DETERMINANTS OF AGGREGATE DOMESTIC PRIVATE SAVINGS IN KENYA, 1980-2003

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DECLARATION

I do hereby declare that this research paper is my original work. A similar work has not been presented or is due for presentation for any ward at any university.

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DEDICATION

To my loving parents Eunice and David Tiriongo

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I feel greatly indebted to the almighty GOD for enabling me to finish this research paper and in general my Masters degree studies. My sincere gratitude also goes to the entire teaching staff of Economics Department of Kenyatta University for both moral and technical support they granted me during my studies.

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Otherwise, I take responsibility for all errors and imperfections that may be found in this project paper.

Tiriongo k. Samuel

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ABSTRACT

This paper studied the determinants of aggregate domestic private savings in Kenya capturing the reform period 1980 to 2003.It was motivated by the existence of substantial fluctuations in the ratio of aggregate domestic private savings to GDP and the interest to test the impact of demographics and financial sector development on private savings. The study included demographic variables like young and old age dependency ratios, and the different measures or indicators of financial sector development: the ratio of M2 money to GDP, the ratio of liquid liabilities to GDP, and the ratio of the assets of commercial banks to the assets of central bank as new variables previously not used in any study on Kenya. Among the other variables were income tax, deposit rate used at central bank, current account deficit, the interest rate spread, terms of trade, inflation rate and real gross disposable per capita income.

A hybrid model was specified consisting of all the variables identified from the Life Cycle hypothesis on savings and consumption, the permanent income hypothesis and the simple Keynesian hypothesis was used in the estimations. The results of the estimations showed that aggregate private savings in Kenya is significantly determined by the current account deficit, the ratio of M2 money to GDP, real gross per capita income growth, deposit rate and the old age dependency ratio.

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LIST OF ACRONYMS

GDP	-Gross Domestic Product
NBFIs	-Non-Bank Financial Institutions
SSA	-Sub-Saharan Africa
GDS	-Gross Domestic Savings
OECD	-Organization for Economic cooperation and Development
PIH	-Permanent Income Hypothesis
RIH	-Relative Income Hypothesis
LCH	-Life Cycle Hypothesis
MPS	-Marginal Propensity to Save
MPC	-Marginal Propensity to Consume
UNDP	-United Nations Development Program
VAR	-Vector Auto regression

OPERATIONAL DEFINITIONS OF TERMS

Domestic private savings-This is the proportion of GDP that is saved in a year by all households and corporate firms in the economy.

Gross Domestic Savings, GDS-This is the total proportion of GDP that is saved in an economy over a period of one year, also referred to as national savings and includes government savings or dissavings. It is also the net of total revenue plus grants over total expenditure in an economy over the same period.

Gross Domestic Product, GDP-This is a measure of the total value of all final goods and services produced in an economy by nationals and foreigners over a period of one year.

Financial repression-This is the act of governments' heavy controls over their domestic financial sectors by intervening, distorting and taxing either directly or indirectly through quantitative credit allocation programs (McKinnon, 1989).

CHAPTER ONE

INTRODUCTION

1.1 Background

Growth in output of an economy depends partly on accumulation of human and physical capital, which in turn depends partly on available savings. Savings is commonly defined as 'postponed consumption' and therefore an important policy instrument critical to planning purposes. Infact, as noted by Thirlwall (1999), the most important issues in development economics are how to stimulate investment and how to bring about an increase in the level of savings to facilitate increased investment.

Investment funds may originate from both domestic and foreign sources. Domestic sources include public and private savings. The latter include savings by resident households and private firms while the former are the government (dis) savings. On the other hand, foreign savings are the deposits in non-resident financial institutions and securities issued by non-resident entities held by the government for liquidity purposes (World Bank, 2000). Jhingan (1992) points out that most developing countries in quest for rapid economic growth have often capitalized on both foreign and domestic sources of investment funds to formulate policies that can/ could encourage investment

However, for most of the developing countries, foreign sources of investment funds have been constrained by the existing external debt and unpredictable foreign aid. This has necessitated greater attention to the mobilization of domestic savings. For example, a 1996 survey by the World Bank and the United Nations Development Program (UNDP) ranked domestic savings top as an issue for institutional development in developing countries. In line with the UNDP survey, the developing East Asian economies have put great emphasis on fiscal discipline and on building a strong, effectively supervised financial sector able to mobilize private savings and allocate them to efficient investment (Makau, 1995). Drastic increases in domestic private savings in the East Asian countries was achieved through the institution of financial sector reforms and the fiscal discipline which facilitated sustainable economic growth rates.

Most individuals in the SSA, show considerable similarity in the methods used for saving, in the reasons they save and in the way they match savings and investment (Mwega *et al.*1990). A majority of the low-income households save in credit unions, the systems of rotating savings, savings and credit associations, co-operative savings association, the single collector system and the moneylenders while others adopt various informal methods including purchase of real assets like land with intentions to liquidate in future.

Many SSA countries, lack well-developed financial sectors, which can provide incentives for individuals to save and for efficient intermediation to convert these savings into credit for borrowers. Failures in the financial sectors of the region have been blamed on the existence of financial repression in most of the economies. Financial repression has been characterized by low or negative interest rates, high reserve requirements (sometimes of 20% to 25% compared to 5% to 6% in developed countries), which led to high spreads and thereby imposing an implicit tax on financial intermediation; mandatory credit ceilings, heavy government ownership and management of financial institutions.

According to Camen *et al.* (1996), financial repression in Africa has also hindered the development of the capacity of financial institutions in carrying out their informational and resource mobilization role. Soyibo (1994) noted that financial sectors in many African countries are heavily regulated, with much of their services geared towards servicing the public sector deficits, leading to a crowding out of the private sector. This, to greater extent explains the low private savings in most of African countries.

In pursuit of a well-developed financial system, many developing countries have implemented far-reaching financial and public sector reforms. Many studies have, found close links between financial deepening, productivity and economic growth and conclude that policies affecting the financial sector have substantial effect on the space and pattern of economic development via savings and investment (King and Levine 1993). It is for example estimated that policies that would raise the ratio of quantity of money in circulation (M2) to GDP by 10% would increase long term per capita income by 0.2-0.4% points (World Bank, 1994).

