negative correlation between IR and GNI, IR and RIR and IR and AG at 0.5589, 0.3615 and 0.4376 respectively symbolizing an opposite movement.

There is also a weak but significant negative linear movement between IR and CAB at 0.42969. The correlation between GCF and AG is also strong and significant at the rate of 0.50007. However, the interdependence among the explanatory variables is likely to arise into a problem of multicollinearity giving rise to a higher R^2.

4.4 Unit root test

To assess whether the variables are stationary (mean, variance and covariance do not change over time) or not, unit root tests were carried out both at levels and at first difference using ADF and an automatic selection of Schwartz info criterion with a maximum lag of 7. They are useful in determining the order of integration of the variables. Included in the test was the trend and intercept. One sided ρ values was considered (MacKinnon 1996) at 5% level. The null hypothesis was that the series is non- stationary. The results shown in the table 4.4 below indicate that only RI was stationary at level I(0)and the rest were non stationary but became stationary after first difference I(1). Hence we reject the null hypothesis. Another way that the stationarity was analyzed was by comparing the critical values of ADF vis-à-vis the critical values at 5% level. For non stationary variables, the absolute values of the ADF test are less than the absolute values at 5% level. For stationary data, the absolute values of ADF are greater than the absolute values at 5% level. The table is as shown below:-

Table 4.4 Unit root test (ADF- Schwartz criterion)

	At level			At First difference		
Variables	5% level	Probability	ADF test	5% level	Probability	ADF test
GDS	-3.5684	0.2506	-2.6814	-3.5684	0.0002	-5.9721
AG	-3.5629	0.1099	-3.1652	-3.5684	0.0001	-6.1151
CAB	-3.5629	0.5373	-2.0778	-3.5684	0.0002	-5.8703
GCF	-3.5629	0.3329	-2.4845	-3.5806	0.0027	-4.8881
GNI	-3.5629	0.1001	-3.2149	-3.622	0.0006	-5.7188
IR	-3.5629	0.025	-3.8841	-3.5742	0.0001	-6.2789
M2	-3.5629	0.4392	-2.2655	-3.5684	0	-6.7817
RIR	-3.5629	0.0279	-3.8355	-3.5742	0	-7.521

Key: GDS = gross domestic savings; AG = annual growth rate; CAB= Current Account Balance; GCF = gross capital formation; GNI is the gross national income; IR = inflation rate; M2 = money and quasi money; RIR= real interest rate.

4.5: Cointegration tests:

This test gave the long run equilibrium relationship between the variables. If there are variables that have a unit root i.e. are non- stationary, and the normal regression analysis is run, the results may be spurious (meaningless). When differenced, they become stationary but loose long run information. Cointegration was therefore conducted to capture long run equilibrium relationship between the variables since the variables that were used were non- stationary at level. The process was conducted because the variables were integrated of the same order $I(1)$ under the null hypothesis of no cointegration among the variables. Cointegration results indicate that causality exists but does not show the direction of the causal relationship.

Johansen technique was used as it is multivariate and allows the detection of all cointegrated vectors and also gives the long run equilibrium parameter estimates. The results are as follows:-

Table 4.5: Cointegration test results

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.94	314.963	187.4701*	0	81.5918	56.7052*	0
At most 1	0.92183	233.371	150.5585*	0	73.9183	50.5999*	0.0001
At most 2	0.83026	159.453	117.7082*	0	51.4302	44.4972*	0.0076
At most 3	0.70199	108.023	88.8038*	0.0011	35.1077	38.331	0.112
At most 4	0.5631	72.9151	63.8761*	0.0072	24.0136	32.1183	0.3477
At most 5	0.53863	48.9016	42.9152*	0.0113	22.4327	25.8232	0.1317
At most 6	0.4254	26.4689	25.8721	0.1162	16.0683	19.387	0.1423
At most 7	0.30138	10.4006	12.5179	0.3015	10.4006	12.518	0.1101

Trace test indicates 6 cointegrating equation(s) at the 0.05 level
Max-eigenvalue test indicates 3 cointegrating equation(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the results in the table 4.6 above, the column of the hypothesized number of cointegrating equations reflects the null hypothesis i.e. “none” indicates that there is no integrating equation while “at most 1” shows that there is only one cointegrating equation. Overall, trace test indicates that there are 6 cointegrating equations with probabilities less than 5%. The rule of thumb also states that *when the critical values are less than the trace statistics, we reject the null hypothesis*. Maximum Eigen values gives 3 cointegrating values (*as marked by the asterix*) with the probabilities less than 5% and the critical values being less than the maximum Eigen statistics. Based on this, there exists a long run equilibrium association (i.e. there is causality but no direction of the causal relationship) hence we cannot accept the null hypothesis. However, in Trace Test and Maximum Eigen, there are two equations and four equations respectively, that do not Cointegrate and have probabilities that are greater than 5% meaning that there exists an error term. Parameter estimates for GDS equation, therefore, can be obtained by considering the first normalized cointegrating coefficient equation below in table 4.6.

Table 4.6 normalized cointegrating coefficient

Normalized cointegrating coefficients (std error in parentheses)								@trend
GDS	AG	CAB	GCF	GNI	IR	M2	RIR	83
1	-9.504	-1.71	-6.49	6.349	-2.087	0.934	-1.054	-0.094
	-1.317	-0.387	-0.635	-1.319	-0.375	-0.533	-0.362	-0.081

Log likelihood 439.0496 * lag length – 1:1; std error at 3 significant figures

Key: GDS = gross domestic savings; AG = annual growth rate; CAB= Current Account Balance; GCF = gross capital formation; GNI is the gross national income; IR = inflation rate; M2 = money and quasi money; RIR= real interest rate

A normalized coefficient table presents the estimates of the model (cointegrating equation) with all the variables taken to the left hand side. In our case, the estimates would appear as:

$$GDS_t + \alpha_1 AG_t + \alpha_2 CAB_t - \alpha_3 GCF_t + \alpha_4 GNI_t + \alpha_5 IR_t - \alpha_6 M2_t - \alpha_7 RIR_t + T = 0 \ldots (4.1)$$

Where; T is the @trend 83.