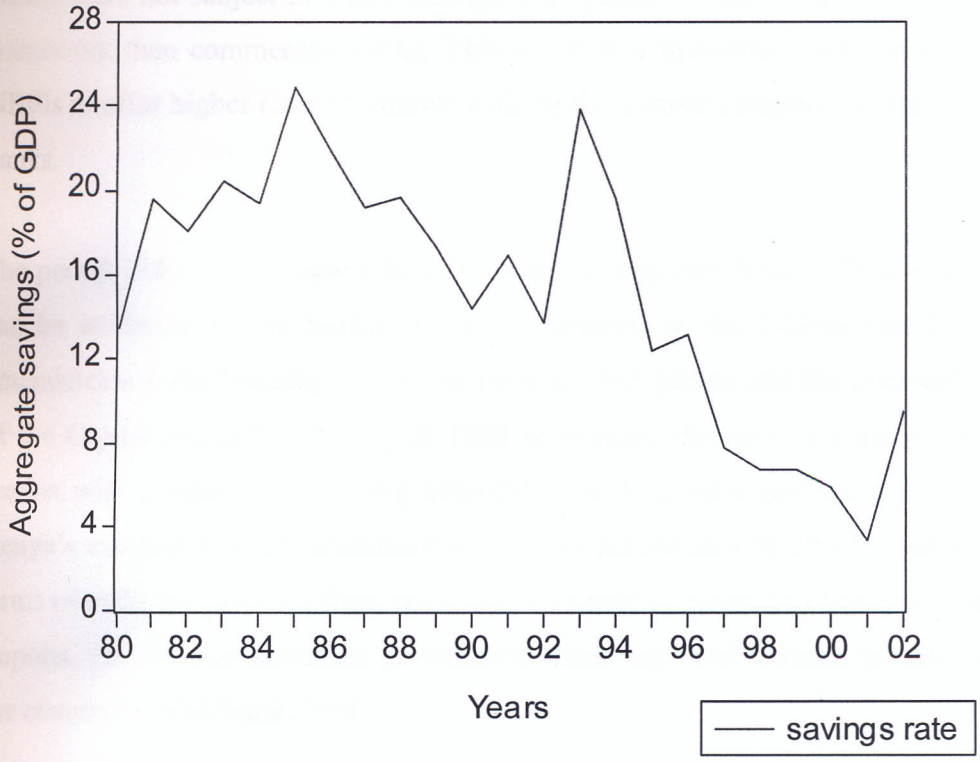
The reforms in the financial and the public sectors were meant to reduce the heavy regulation by the governments on the financial sectors and allow market forces take the lead in the accumulation of savings (Mwega, 1995). The reforms included lifting restrictions on bank lending, the provision of market based systems of credit allocation, lowering of reserve requirements and easing of entry restrictions to the banking sector by private firms, and financial liberalizations.

Despite attempts to increase savings through the reforms, many policies introduced into developing countries, such as concessionary discount facilities in central banks (vehicles for handling donor funds), high reserve requirements, and extensive use of targeted credit programs have discouraged deposit mobilization. Moreover, the numerous small savers that exist, even in the poorest sectors of the least developed economies, have been overlooked as a source of internal investment funds. The problem is that it is far easier and faster for governments to accept donor funds that come with conditionalities, than to mobilize domestic savings even though the latter may, in total, provide more credit than the former (Mavrotas and Kelly 2001).

1.1.1Savings and Kenya's macro economy

Major financial sector reforms were instituted in Kenya after 1981, motivated by low ratio of gross domestic savings(GDS) to GDP(Development plans 1994-1996,2002-2002).This ratio is normally used to measure the savings rate in an economy(Republic of Kenya,1988). The savings rate was 13.4% in 1980 and stood at 9.5% by 2002.In the period between 1980 and 2003, it fluctuated as Figure 1 illustrates.

Fig.1 Aggregate savings rate in kenya,1980-2002



Source: Republic of Kenya, *Statistical Abstracts (Various Issues),* Nairobi: Government Printer.

The rise in savings rate from 13.4% in 1980 to 20.4% in 1983 may be attributed to the political instability in Kenya that resulted from the attempted 1982 coup. This created political uncertainty and hence may have induced individuals to increase savings to cater for the uncertain political future. The rise in savings rate however, occurred in the midst of poor economic performance partly attributed to the poor economic performance of the major Western economies. This resulted to increased international rates of interest and a fall in demand for Kenyan exports. The GDP growth rate declined from 8.2% in 1980 to 6.8% in 1982 (Republic of Kenya, 1983). In 1984, the savings rate dropped to 19.4%, perhaps in response to the severe drought that wrecked the country and led to increased government expenditures and induced public savings.

However, in 1985 the savings rate rose to 24.9% up from 19.4% in 1984. This was perhaps as a result of the increase in the nominal deposits rates by about 100% in the first half of the 1980s and a reduction in inflation rate to 10.3% in 1984 down from 11.5% in 1983.During the period before 1985,many NBFIs were established because of

the minimal start-up capital required; lower than those required for commercial banks. NBFIs were not subject to credit ceilings and operated under a more liberal legislative framework than commercial banks. This acted as a favorable policy that enabled the NBFIs to offer higher rates of interest making them more competitive than commercial banks.

The period 1986 to 1990 saw a decline in the savings rate from 19.2 % to 14.4%. This can be attributed to the tightening of the controls to the NBFIs that followed the amendments to the Banking Act in the 1986 to 1988 period and the eventual setting up of the Capital Markets authority in 1989 to oversee the development of the equities market with a view to enhancing availability of long term resources for investment. Kenya's external position weakened during this period as a result of marked fall in its terms of trade that resulted from reduction in export volumes and increased volumes of imports. This further increased government dissavings and reduced private savings in the country (World Bank, 1990).