Therefore the signs of the estimated coefficients of the variables were reversed (except that of GDS), to compare whether the signs are as anticipated or not. Below each coefficient estimate, the standard error is given within the parentheses. The cointegrating equation can then be written as;

$$GDS = \underset{(1.317)}{9.504}AG + \underset{(0.387)}{1.710}CAB + \underset{(0.635)}{6.490}GCF - \underset{(1.319)}{6.349}GNI + \underset{(0.375)}{2.087}IR - \underset{(0.533)}{0.934}M2 + \underset{(0.362)}{1.054}RIR + \underset{(0.081)}{0.094}T \ldots\ldots (4.2)$$

Table 4.7: Significance test for the long run coefficients

Variable	Std. err	coeff	t cal	t crit	observed	decision	Conclusion
AG	1.317	9.504	6.834	2.074	$t_{cal} > t_{crit}$	Reject H_0	Significant
CAB	0.387	1.71	4.419	2.074	$t_{cal} > t_{crit}$	Reject H_0	Significant
GCF	0.635	6.49	10.22	2.074	$t_{cal} > t_{crit}$	Reject H_0	Significant
GNI	1.319	-6.349	-4.813	2.074	$t_{cal} > t_{crit}$	Reject H_0	Significant
IR	0.375	2.087	5.565	2.074	$t_{cal} > t_{crit}$	Reject H_0	Significant
M2	0.533	-0.934	-1.752	2.074	$t_{cal} < t_{crit}$	Accept H_0	Insignificant
RIR	0.362	1.054	2.912	2.074	$t_{cal} > t_{crit}$	Reject H_0	Significant
T	0.081	0.094	1.16	2.074	$t_{cal} < t_{crit}$	Accept H_0	Insignificant

Key: GDS = gross domestic savings; AG = annual growth rate; CAB= Current Account Balance; GCF = gross capital formation; GNI is the gross national income; IR = inflation rate; M2 = money and quasi money; RIR= real interest rate

The results in table 4.7 above, against the null hypothesis of no long run significant relationship between savings and the seven economic variables, indicates that all the coefficients of the variables were significant in determining the GDS in Kenya except M2 and the trend (T). The rule of thumb of $t_{cal} > t_{crit}$ was used to reject the null hypothesis.

However, the statistical significance using the t-test at 5% level of significance was carried out and the results given in table 4.7 above using the following rule of thumb, *"half the t- statistics must be greater than the standard error"*.

4.6 OLS Estimation

This method was used to estimate the true population relationship between GDS and the independent variables- at first difference- using the equation below and results shown in table 4.8 below:

$$GDS_t = \alpha_0 + \alpha_1 AG_t + \alpha_2 CAB_t + \alpha_3 GCF_t + \alpha_4 GNI_t + \alpha_5 IR_t + \alpha_6 M2_t + \alpha_7 RIR_t + \varepsilon_t \ldots (4.3)$$

Table 4.8: OLS estimation

Variable	Coefficient	Std. Error	t- Statistic	Prob.
C	-0.4599	0.51753	-0.8887	0.3834
AG	0.53824	0.53643	1.00337	0.3261
CAB	0.41185	0.24056	1.71203	0.1003
GCF	0.23697	0.4309	0.54993	0.5877
GNI	-0.2995	0.48566	-0.6167	0.5435
IR	-0.0266	0.17111	-0.1552	0.878
M2	-0.1853	0.2378	-0.7791	0.4439
RIR	0.13309	0.19852	0.67037	0.5093

R-squared	0.343494	Mean dependent var	-0.537437
Adjusted R-squared	0.143688	S.D. dependent var	2.94338
F-statistic	1.719135	Durbin-Watson stat	2.02596
Prob(F-statistic)	0.154001		

Key: GDS = gross domestic savings; AG = annual growth rate; CAB= Current Account Balance; GCF = gross capital formation; GNI is the gross national income; IR = inflation rate; M2 = money and quasi money; RIR= real interest rate

Interpretation of the results: The results were interpreted against the specific objective of establishing the relationship between savings and a set of seven economic variables. The null hypothesis was all the coefficients are zero.

From the above results, there is a negative constant coefficient and an intercept of 0.459 meaning that in the absence of all the other independent variables, 0.459 units decline of the GDS each year occurs as a result of a unit increase of other factors other than the independent variables highlighted. As per the statistical significance, the OLS results suggest that the coefficients of AG, CAB, GCF, GNI, IR, M2 and RIR are statistically insignificant at 5% level. The OLS equation can thus be written as follows:-

$$GDS_t = -\underset{(0.51753)}{0.4999} + \underset{(0.53643)}{0.5382} AG_t + \underset{(0.24056)}{0.41185} CAB_t + \underset{(0.4309)}{0.23697} GCF_t - \underset{(0.48566)}{0.2995} GNI_t - \underset{(0.17111)}{0.0266} IR_t$$
$$- \underset{(0.2378)}{0.1853} M2_t + \underset{(0.19852)}{0.13309} RIR_t + \varepsilon_t \quad \text{.....(4.4)}$$

The probability of F- statistics (which also tests for the overall model fit within the population) is 15.4% which is higher than 5% level. The R^2 (coefficient of correlation), measures the model fit within the sample i.e. how the independent variables explains the dependent variables, is also not very impressive at 34.34%. The adjusted R^2 is also not very impressive at 14.36%.

From the above, results gotten directly from the OLS estimation was not very impressive. Bearing in mind that R^2 is less than 50%, it symbolizes that the independent variables only explains 34.34% of GDS. The F-statistics are also greater than 5% and hence was interpreted to mean than the variables chosen were not the best in estimating the population. Bearing the fact the independent variables are the major determinants of savings (Modigliani, 1963), an over-parameterized error correction model was thus important. This low explanatory power could have been as a result of many variables that were incorporated into the model. It could also be as a result of the existence on Multicollinearity that existed between the variables especially RIR and IR, CAB and RIR, GNI and IR, GNI and M2, AG and IR, AG and GCF.

4.7 Error Correction Mechanism

Error Correction Models (ECMs) are a category of multiple time series models that directly estimate the speed at which a dependent variable - Y - returns to equilibrium after a change in an independent variable - X. ECMs are useful for estimating both short term and long term effects of one time series on another. From the parameter estimates in equation 4.2, the following ECM was established and included were 30 observations after adjustments. The table is as shown below:-

Table 4.9: Error correction model table: GDS-1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.06465	0.517699	0.12488	0.9019
AG-1	-0.0117	0.372556	-0.0313	0.9753
CAB-1	0.70308	0.220598	3.18717	0.0046
GCF-1	0.62107	0.358775	1.73108	0.0988
GNI-1	0.15131	0.336774	0.44929	0.6581
IR-1	-0.1344	0.170143	-0.7898	0.4389
M2-1	-0.3259	0.243994	-1.3356	0.1967
RIR-1	0.01551	0.184107	0.08426	0.9337
U(-1)	-0.7616	0.201725	-3.7753	0.0012

R-squared	0.725724	Mean depend var	-0.106384
Adjusted R-squared	0.616013	S.D. dependent var	4.466032
F-statistic	6.614897	DW stat	1.387151
Prob(F-statistic)	0.000292		

Key: GDS-1 = gross domestic savings lag 1; AG-1 = annual growth rate lag 1; CAB-1= Current Account Balance lag 1; GCF-1 = gross capital formation lag 1; GNI-1= the gross national income lag 1; IR-1 = inflation rate lag 1; M2-1 = money and quasi money lag 1; RIR-1= real interest rate lag 1

Interpretation:

Table 4.9 above indicates the results of the error correction model. From the table, the coefficients of the independent variables are the short run coefficients, not the long run coefficients. All these coefficients are not statistically significant at 5% level except CAB and the error term U(-1), meaning that the short run coefficients are not significant variables to explain the dependent variable- GDS. The coefficient of the error term U(-1) i.e. the residual of the regression model is -0.761581. The sign of the coefficient is negative and it is also significant at 0.0012%.

The result in the table 4.9 above was modeled as below, standard errors in parenthesis () while the coefficients indicate the rates of response.

$$GDS_{t-1} = \underset{(0.517699)}{0.064648} - \underset{(0.372556)}{0.011662}AG_{t-1} + \underset{(0.220598)}{0.703083}CAB_{t-1} + \underset{(0.358775)}{0.621068}GCF_{t-1} +$$

$$\underset{(0.336774)}{0.151308}GNI_{t-1} - \underset{(0.170143)}{0.134371}IR_{t-1} - \underset{(0.243994)}{0.325872}M2_{t-1} + \underset{(0.184107)}{0.015512}RIR_{t-1} -$$

$$\underset{(0.201725)}{0.761581}U_{t-1} + \varepsilon_t \quad \text{.....(4.5)}$$

Where Gds_{t-1} = previous gross domestic savings; AG_{t-1} = annual GDP growth previous period; CAB_{t-1} = current account balance previous period; GCF_{t-1} = gross capital formation previous period; IR_{t-1} = inflation rate previous period; GNI_{t-1} = gross national income previous period; $M2_{t-1}$ = money supply previous period; RIR_{t-1} = real interest rate previous period; U_{t-1} = error correction term, ε_t = the error term.

Given the independent variables that the study looked into, namely the GNI, RIR and IR, equation 4.5 suggests that a unit increase in GNI in the previous year resulted in an increase in GDS in the previous year by 0.151308; a unit increase in the previous period's RI resulted in a decrease in the previous GDS by 0.134371 while a unit increase in the previous year's RIR resulted in an increase in the previous year's GDS by 0.015512.

The negative sign and the significance of the error correction term gives validity that the dependable variable GDS and a set of the seven economic variables have a long run relationship. The coefficient means that the error correction term corrects the disequilibrium of the system at a very fast rate annually. The speed of adjustment with which it corrects the system is at the rate of 76.16% annually. The R^2 is 0.7257, meaning that the model explains 72.57% of the total population. The F- statistics is also very significant at 0.000292. The DW is also greater than the R^2, meaning that the model is not spurious.

4.8 Over parameterized model (The General Linear Model)

The choice of an over parameterized model was chosen because of its ability to provide a solution for the normal equations when the independent variables are not linearly independent. From the correlation matrix, there were variables namely GNI and M2 as well as GNI and IR that had a high correlation between them rendering OLS results meaningless. The table 4.10 below shows the results of the over-parameterized model after 1 adjustment (lag).

Table 4.10 Over Parameterized model

Dependent Variable: GDS				
Included observations: 29 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.35E-01	3.40E-01	0.987304	0.343
AG	-3.02E-01	4.99E-01	-0.60365	0.5573
AG(-1)	1.257641	8.98E-01	1.40E+00	0.1866
CAB	3.31E-01	1.58E-01	2.097242	0.0578
CAB(-1)	-0.231995	2.55E-01	-9.10E-01	0.3809
GCF	3.01E-01	2.71E-01	1.107789	0.2897
GCF(-1)	-0.667516	3.81E-01	-1.75E+00	0.1051
GDS(-1)	8.10E-01	1.78E-01	4.545659	0.0007
GNI	0.425447	5.31E-01	8.01E-01	0.439
GNI(-1)	-1.48E+00	9.02E-01	-1.64403	0.1261
IR	0.009488	1.16E-01	8.15E-02	0.9364
IR(-1)	-0.169294	0.171859	-0.98507	0.344
M2	-0.385805	0.217529	-1.77358	0.1015
M2(-1)	1.56E-01	0.236767	6.57E-01	0.5235
RIR	9.30E-02	0.134038	0.693621	0.5011
RIR(-1)	-0.163561	0.16592	-0.98578	0.3437
U(-1)	-0.566904	0.141887	-3.99547	0.0018
R-squared	0.956543	Mean dependent var	-0.106384	
Adjusted R-squared	0.8986	S.D. dependent var	4.466032	
F-statistic	16.50836	Durbin-Watson stat	1.473236	
Prob(F-statistic)	0.000009			