Savings increased to 23.8% of GDP in 1993 from 14.4% in 1990,despite a decline in 1992 to 13.7%. The increase in savings over this period could be attributed to the liberalization of the treasury bills market in November 1990 and the abolition of the financial institutions credit guidelines in December 1993 (which had existed since 1975 in favor of agriculture). These improved the rationalization and the operations of the domestic financial institutions by increasing their capacity to mobilize domestic savings (Mwega, 1995). This period also experienced the re-introduction of multi-party political system as major political reform in Kenya in 1992.This was accompanied by economic uncertainty, especially towards the season of electioneering later the same year. The uncertainty may have reduced domestic savings as funds were used in electioneering campaigns hence increase in dissavings. In 1993, the Kenyan economy was affected by an increase in money supply that led to a rise in inflation rates. This led to an increase in interest rates and hence a boost to private savings in the economy.

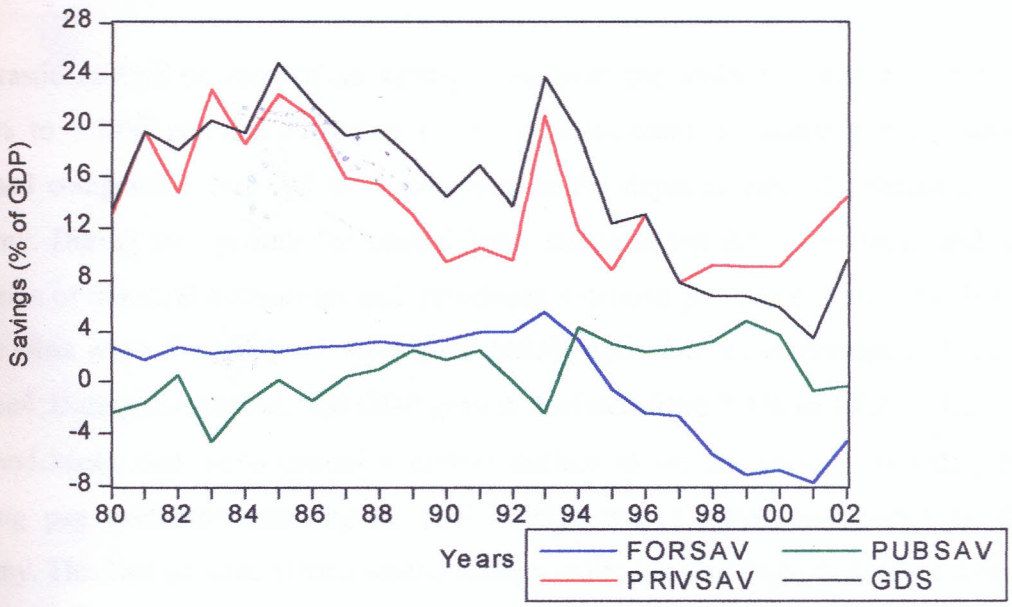
Other reforms in the period included the reduction of the direct and indirect taxation of financial institutions through reduction in reserve requirements, mandatory credit ceilings and credit allocation guidelines. Reduction in barriers to competition was also implemented in the financial sector by scaling down government ownership through

privatization, and facilitation of entry into the financial sector by domestic firms; and restructuring and liquidation of insolvent banks.

After 1994, the savings rate declined steadily from 19.6 % in 1994 to 8.0% on average in 1995-2002 period. This may have resulted from the continued withholding of aid by donor countries, which caused foreign exchange crisis that increased uncertainty in the financial markets. The uncertainty led to a reduction in the purchasing power of the domestic currency resulting to a drop in aggregate real incomes. In line with these factors, the ability of the private sector to save fell considerably. This perhaps explains the fall in the savings rate from 19.6% in 1994 to 9.5% in 2002.

The presentation so far has focused on gross domestic savings. However, gross savings has three components: public savings, foreign savings and private savings. Figure 2 shows the trends of the components of savings in Kenya over the 1980-2002 period.In the Figure 2 PUBSAV denotes public savings, PRIVSAV is private savings and FORSAV is foreign savings.

Fig.2 Savings rates (total,private public,foreign) in kenya,1980-2002



Source: Republic of Kenya, *Statistical Abstracts (Various Issues),* Nairobi: Government Printer

It is apparent from Figure 2 that private savings describe to a greater extent the trend in gross savings in Kenya. Therefore, the possible explanation suggested for the trend in gross savings rate hold for private savings rate.

During the 1980 to 1984 period, the private savings rate increased due to the uncertainty in the country that resulted from the attempted coup (1982) and the severe drought (1984) that led to a reduction in investments in the country and hence increased private savings. Besides, the Central Bank of Kenya adjusted all the principle rates of interest upwards in 1981 to bring the rates to positive real levels that had become negative after the 1973/74-oil price increases. Also, during the 1980-1985 period, the NBFIs experienced rapid expansion of their role in the economy by way of lending and the mobilization of deposits, which grew at an average of 28%. This growth may be attributed to the prevailing high returns on investment in the financial sector, facilitated by the less stringent controls governing these institutions before 1985. This had a positive impact on private savings that rose to the peak of 22.49% in 1985, the highest so far realized in Kenya (Republic of Kenya, 1989).

The drastic decline of the private savings rate over the 1985 to 1990 period from 22.49% to 9.39% can be attributed to the establishment of many NBFIs, which increased competition and led to a reduction in the deposits rate of interest in the economy. During this period, the central bank strengthened the supervision and the inspection of financial institutions and introduced a deposit protection fund. This led to a bank crisis when a number of 'specified' NBFIs and other small commercial banks collapsed. During this period, real GDP growth declined from 7.1% in 1986 to 4.2% in 1990 and hence may have caused a further decline in private savings. Besides, the crawling peg exchange rate regime (1983-1993) was allowed to operate in the economy. This had adverse effects on the foreign exchange earnings, and hence a drop in the income levels in the country. This resulted to a decline in the private savings. Inflation rates in the economy during this time rose from 4.8% in 1986 to as high as 29.5% in 1992.This had an effect of increasing the consumption expenditure of both business firms and households in the country and hence reducing private savings.