Key: GDS(-1) = gross domestic savings lag 1; AG(-1) = annual growth rate lag 1; CAB(-1)= Current Account Balance lag 1; GCF(-1) = gross capital formation lag 1; GNI(-1)= the gross national income lag 1; IR(-1) = inflation rate lag 1; M2(-1) = money and quasi money lag 1; RIR(-1)= real interest rate lag 1

GDS = gross domestic savings (current period); AG = annual growth rate(current period); CAB= Current Account Balance(current period); GCF = gross capital formation(current period); GNI is the gross national income(current period); IR = inflation rate(current period); M2 = money and quasi money(current period); RIR= real interest rate(current period).

Interpretation: From these results, the R^2 is 95.65%. The F-statistics is also very significant. The coefficient of the error term is -0.5669 and is very significant at 0.0018. All the coefficients of the variables are different from zero and the probability values at 5% significance level signified that the lagged variables of AG, GNI, CAB, GCF, GNI, IR, M2 and RIR were not statistically significant at 5% significance level while current values of AG, CAB, GCF, GNI, IR, M2, and RIR were also not statistically significant. The only variables that were significant were the GDS lagged as well as the lag of the error term. From the table above, some coefficients

were negative while others were positive. The negative coefficients implied that as the independent variable increase, the dependent variable goes down by the percentage size of the coefficient. The positive coefficients implied that as the independent variable increased, then, the dependent variable also increased by the percentage size of the coefficient.

Discussion: The over parameterized model gives estimates of both the lagged values of the independent variables as well as the current variables put together. Also included is the lag of the dependent variable. The F-statistics are statistically significant. The R^2 values are very impressive and signify that the inclusion of the lags explains 95.65 % of the dependent variable. The coefficients of the over-parameterized model shows mixed relationship between the dependent variable and the independent variables. The probability values greater than 5% imply that the corresponding variables are not significant whereas those that are less than 5% are statistically significant in determining GDS. The almost ideal nature of this model called for the use of a parsimonious model formed below.

As compared to the OLS results in table 4.8, which had an R^2 of 0.353493, the over parameterized model resulted into an R^2 of 0.956543, however, despite this result, and except for the variable GDS (-1) being significant at 0.0007, the rest of the variables are not significant at 5% level.

The result in table 4.10 indicated that the inclusion of the lags into the model improved the explanatory power of the model. Of importance to note was that savings also had its own momentum and that the previous savings has an influence on the current savings.

4.9 Parsimonious model

This model was adopted hopefully to take into account the weaknesses exhibited by the OLS.
The results were captured as below:-

Table 4.11: Parsimonious model

Dependent Variable: GDS				
Included observations: 29 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.49506	0.275396	1.79763	0.0866
AG(-1)	1.11483	0.291474	3.8248	0.001
GCF(-1)	-0.4422	0.209573	-2.1102	0.047
GDS(-1)	0.95125	0.108478	8.76913	0
GNI(-1)	-1.2125	0.266597	-4.548	0.0002
M2	-0.2905	0.095305	-3.0481	0.0061
RIR	0.08076	0.030999	2.60518	0.0165
U(-1)	-0.5071	0.097405	-5.2061	0
R-squared	0.923545	Adjusted R-squared	0.89806	
F-statistic	36.23873	Durbin-Watson stat	1.834129	
Prob (F-statistic)	0			

Key: GDS(-1) = gross domestic savings lag 1; AG(-1) = annual growth rate lag 1; GCF(-1) = gross capital formation lag 1; GNI(-1)= the gross national income lag 1; M2 = money and quasi money(current period); RIR= real interest rate(current period); RIR= real interest rate(current period); U(-1)= error correction term

Interpretation:

From the above table, the coefficients of the results show the short run relationship between the dependent variables and the independent variables. At 5% level of significance, the relationship between GDS, AG, GCF (-1), GDS (-1), GNI (-1), RIR and M2 are significant. It therefore means that they explain the movement of GDS. The coefficient of CAB was not significant at 5% level, meaning that they do not statistically explain GDS and hence was removed from the harmonized model.

R^2 is 0.9235 meaning that the independent variables explain 92.35% of the total variations in the dependent variable GDS. The F-statistics at 36.23873 with a probability of 0.0000 is also very significant. It was therefore concluded that 7.65% could be attributed to the error term or other factors not incorporated in this study. Again, of significance noted was that "*savings yesterday significantly affects savings today",* as shown by the significance of the lagged GDS. The final equation can then be written as follows only in consideration of the significant variables only.

The coefficient of the residual term U (-1) is also negative and statistically significant at 5% level, meaning that the speed of adjustment from the disequilibrium is 50.71% annually and the

significance of the probability of the residual term authenticated a long run relation between the dependent and the independent variables. The results in table 4.11 were expressed in a linear equation model and presented as below, values in the parentheses () indicating the standard error;-

$$GDS_t = \underset{}{0.49506} + \underset{(0.275396)}{1.11483}\,AG_{t-1} - \underset{(0.291474)}{0.4422}\,GCF_{t-1} + \underset{(0.209575)}{0.95125}\,GDS_{t-1} - \underset{(0.108478)}{1.2125}\,GNI_{t-1} - \underset{(0.266597)}{0.2905}\,M2_t + \underset{(0.095305)}{0.08076}\,RIR_t - \underset{(0.030999)}{0.5071}\,U_{t-1} \quad \text{.....(4.6)}$$

Where Gds_t = current gross domestic savings; AG_{t-1} = annual GDP growth previous period; GCF_{t-1} = gross capital formation previous period; GDS_{t-1} =gross domestic savings previous period; GNI_{t-1} = gross national income previous period; $M2_t$ = money supply current period; RIR_t = real interest rate current period; U_{t-1} = error correction term.