Between 1990 and 1991, there was an increase in the private savings rate from 9.39% to 10.57%. This can be attributed to the start of liberalization of the money market and

the treasury bills market in November 1990 that caused an increase in the Treasury Bills rate hence increasing private savings. It was also during this time that foreign donor aid was withdrawn and hence the government ran huge budget deficits as shown by the downward trend of public savings rate in Figure 2. However, in 1993 the private savings rate rose to 20.73%. This can be attributed to the increase in money supply in the economy that resulted from the 1992 general elections that led to increase in the rates of interest.

After 1993,the private savings rate declined to 7.84% in 1997.It rose in subsequent years to 14.38% in 2002.The decline up to 1997 may have been caused by continued withholding of foreign aid that caused a persistent increase in the exchange rate, which resulted to an increase in expenditure on the basic consumer products. The approval of the Central Bank Amendment Bill in 2000 that obliged commercial banks to fix the lending and deposit rates at respectively 4% and 8% points above the 91-day Treasury Bills rate may have also affected private savings. This was intended to control the hike in interest rates experienced in the two preceding years (though was a step backwards in the market liberalization, which was completed in 1995). Foreign savings during the period 1993 to 2002 continued to decline due to unreliable foreign aid that probably forced the government to privatize public institutions to finance the budget hence maintaining public savings almost constant.

2.3 Problem statement

The movement in private aggregate savings (% of GDP) in Kenya was erratic over the 1980 to 2002 period. From 1980 to 1983 it increased to 13.13% to 22.81%. After 1984, it dropped drastically to 7.84% in 1997(except for 1993 when it was 20.73%), then later rose slowly to 14.38% by 2002 (Fig.2). It is therefore not clear whether the ratio would persist to increase in the post 2003 period. To facilitate economic growth in Kenya, the private savings rate must increase enough to facilitate desired increase in investment levels. According to Figure 2, private savings comprises the largest proportion of gross savings compared to public and foreign savings. Consequently, policies to improve domestic savings in Kenya can and have been directed to private savings. Despite this, the private savings in Kenya have depicted erratic movement in an environment of static public savings and falling foreign savings.

The decline in the private savings rate between 1980 and 1992 period led the government to come up with the theme 'Resource mobilization for sustainable development' for the 1994-1996 development plan. The plan highlighted financial sector reforms that would be undertaken to improve the investment scenario in Kenya through a reduction in the levels of financial repression, by allowing market forces to dictate the levels of interest rates among other financial parameters. It projected the ratio of private savings to GDP to 17% by 1996 (Republic of Kenya, 1994). The ratio achieved by 1996 was 13.08%, which was 3.92% below the projection. The 2002-2008 development plan projected the ratio to between 25%-30% after 2002.

A number of previous studies on Kenya focus on the economic factors that determine national savings and/or private savings deposits (see for instance Oshikoya, 1992, Munyuka, 1994, Asele, 1997, Mwega *et al.*1995), However, while they add to our knowledge on this topic, they do not consider some potential determinants. For example, the Life cycle savings hypothesis suggests that the age composition of a population may influence private savings; this has not been investigated in the case of Kenya, except for Lillydahl (1976),who studied private savings in Nairobi town. In a study of financial savings in Kenya Asele (1997) suggested that a gap remained regarding the influence of demographic factors on private savings in Kenya. Further, although financial sector development can influence private savings, previous studies with exception of Asele,1997 (who used number of cheques cleared as a proxy for financial innovations in commercial banks, to capture financial development) have not considered indicators of financial sector development in the determination of private savings in Kenya.

From the foregoing, understanding the determinants of private savings in Kenya remains an important topic. The following research questions therefore arose for this study:

(i) What is the impact of economic and demographic factors on domestic aggregate private savings?

(ii) What is the impact of the indicators of financial sector development on domestic private savings?

1.3 Objectives of the study

The general objective of this study was to investigate the determinants of aggregate private savings in Kenya in the 1980-2003 period. The specific objectives of the study were:

(i) To examine the impact of economic and demographic factors on domestic aggregate private savings in Kenya.

(ii) To establish whether indicators of financial sector development have any significance to the determination of private savings.

1.4 Significance of the study

The study is significant for two reasons. First, it may be necessary for appropriate policy making geared towards increasing aggregate private savings in Kenya. Secondly, it adds to the country specific studies and hence addition to knowledge and can serve as a foundation for further research.

1.5 Scope of the study.

The study focused on the determinants of private savings in Kenya, and covered the period 1980 to-2003. The rationale for the choice of this time period was the fact that it is from the early 1980s that reforms in the financial sector were initiated, and therefore the study intended to cover the reform period. Also, data constraints on the key determinants like the demographic variables were experienced for periods before 1980.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter first outlined the theoretical literature about private savings and secondly presented empirical literature on a number of studies on the determinants of aggregate private savings mainly in developing countries. Finally, based on the theory reviewed and the empirical findings, an overview of literature was done.

2.2 Theoretical Literature

Private savings comprise of savings by firms (retained earnings or provision for depreciation) and household savings. The two components of private savings are inversely related to each other in the sense that an increase in firms' savings attained by reducing the portion of distributed profits will reduce households' disposable income by the same amount thus reducing households' savings. The net effect on private savings will depend on the marginal propensity to save (MPS) in the households sector.

Different theoretical approaches have been put forward to explain private savings behavior: Classical theory, Relative income hypothesis, Keynesian/absolute income hypothesis, life-cycle hypothesis, and the permanent income hypothesis. According to classical theory, an increase in the rate of interest will have stronger effects of increasing the MPS than discouraging investment. In this theory, the level of investment is constrained by the volume of savings available. This theory assumes full employment in the economy and therefore the level of income is exogenous.

The Keynesian or Absolute income hypothesis, in its simple form, fronted by Keynes (1936), however, states that savings is a stable and increasing function of the level of income. This can be formalized as:

$$S_t = a + bY_t \quad \text{.....(2.0)}$$

Where S_t and Y_t are real personal saving and real personal disposable income for the current period respectively, a is a constant and b is the MPS. Keynes envisaged the

marginal propensity to save to be governed by what he called objective and subjective factors, and included such factors as the rate of interest, social and institutional changes, and subjective motives for savings. However, it was considered that these factors were relatively constant, and that by far the most important variable which influenced saving (Consumption) was the income an individual 'counts on' (disposable income). But changes in other factors would produce a change in the MPS.

There are three further aspects of this hypothesis that are important to underline: First, Keynes regarded savings as a residual after consumption had taken place. Second, the short run MPS is greater than the long run MPS as consumers take some time before they adjust their consumption levels to new conditions, but both the short run and long run marginal propensities to save are greater than zero and third, it is investment and the condition that it produces which determine the level of income through the multiplier, and given the MPS, any level of investment will generate its own finance.

Growth according to this theory is not constrained by finance, but rather by insufficient effective demand. Keynes did not discard completely the classical assertion that saving and investment will determine the equilibrium rate of interest for a given level of income. Keynes main contention was that an increase in the rate of interest has a negative effect on investment, which is stronger than the positive effect on savings. Further, since investment determines income, a decrease in income would reduce the volume of savings rather than increase it. The classical assertion for him was only valid when the economy is in full employment, that is when the level of income is given.

Keynesian consumption (savings) theory was put forward as part of a general framework aimed at understanding the dynamics of an economy, which is not in full employment. It is meant to explain the saving determination in an economy which has the following characteristics: First, it is a stable economy with little changes in economic and social structures, second, it is a developed economy which is in underemployment, third, it is an economy in which either income is exogenous and follows a random walk, or where liquidity constraints are important and consumers are forced to rely on the current income. Some of these features of this theory call its relevance in developing countries into question.

The implication of this for the Keynesian hypothesis is that the relation between savings and income is not as this hypothesis predicts. On the contrary, the relationship is more complex. In the process of development, the MPS and average propensity to save (APS) change, presumably due to the structural changes that these economies undergo. The Keynesian hypothesis will only be corroborated if very small periods of time are considered, when these structural changes do not figure importantly. Any hypothesis put forward for developing countries must begin by recognizing the existence of structural changes. If they do not, then any predictions made therefrom are likely to be wrong.

James Duesenberry (1949) developed the Relative Income Hypothesis(RIH). This hypothesis states that people are not just concerned about absolute levels of possessions, they are infact concerned about their possessions relative to others and that 'keeping up with the 'joneses' may be a more powerful incentive than the pursuit of wealth for its own sake'. The hypothesis argues that an individual's attitude towards consumption and saving is guided by his income relative to others than by an abstract standard of living. Duesenberry also state that poor people may consume more of their income than the rich people because they want to reduce the gap in their consumption levels. This is in contrast to the simple Keynesian consumption and savings function. The RIH also argues that people have a greater tendency to resist decreases in spending relative to falls in income than they do to increase expenditure relative to increases in income. The reason is that they don't want to alter their standard of living downwards, and hence use the previous peak income to maintain them in the previous levels of consumption.

Another hypothesis of consumption and savings, the permanent income hypothesis (PIH), was put forward by Friedman (1957). PIH which is related to the Relative Income Hypothesis through the previous peak levels of income. It propounds that consumption, defined so as not to include consumer durables but only that part actually consumed, is a function of a non observed variable which he called permanent income (Y_t^P)

$$C_t = kY_t^P + U_t \quad \text{.....(2.1)}$$

Where Y_t^P is permanent income in period t, C_t is consumption in period t, k is the MPC and U_t is the error term with mean of zero and constant variance. Permanent income is defined as the maximum income that an individual could spend without reducing the real value of his wealth, that is the capitalized present value of his expected future earnings or the real interest rate times the expected value of his wealth, which is defined to include both non human and human wealth. The Average Propensity to Consume (APC) and k are functions of the real interest rate (r) at time t, the ratio of non human wealth to permanent income (w) and a variable which captures other factors such as tastes and preferences or at the aggregate level factors like age and family size. The difference between measured or observed income and permanent income is transitory income (Y^T_t). Similarly, a redefined concept of consumption is divided into permanent and transitory components. Both transitory income and consumption have a mean equal to zero and are uncorrelated with their permanent components, and hence if there are no measurement errors then U_t in 2.1 is transitory consumption.

Since in the steady state both transitory components of income and consumption will have a mean of zero, Friedman explains the constancy of the APC using equation 2.1. In the long run, one will observe the permanent components, and the ratio of consumption to income will equal k, which Friedman found to be close to 0.9. It was his contention that those variables, which affect k, were constant over the long run or else their effects would tend to offset each other. In the short run, since Y_t^P will differ from current income Y_t, this will account for the variability in the short run MPC from current income. One major problem with the hypothesis is to estimate the value of permanent income from observed data. Friedman related permanent income to a distributed lag function of past values of measured income as in equation 2.2:

$$Y^P_t = (1-\mu)\, S\mu^i\, Y_{t-i} \quad \ldots\ldots (2.2)$$

Where Y^P_t is permanent income in period t. Y_{t-i} is the lagged real aggregate income or per capita real current income, t is the period over which the estimate is calculated and μ is a constant, $(1-\mu)$ is a parameter determining the weights given to the measured income at different periods, the longer the lag length (i) the lower the value.

Based on the neoclassical theory of optimization, the consumer is modeled as a completely rational individual capable of anticipating with complete certainty the variables he/she needs to estimate for his permanent income and consumption that is future income, prices, the rate of interest and other variables which are likely to affect optimization. This consumer maximizes utility subject to constraint imposed by total wealth or the permanent value of all earnings to be received over the life cycle.

Uncertainty is only considered to the extent that it affects the ratio of non-human wealth to permanent income. Greater uncertainty with respect to future events will induce the consumer to increase his level of saving and thus, raise this ratio. Savings in this model has three-purposes:(i) To smooth out the stream of the expenditure;(ii) To earn interest when interest rate is high since future consumption becomes worthwhile, and (iii) To make provisions against more uncertainty than the previously expected.