The results showed that $AG_{t-1}, GDS_{t-1}, RIR_t$ are positively related to GDS while $GCF_{t-1}, GNI_{t-1}, M2_t$ are negatively related to GDS. The coefficients indicate the magnitudes of change.

By comparing the results in the over parameterized model in table 4.10 and the parsimonious model in table 4.11, there is a difference of 0.032998 in R^2. The variables considered in the parsimonious model were only 7, a drastic reduction from the 16 variables considered under the over parameterized model. This therefore suggested that the explanatory power of the reduced variables in table 4.11 better explained the aggregate savings as opposed to the many variables that the study considered in table 4.10.

Discussions:

The discussion was done based on the objectives of the study and the hypothesis underlying them.

The first objective was to determine the effect of Real Interest Rates on Aggregate Savings in Kenya. From the result, RIR is very significant in the determination of savings (p value= 0.0165) and a unit increase in RIR leads to 0.008076 increase in savings. The results were in agreement with what Pettinger (2013), in the study of the UK found and also what Loayza & Shankar

(2000), in the study of India, found. Their studies all concluded that interest rates were positively related to savings and were also significant.

The second objective was to look at the extent to which income affects savings. The results revealed that there was a statistically significant negative relationship between income and savings. However, the coefficient indicates that a unit increase in income results in a decline of savings by 1.2125 (p value = 0.0002) hence the study accepted the null hypothesis. This is in agreement with what Loayza & Shankar (2000) found out. Although they used the t-statistics to draw their conclusion on the level of significance (coefficient= 0.24; t= 5.9), the conclusion remain basically the same i.e. interest rates is significant and positively affects savings.

The third objective was to look at the effect of inflation on savings. The results revealed that there was an insignificant positive relationship between the current rate of inflation and savings as well as a negative insignificant relationship between lagged rate of inflation and savings as the over parameterized model indicated in table 4.10. From the results, an increase in the rate of inflation by one unit results into a decline in the savings level by 0.009488 (p value = 0.9364) while a unit increase on past inflation rate dropped savings by 0.169294 (p value = 0.344), hence the study accepted the null hypothesis although the effect is not significant. The results agreed with the findings of Igbatayo & Agbada (2012). They concluded that inflation may not have stimulated nor sufficiently responded to output growth or savings in Nigeria over the period of analysis.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the main study findings, conclusions, recommendations, based on the major findings, and lastly the research gaps.

5.2 Summary and conclusion

The overall objective of the study was to determine the effect of real interest rate, inflation and income on savings in Kenya. The study used Johansen cointegration test as well as the error correction model. Cointegration test under the maximum Eigen value showed that there were three cointegrating equations. On the error correction model, the coefficient of the error term was negative and significant but was very high. From the research findings, the empirical results from the parsimonious model were very impressive. The result indicated that over 87.47% of the variations in GDS, for the period under review, were captured by the above explanatory variables. F- Statistics were also very good as the probability was 0.0000, meaning that the overall effect of the independent variables are very significant in the determination of GDS.

The first objective was to determine the effect of real interest rates on savings in Kenya. The null hypothesis was that there is a significant relationship between Real Interest Rate and savings in Kenya. The parsimonious model findings revealed that real interest rate have a positive and a significant effect on savings; hence the null hypothesis was accepted. From this result, it was concluded that the policy makers' need to closely monitor the movements of real interest rates particularly those on savings since increasing them may lead to an increase in the savings level.

The second objective was the extent to which income affect savings in Kenya. The null hypothesis was that income affects savings. From the results, the probability of GNI was very significant. The coefficient of income was also negative. This meant that an increase in the levels of income by one unit resulted in a reduction in the levels of GDS by 1.2125 units and as such, the null hypothesis was accepted. However, the study concluded that the economic priori expectation was not fulfilled. Often, it is believed that those who earn more tend to save more

but the results portrayed that in Kenya, as the levels of income increases, the level off savings goes down.

The third objective was the effect of inflation on savings in Kenya. The null hypothesis was that inflation affects savings. The over parameterized model revealed that both the current and the lagged inflation rate were insignificant in the determination of savings and a unit increase in current inflation leads to an increase in savings by 0.009488 while the lagged inflation rate led to a decrease in savings by 0.169294. The probabilities were however insignificant at 0.9364 and 0.344 respectively. As a result, the null hypothesis was accepted. It was concluded that in Kenya, the urge/act to save does not depend on the rates of inflation so much. People's decision to save depends on some other factors and inflation is not among the factors that would dampen or encourage the savings pattern in Kenya.

5.3 Recommendation

From the empirical results, it is obvious that the selected variables of the study namely the AG, CAB, GCF, GNI, IR, M2, and RIR, have a linear relationship as per OLS and Cointegration analysis. As to the level of significance, the parsimonious results show that the lagged AG, GCF, GDS and GNI together with the current M2 and RIR were statistically significant while that of CAB and IR are not statistically significant at 5% confidence level. However, for the country to achieve the required 30% annual increase in savings as depicted in Vision 2030, the following recommendation were made:

The government needs to clearly address issues that affect AG, GCF, GNI, RIR and M2. These factors alone accounts for the 92.35% effect on GDS. Issues of CAB and IR do not affect GDS significantly. The stability of these macro economic variables must be guaranteed.

From the results on RIR, it was found that it influences savings positively and very significantly hence should be increased in order to motivate the private sector to increase their levels of savings.