A key aspect of this hypothesis is the estimate of permanent income used for testing this theory. Friedman used a formula as in equation 2.2, where the value of $(1- \mu)$ is called the 'inertia parameter', for it reveals the importance attached to current income in forming expectations of the value of future incomes. This methodology implies that it leaves the most important parameter to be determined by the data to be used and there are no predetermined values for this parameter. This point is very important because while this hypothesis is based on the ex-ante concepts of permanent income, which depend on the expectations of each individual, the methodology uses ex-post concepts that are not in accordance with this theoretical concept e.g. measured income.

Equation 2.2 asserts a particular pattern for the formation of expectations where the consumer observes an income generating process of income level and where future values are only a function of past values of the same variable. This requires some ex-ante information to facilitate the formation of expectations; otherwise the hypothesis is rendered arbitrary. The hypothesis also assumes that consumers face no constraints and that it is always possible to transform present income into future consumption. It is also assumed that savings is not only a residual but there are other motives for savings other than to smooth out streams of expenditure. If it is envisaged that developing countries are prone to a higher degree of uncertainty with respect to future price levels, income,

interest rates etc, and subject to important structural changes, then a more adequate and appropriate model should capture these factors.

The life cycle hypothesis (LCH) by Modigliani and Brumberg (1954), like the Permanent Income Hypothesis (PIH) propounds that consumption (defined as in PIH) is not a function of current income but the expected discounted value of future labor earnings of the individual. However, in contrast to the infinite life, which Friedman assumes in the concept of permanent income, the LCH establishes a relation between consumption and lifetime resources. The allocation between consumption and savings will be affected by position in the life cycle, and not by the extent of total resources. It assumes that individuals in the same age group have the same preference for allocating consumption overtime and that the factors determining the distribution of income; expectations of income, and net worth over the different age cohorts remain constant.

Ando and Modigliani (1963) in testing the life cycle hypothesis stated by Modigliani and Brumberg (1954) formulated their consumption function as in the following equation:

$$C_t = a_1 YL_t + a_2 YL^e_t + dA_{t-1} \quad \text{.....(2.3)}$$

Here, C_t is current consumption, YL_t is current labor income, YL^e_t is the average annual expected income (defined as the present value of the expected value of future labor income divided by the number of years for which the individual expects to receive income), A_{t-1} is the accumulated wealth as at the previous consumption period, and a_1, a_2 and d are parameters. Expected lifetime resources are defined as the sum of current income, expected income and accumulated net worth.

Furthermore, they argue that the average annual expected income is a function of current labor income and this depends on the ratio of the total labor force to those actually employed. This yields the following consumption function:

$$C_t = a\, YL_t + dA_{t-1} \quad \text{.....(2.4)}$$

Where variables are defined as before and $a = a_1 + a_2$. If we assume that the long run expectations are fulfilled and income is equal to expected income, then

$Y_t^e = Y_t = C_t + S_t$.....(2.5)

Where S_t is saving and the other variables are defined as before. Then if total income Y_t is equal to $Y_1 + rA_{t-1}$, where r is the rate of return and rA_{t-1} is capital income, a savings function consistent with (2.4) can be obtained as follows:

$S_t = (1-a)\ Yt - d^*A_{t-1}$.....(2.6)

Where d* =d-ar, and other variables are as defined above. Saving in this hypothesis should be seen as the accumulation of wealth for several motives. The most important of these are: for retirement, for making necessary allowances to smooth consumption stream over the individual's life, and as insurance against unforeseeable eventualities, which is relevant when uncertainty is considered.

In general, this hypothesis asserts that if individuals can anticipate with complete certainty their income and consumption levels throughout their lives and the years in which they work and retire, then it is possible to show that the MPC is constant and is independent of income. Consumers will save to consume a constant stream of their resources each year (which do not depend on current income), and if retirement is an important motive, then saving will occur at an early stage of the life cycle when workers are still in their productive years and dissaving will occur only when in retirement.

At an aggregate level, assuming that the variations in age structure of the population are minimal, then it is possible to predict a saving ratio that:(i) Will be zero in a stationary state, with the saving of the working population equal to the dissaving of those who have retired; and (ii) Will be positive in the steady state if growth will be attained either by population growth or by higher productivity. In both cases (in ii), the savings ratio of those in their working years relative to the dissaving of those in retirement will increase, either by increasing the number of the workers or the wage rate respectively.

If annual expected income is allowed to differ from current income, it is possible to explain the short run instability of the average propensity to consume in the following

circumstances: First, if current income is above the expected level, then this transitory income will be saved as was the case in PIH. Second, if this change induces an upward revision of the expectations, for example, because the actual level of current income is an important factor affecting expectations of future income, then the desired level of assets will be corrected to the new (higher) level of expected future income. Moreover, it is also possible that upwards corrections in expected income will have a depressing effect on consumption the closer the retirement year comes (Modigliani and Brumberg, 1954).

2.2 Empirical Literature

2.2.1 Specific Literature

Modigliani and Ando (1963) provided one of the first empirical tests of the life-cycle model. They ran the following regression,

$$C_t = c_t (Y_d)_t + k_1 W_t + U_t \quad \ldots\ldots (2.7)$$

Where C_t is total consumption, $(Y_d)_t$ is disposable labor income and W_t is the financial wealth of the household sector all at a particular time t. U_t is the random error term. The equation was estimated using annual time series data for the 1952-1962 period. They expected to find c_1 (MPC out of current income) to be less than 1,and the coefficient k_1 a little greater than the annual rate of interest, because a person behaving according to the life-cycle theory would like to spend her assets over the entire lifetime. If she consumes only the interest income in each period, she would die with her assets intact; she must therefore consume a little more than the interest earnings. Ando and Modigliani estimated the value of c_1 at 0.7 and k_1 at 0.06, the latter slightly more than the annual real rate of interest.