Regarding the levels of income, the results showed that as it increases, savings become less and less. This goes against the economic priori expectation which suggests that with increased levels

of income, savings should also increase. Hence, the policy makers should sensitize the population on the benefits of savings.

On inflation, moderate inflation of 1% to 4% is welcome in order to increase the levels of investments. Because the lagged inflation hurts savings more (by 0.169294) as opposed to the current inflation rates (by 0.009488), the policy makers should therefore tame the current inflation in order to encourage future savings.

In addition, the results indicated that savings "today" is greatly influenced by savings "yesterday" i.e. savings has its own momentum. Such a result suggests that savings culture is an acquired trait and could be learnt from generation to generation. Based on this, the study recommends that the government needs to encourage the current generation to adopt savings culture as this would create a significant platform for savings in the future.

5.4 Limitations of the study

There were lack of and inconsistency of historical data on some pertinent variables like dependency rates/ratios which could have really enhanced this study.

Improvements on the results would have been enhanced much more had the current data (for year 2013) been made available. All the eight economic variables that this study looked into had their data capture only up to the year 2012.

5.5 Suggestions for further research

From Johansen Cointegration, there was a possibility of a multi directional analysis between the considered economic variables. This multi directional relationship can form other interesting research topics if pursued further.

In the parsimonious model, the considered independent variables only explained 92.35% of the dependent variable, GDS. Key among the missing variables that the research left out but which the study felt could add more relevance was the non-financial factors such as the dependency rates. The reason for its exclusion was because of the unavailability of data. Upon making such

data become available, future researchers can incorporate them together with the economic variables to have a compact analysis of determinants of Gross Domestic Savings in Kenya.

Last but not least, cointegration analysis was conducted but the causality test as well as the vector error correction mechanism (VECM) was left out because they were not part of the objectives of this study. Therefore, an opportunity exists for future researchers to perform these tests to find out the direction and the nature of the long term relationship between the dependent and the determining independent variables.

REFERENCES

AARP Public Policy Institute. (2002). *A new perspective on "Savings" for Retirement*. Reinsdorf, M.

Akbas Y. E., Lebe, F., & Uluyol, O. (2014). Analyzing the Relationship Among The GDP –Current Account Deficit and Short Term Capital Flows: *The Case of* Emerging Markets. *Journal of Economic Literature*, 2 (21).

Arnold, E,. Dräger,. L & Fritsche U.(2014). *Evaluating the Link between Consumers' Savings Portfolio Decisions, their Inflation Expectations and Economic News*. Discussion Papers Macroeconomics and Finance Series 2. Hamburg.

Australia Broadcasting Corporation. (1998). *The relationship between savings and investment*. McGregor, L.

Balassa, B.(1988). *The Effects of Interest Rates on Savings in Developing Countries*. World Bank. Washington, D.C.

Baharumshah, A,. Lau, E,. & Fountas S., (2004). *Current Account Deficit Sustainability: A Panel Approach.* Working Papers 0073. National University of Ireland Galway. Department of Economics.

Campbell, J.Y., & Mankiw, N. G. (1989). *Consumption, Income, and Interest Rates: Reinterpreting the time series evidence.* Princeton University and Nber/Harvard University. MIT Press. Volume ISBN: 0-262-02296-6. Pg. 185 – 246.

Carroll, D., & Weil, D. (1994).Savings and growth with habit formation. *American Economic Review.*

Central Bank of Nigeria. (2009*). Inflation in Nigeria, concept, measurements and control, Bullion. 33(1).* Orubu, O.

Chakrabati, A. (2006). The Savings – Investment Relationship Revisited: New Evidence from Multivariate Heterogeneous Panel Cointegration Analysis. *Journal of comparative economics*, 34, 402-419.

Chaturvedi, V., Kumar, B., Dholakia, R. H.(2009). Inter-Relationship between Economic Growth, Savings and Inflation in Asia. *Journal of International Economic Studies*. No.23, 1–22.

Davidson, R., & MacKinnon, J. G.(1982). *Inflation and the Savings Rate*. Queen's Economics Department Working Paper No. 493

Deaton, A. (1989). *Saving in developing countries: Theory and Review*. Proceedings of the World Bank annual conference on development economics, 1989, Washington D.C; World Bank.

Desroches, B.,& Francis, M.(2007). *Global savings, investment, and World real interest rates*. Bank of Canada Working Paper.

Defina, H.R. (1983). *The Link between Savings and Interest Rate. Key Element in the tax policy.* The Federal Reserve Bank of Philadelphia.

Den Haan, W.J., 1990, The Optimal Inflation Path in a Sidrauski-Type Model with Uncertainty, *Journal of Monetary Economics*, 25, 389-409.

Eldmendorf, D.W. (1996). *The effect of Interest Rate changes on Household Savings and Consumption: A survey.* Federal Reserve Board.

Finance. (2013). *Determinants of savings*. Retrieved from http://finance.mapsofworld.com/savings/determinants.html

Fama, F.E, (1981). Stock Returns, Real Activities, Inflation and Money. *American economic review*.71(4), 545-565.

Federal Government of Nigeria. (2012). *Medium-term expenditure framework & fiscal strategy paper (revised).* Budget Office of the Federation. Federal Ministry of Nigeria.

Federal Reserve Bank of New York. (2011). *Understanding Market Operations*. Akhtar, M.A

Friedman, M. (1957). *A Theory of the Consumption Function*. *Permanent income hypothesis*. Princeton University Press. ISBN: 0-691-04182-2.

Fry, M.J. (1978). Money and Capital or Financial Deepening in Economic Development. *Journal of Money, Credit and Banking;* 10(4).

Fry, M.J. (1980). *Saving, Investment and Growth and the Cost of Financial Repression*. World Development.

Gachie, J. (2014). *Kenya foreign policy and international relations*. Retrieved from: www.softkenya.com/world

Gans, J.,Kings, S., and Libich,J. (2014). *Principles of economics, 6th edition*. cengage learning Australia. China translation and printing services.

Gichuki, J. K. & Moyi, E. (2013). An Intertemporal Assessment of Kenya's Current Account Deficits. *International journal for economics and management science*. Kenya Institute of Public Policy Research and Analysis. 2 (9).

Giovanni, A. (1983).*The Interest Rate Elasticity of Savings in Developing Countries: The Existing Evidence*. World Development, 11 (7).

Goda, G.S., Manchester, C.F., & Sojourner, A. (2013). *Do income projections affect retirement savings?* Center for retirement research. Boston College.

Gokal, V., & Hanif, S.(2004). *The relationship between Inflation and Economic Growth.* Working paper 2004/04. Economics Department. Reserve bank of Fiji.

Government of the Republic of Kenya. (2007). *Kenya vision 2030. The popular version*. The government press.

Gujarat, D.N (2004). *Basic Econometrics. 4th Edition*. McGraw- Hill companies.

Heer, B., & Suessmuth, B. (2006). *The Savings-Inflation puzzle*. Cesifo working paper no. 1645. (6).

Hong-mei, W., & Xiao-feng, J.(2008). *The Relationship between Precautionary Motive and Savings of Urban Households in China. An empirical study*. 15th annual conference proceeding, Long Beach, C.A.

Igbatayo, S., & Agbada,O.A. (2012). Inflation, Savings and Output in Nigeria: A Var approach. *Journal of emerging trends in economics and management sciences*. (447-453).

Ikhide, S., & Alonade, A. (2001). Financial sector reforms, macro -economic instability and the order of economic liberalization, the evidence from Nigeria. *Economic Research Consortium research*. Paper 112.

IMF. (2013). Economic Indicators. Gross national savings (% of GDP). *Economic watch*. Retrieved from: http://www.economywatch.com/economic-statistics/economic-indicators/Gross_National_Savings_Percentage_of_GDP/2013/

Ireri, M.(2011). *Kenyans' poor savings culture hurts growth, investment prospects*. Ipsos-synovate.

Jappeli,T., & Pagano, M.(1994). Savings, growth and liquidity constraints, *Quarterly journal of economics*, 109.

Jump, G.V. (1980). Interest rates, Inflation expectations, and Spurious elements measured real income and savings. *American economic review*,70

Karen, E. D., Skinner, J., & Zeldes, S. P. (2004). Do the Rich Save More? *Journal of Political Economy*. The University of Chicago, 112(2).

Kendrick, D. A. (2002). *Stochastic control for economic models. 2nd edition, version 2*. Mcgraw-Hill, inc.

Keynes, J.M. (1936). *The general theory of employment, interest rate and money*. Polygraphic company of America. New York.

Kotkoliff, L.(1992). Savings and the general effects of fiscal policy. *Personal savings, Consumption and tax policy*. American enterprise institute. Marvin H. Koster,ed.

Krieckhaus, J. (2002). *Reconceptualizing the developmental state: public savings and economic growth*. World development, 13(10).

Labonte, M.(2011). Inflation: Causes, Costs, and Current Status. Congressional Research Service,7 (5700).

Lakshman, W.D., & Tisdel, C.A. (2000). *Introduction to Sri Lanka's development since Independence. Socio- economic perspective and analysis.* Nova publishers.

Leigh, A., & Posso, A. (2009).*Top Incomes and National Savings. Review of Income and Wealth*. Series 55, No. 1

Loayza, N., Schmidt –Hebbel, K., & Shankar, R.(2000). *What drives private Savings across the World?* The review of economics and statistics, 82(2).

Madigan, B.F., & Nelson, W.R.(2002). *Proposed Revision of the Federal Reserve's Discount Window Lending Programs*. Division of the Monetary Affairs. Fed, 36 (544).

Malinen, T.(2011). *Income inequality and savings: a reassessment of the relationship in cointegrated panels*. Helsinki Centre for Economic Research. Discussion paper, *337.*

McKinnon, R. (1973). *Money and Capital in Economic Development*. Washington D.C. Brookings institution.

Misztal, P. (2011. *The relationship between savings and economic growth in countries with different level of economic development*. Financial Internet Quarterly, Vol. 7(2), (17-29)

Modigliani, F. (1966).*The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital.* ProQuest Information and Learning Company.

Mohan, R. (2006). Causal Relationship between Savings and Economic Growth in Countries with different Income levels. *Economics bulletin*. 5(3).

Mundell, R. (1963). *Capital mobility and stabilization policy under fixed and flexible Exchange Rates.* Canadian Economics Association. *29(4)*

Mugenda, M.O., & Mugenda, A.G. (2003).*Research Methods. Quantitative and Qualitative approaches*". Acts press.

Mukras, M. (2012). *Fundamental Principles of Time Series Econometrics. Theory and Applications. Vol.2*. Lambert Academic Publishing.

Mwega, F.M., Ngola,S.M., & Mwangi, N.(1990). Real Interest Rate and the mobilization

of Private Savings in Africa. A case study of Kenya. *African Economic Research Consortium*, research paper 2.

Ngugi,R. (2001). An empirical analysis of Interest Rate spread in Kenya. *African Economic Research Consortium,* Research paper 106.

Nwachukwu, T. E. & Odigie, P (2011). What Drives Private Saving in Nigeria. Research. *African Economic Research Consortium,* Paper 212.

Obamuyi, T.M. (2009). An investigation of the relationship between Interest Rates and Economic Growth in Nigeria. *Journal of Economics and International Finance 1(4), (093-098).*

OCHA. (2011). *Stepping up the response in the horn of Africa*. United Nations Office for the Coordination of Humanitarian Affairs. Retrieved from http://www.unocha.org/top-stories/all-stories/stepping-response-horn-africa

Ojo, J.A.T. (1976). *The Nigerian Financial System*. University of Wales press, Cardiff.