The findings of Ando and Modigliani were encouraging for the life-cycle theory. Further tests of the life-cycle model have provided some substantiation, but they have also turned up some empirical inconsistencies. It seems that households indeed save more during the prime of working years than they do when they are young or old. But at the same time older people appear not to dissave very much. In other words, they

keep their assets intact, and eventually pass along these assets to their heirs inform of bequests rather than use their wealth for consumption during their own lifetimes. The failure of the old to run down their wealth remains one of the important puzzling counterexamples to the reasoning of the life-cycle hypothesis.

Many of the studies on savings and income have commonly been based on the simple Keynesian hypothesis and permanent income hypothesis to study the relationship between savings and income. Johnson and Chiu (1968), in a macro study of the relationship between private savings and income in a cross section of 30 countries (developed and developing) over the 1950-1965 period, estimated a simple savings equation of the form:

$$S_t = a + bY_t + u_t \quad \text{.....(2.8)}$$

Where S_t is aggregate private savings (nominal) at time t, Y_t is the total disposable income in a country at time t, u_t is the random error term, and *a* and *b* were parameters to estimate autonomous savings and the MPS, respectively. The results showed that income was a significant determinant of private savings and it had a positive coefficient.

Kelly and Williamson (1967), in a microeconomic study of household saving behavior in Jakarta Indonesia, (1958-1958) examined the impacts of occupation and sources of earnings on savings. They used a sample size of 490 households, divided into six occupational groups namely, farmers (296), traders and craftsmen (35), owners of business (33), government employment (43), other wage earners (47) and unclassified occupations (36). For each of the groups they expressed a simple Keynesian function defined by per capita saving and per capita income. In all classes the income coefficient was positive while the intercept term was negative, hence implying that MPS>APS. All the estimated coefficients were significant at the 99% level with a goodness of fit of 0.81,0.61,0.442,0.239,0.17 and 0.113 respectively. It can therefore be observed that businesslike occupations are likely to contribute more to savings than occupations defined by wage employment.

Leff (1969) tested the null hypothesis that high dependency rate leads to low savings against the alternative hypothesis that it does not lead to low savings. Dependency rate as suggested by the Life Cycle theory of consumption and savings was used. It was defined as the ratio of those below the age of 14 and above 65 years to the total population, of a cross section of 74 developing countries in Asia and Africa.Multivariate regression analysis was used with the dependent variable being per capita savings and the independent variables were disposable income, real interest rate, and the dependency rate. A log linear savings equation was estimated. The null hypothesis could not be rejected, hence an indication that dependency ratio was statistically significant and important determinant of savings. The estimated model's goodness of fit measure was 94%.

Gupta (1970a), in a study to examine the household saving behavior in India ran regression equations for the urban and rural sectors separately. His study was based on annual time series data for the 1950-1966 period. He defined both income and savings in real per capita terms and estimated the simple Keynesian function:

$$S/N = a + b\ Y/N \quad \text{.....(2.9)}$$

Where S/N is per capita savings and Y/N is per capita income. The function was found to fit the rural sector well and gave a measure of goodness of fit of 91% compared to 49% for the urban sector. Income coefficient was found to be positive and significant. Using the simple Keynesian model , Qian (1988) in a study of urban and rural households saving behavior in china, finds a high propensity to save in the rural sector. This may be attributed to the varying definitions of income used in the studies. Gupta used per capita income, which was highest in urban India while Qian used current income, which was highest in rural china.

Gupta (1970b) using time series data for rural and urban household savings in India for the 1950-1966 period identified different interest rates. A simple savings function (as of chiu, 1968) was estimated. For the urban sector, different interest rates were tested and the commercial bank saving deposit rate was found to give good results. The goodness of fit for the model was 67%. For the rural sector, relevant interest rate was that of post

office saving deposits, which gave an R-squared of about 94%. Savings responded positively to interest rate in both sectors.

Mikesell and Zinser (1973), using data from Latin American countries, estimated the simple log linear savings equation like Leff's (1969) for a sample 1964 to 1972 period. The log linear equation estimated was of the form:

$$\ln S = ß_0 + ß_1 \ln Y_g \quad \text{.....(3.0)}$$

Where lnS is the logarithm of savings, $\ln Y_g$ is the logarithm of income growth, and $ß_0$ $ß_1$ are elasticities.They found high propensity to save for the rural sector.

Pickersgill (1976) estimated Leff's model of 1969 to investigate the determinants of household saving behavior in the Soviet Union. Data on real per capita savings and per capita disposable income for the 1955-1971 period was used. Also included was dependency ratio as an independent variable. It was measured by the proportion of population above the age of 65 and below 14 to the total population. The estimates for the log linear model had a goodness of fit of 86% with a positive marginal propensity to save (MPS). The dependency ratio was also found to be significant. Results of the permanent income hypothesis were not any different, while the intercept term was negative and significant, implying that MPS was greater than average propensity to save (APS).

Boskin (1978) on the other hand using United States of America time series data for the 1929-1969 period tested the effect of interest rate and taxation on savings. Both the estimates for the log linear savings function and semi log savings functions yielded identical results. The log linear and semi log linear savings functions were respectively:

$$\text{Log } S_t = a + \log r + \log Tr + E_t \quad \text{.....(3.1)}$$
$$S_t = a + \log r + \log Tr + E_t \quad \text{.....(3.2)}$$

Where S_t, is the total aggregate savings (nominal), r is the rate of interest (interest earned on savings deposits), Tr is the tax rate and E_t is the random error term. The interest elasticity of savings was estimated at 0.4,and that of tax rate was -0.54.

Other studies, for example Giovannini (1985) examined the relationship between savings and interest rate using time series data for 1973-1986 period from seven Asian countries.The null hypothesis was that interest rates and savings had a positive relationship. Based on results of a non-linear model the findings showed that the real interest rate was significant and inversely related to savings.Thus the null hypothesis could be rejected.