Onwumere J.U.J., Okore A.O., & Imo.G.I. (2012). Financial structure and Economic Growth: evidence from Nigeria .*Research Journal of Finance and Accounting*. *3(10).*

Oparanya, W.A. (2012). *Kenya vision 2030. From a great past to a greater future*. London investment summit.

Oso,W.Y., & Onen, D. (2009). *A General Guide to Writing Research Proposal and Report*. *A handbook for Beginning Researchers*. The Jomo Kenyatta foundation.

Pettinger, T.(2013). *How do interest rates affect savers and saving levels*? Retrieved from www.economicshelp.com

Rutherford, D. (2012). *In the shadow of Adam Smith*. *Founders of Scottish economics.* Pulgrave Macmillan.

Siegel, J. J. (1979). Inflation-induced distortions in government and private savings Statistics. *Review of Economics and Statistics*, 61, (83–90).

Singhal, R.K. (2008). Impact off savings due to changes in GDP and Rates of Interest in India. *Journal of Economic Literature*, 120.

Schmidt-Hebbel, K., & Serven, L. (2000). Does income inequality raise aggregate saving? *Journal of Development Economics*. Central Bank of Chile*, 61,(417–446)*

Shaw, E.S. (1973). *Financial deepening in Economic Development*. New York, Oxford University press.

Shukla, R.(2012). Low growth, high inflation. *The economic times*. Retrieved from

http://www. articles.economictimes.indiatimes.com/2012-07-13

Soyibo, A., Olayimola,K. (2000). *Interest rate policy and the promotion of savings investment and resource mobilization in Nigeria*. Development policy centre, Ibadan. Research report 24.

Stratlink Africa. (2012). *East Africa economic review and assessment*. International Research and risk management. Retrieved from http://www.stratlinkglobal.com.

Summers, L. (1996). *Commentary in Ricardo Hausmann and Liliana Rojas-Suarez eds*. Volatile Capital Flows, (46).

Waithima, A.K. (2008). The Egg or The chick first; savings on GDP growth. Case for Kenya. Journal of Business Management, 1(1).

Wachtel, P. (1977). Inflation uncertainty and Savings behavior since the mid 1950's. *Explorations in economic research*. (58- 78).

Wooldridge, J.(2012). *Introductory Econometrics: A Modern Approach (Fifth ed.).* Mason, OH: South-Western Cengage Learning.

World Bank. (2012). *Walking the Tightrope: Rebalancing Kenya's Economy*. Nairobi: World Bank, June 2012.

World Bank, (2013), World Bank development indicators.

Ordinary Least Squares Linear Regression: Flaws, Problems and Pitfalls. (2009). Retrieved from *www.clockbackward.com*.

Zhu, C. (2011). *Savings and Current Account Balance: A Demographic Transition Perspective.* Retrieved from http://www.SciRP.org/journal/me

APPENDICES

Appendix 1: Map of Kenya

Appendix 2: Raw Data

	GDS	AG	CAB	GCF	GNI	IR	M2	RIR
1981	19.6	3.8	-9.9	18.6	3.8	10.9	29.5	1.4
1982	17.0	1.5	-5.5	19.0	0.9	11.6	30.4	2.6
1983	18.7	1.3	-2.7	18.1	2.1	11.8	28.2	3.6
1984	14.5	1.8	-3.9	17.2	1.7	10.2	28.3	3.8
1985	20.5	4.3	-3.6	17.3	4.2	8.3	26.7	5.3
1986	17.7	7.2	-2.6	19.6	7.2	8.7	30.4	4.9
1987	19.2	5.9	-8.0	19.6	5.7	5.4	30.2	8.2
1988	20.2	6.2	-8.4	20.4	5.8	6.5	28.9	8.0
1989	17.8	4.7	-10.3	19.5	5.7	9.8	28.4	6.8
1990	18.5	4.2	-8.5	20.6	3.0	10.6	29.6	7.3
1991	19.5	1.4	-5.2	19.0	1.0	12.5	31.0	5.7
1992	16.5	-0.8	-3.9	16.6	-0.6	18.9	36.5	1.8
1993	22.6	0.4	1.1	16.9	-1.8	25.7	37.1	3.4
1994	22.1	2.6	0.2	18.9	3.8	17.0	38.0	16.4
1995	15.3	4.4	-5.3	21.4	6.2	11.2	42.2	15.8
1996	8.1	4.1	-1.3	16.0	5.9	42.0	35.8	-5.8
1997	6.5	0.5	-4.0	15.4	1.0	11.4	38.4	16.9
1998	8.1	3.3	-4.1	15.7	3.7	6.9	35.8	21.1
1999	9.0	2.3	-2.0	15.6	1.9	4.2	35.8	17.5
2000	7.3	0.6	-2.6	16.7	1.0	6.1	35.2	15.3
2001	8.7	3.8	-2.6	18.2	3.6	1.6	35.2	17.8
2002	9.8	0.5	-1.4	17.2	0.8	0.9	38.2	17.4
2003	10.5	2.9	0.4	15.8	2.8	6.2	39.0	9.8
2004	10.7	5.1	-0.8	16.3	5.4	7.1	39.3	5.0
2005	10.2	5.9	-1.3	18.7	6.8	4.9	38.9	7.6
2006	7.8	6.3	-2.3	19.1	6.0	7.8	39.7	5.4
2007	8.2	7.0	-3.8	19.4	6.8	5.6	42.3	7.3
2008	5.1	1.5	-6.5	19.4	1.9	13.2	42.5	0.7
2009	6.6	2.7	-5.5	19.7	2.8	9.3	44.1	5.1
2010	7.5	5.8	-7.4	20.3	5.4	2.0	50.1	12.2
2011	4.3	4.4	-11.4	20.4	4.9	12.1	51.0	2.6
2012	2.9	4.6	-10.4	20.4	4.1	10.1	50.6	8.7

Source: World Bank data (2013)