Klaus *et al* (1991a) extended the log linear savings function to include growth of per capita income as a separate variable. He sampled 10 developing countries from south America Asia and Africa, in a study of household saving behavior. Using time series data for the period 1970-1985, they found all the income variables to have positive effect on savings with the per capita disposable income being the most significant.

In Mexico,a study to investigate the determinants of private savings by Arrau and Oks (1992) was prompted by a sharp decline in the private savings level between 1980-1990.The findings of the log linear saving function (like in Klaus *et al.*, 1991) revealed that the decline was caused primarily by a fall in disposable income and increasing consumption. Disposable income was noted to have been fluctuating in the 1980s.This supports the view that savings and income are positively related.

Klaus *et al* (1991b) defined dependency rate as a proportion of the people below the age 15 and above 65 years to total population. They argued that older people work less and at least partially live off their savings while households with more children at home are thought to save less because they would postpone saving for retirement until the children moved out. The results of this study were mixed and the dependency ratio was found to possess widely varying effects unlike the results of Leff (1969).

Celasum and Tansel (1993) estimated a simultaneous equations model for Turkish saving-investment behavior over the 1972-88 period. The relationships between household saving, income and the number of children are examined. The estimation results were based on the significant impact of functional income distribution on private as well as on total domestic savings. Financial liberalization captured by a dummy appeared to have a positive effect on private savings in Turkey.

Another study of private savings in Turkey is by Kivilcim (1995), which covered the period 1968-1994. Private savings was measured by the net of total revenue over total expenditure, minus foreign savings. The categories: government policies (social security programs, fiscal policy measures), private savings inertia (lagged private savings), income and growth variables, financial sector development variables, demographic variables (life expectancy, urbanization ratio, age distribution of the population), macroeconomic stability and political stability, were used as the explanatory variables in the model estimated.The study found that income has strong positive impact on private savings while the effect of growth rate of income is not statistically significant. Private credit and real interest rates were used to capture the severity of the borrowing constraints and the degree of financial repression in Turkey. Moreover, life expectancy was found to have a negative and significant impact on private saving.

Arestis, (1997), studied savings and financial sector developments (proxied by the ratio of broad money, M2 to GDP) also employing an innovative panel cointegration approach on 17 sub-Saharan African countries (Kenya included). The study investigated the potential long-run determinants (excluding rate of interest and demographic variables) of private saving. The study used three different measures of financial sector developments (the ratio of M2 money to GDP, ratio of liquid liabilities to GDP, and the ratio of deposit money banks assets' to central bank assets) to capture the variety of sectors through which the financial structures affect the domestic economy. Inconclusive evidence associated with this study seems to suggest that the financial reforms undertaken in many African countries in recent years and the existing financial structures in many of the African countries are not appropriate to mobilize private savings. The results obtained showed that disposable income had a significant impact on private savings in most of the countries.

Aron and Muellbauer (1999) investigated the determinants of private savings in South Africa, separately examining household savings and corporate firms' saving behavior over nearly three decades (1962 to 1997). It was found that wealth and financial liberalization had negative and significant effects on private savings while real interest rates and uncertainty had positive and significant effect. Moreover, it was found that

corporations save more when dividends-tax rates rise, while in the absence of capital gains tax, higher inflation raises corporate saving.

Kelly and Mavrotas (2003) studied the determinants of private saving in Sri Lanka and 17 African countries with a primary focus on the role of the financial sector development. An index of financial sector development variables was constructed, based on measures of relative size of the financial sector, the absolute size and the activity of financial intermediaries. The index was found to have a significant positive influence on the level of private saving, giving support to the hypothesized nexus between saving and financial sector development. The study also found empirical evidence for the significance of credit constraints on private savings .Use of different measures of financial sector development for a heterogeneous panel of the 18 countries (Kenya excluded) was employed. On the modeling front, an innovative econometric methodology of the extended life cycle hypothesis of the savings behavior, was used for estimation, related to a series of co integration tests within a panel, to check heterogeneity bias problems. It was found out that in most of the countries in the sample, positive relationships between financial sector development and savings was significant. The model took the form:

$$PSAV_t = a + a_1 PCRED_t + a_2 GOVSAV_t + a_3 RGPDI_t + a_4 FSDx_t + e_t \quad \ldots\ldots\ldots\ldots\ldots (3.3)$$

Where $PSAV_t$ is the private saving rate defined as total investment minus government savings and foreign savings, $PCRED_t$ denotes the liquidity constraint captured by financial resources provided to the private sector, $GOVSAV_t$ is the rate of government saving, $RGPDI_t$ measured real gross private disposable income per capita, and $FSDx_t$ was an appropriate financial sector development indicator.

2.2.2 Literature specific to Kenya.

Lillydahl (1976) studied the economic and demographic influences on household savings in urban Kenya. The variables considered included income, wealth, household size, family structure, tribal affiliation, education and number of income earners in the household. Data was obtained from the 1968/69 Kenya urban household budget survey. The study found that income was by far the most significant determinant of urban

household savings. It was an increasing but non-linear function of income. Household size, and education of income earners were found not to significantly influence savings in urban households .

Lillydahl found the impact of the number of children on savings and consumption not significant. What the study noticed to be influencing savings inversely was the extended family institution. The factors; household size and education of income earners in the households however may indirectly have impacts on savings through their influence on household income. The study however did not include other variables like employment status and did not cover the rural setting in Kenya.

Kamau (1973) conducted a study on the effects of Kenyanization on personal savings. Kenyanization was defined as residence in Kenya. The motives behind savings by Europeans, Asians and Africans were investigated. It was noted that Asians were particularly instrumental in saving for investment and educational purposes while Europeans saved for use at old age. The Africans on the other hand saved to be able to consume high value consumer goods and educate their children. In combining the three groups in a descriptive analysis, the majority of the respondents saved for their children's education above all other motives, followed by a better future for family motive and savings for emergencies. 27.9% of the respondents saved for children education, 15.7% for better future of the family and 13.6% for emergencies. Others were investment motives (11.4%), provision for old age (5.8%), purchase and development of farm/ land (5.8%), supporting relatives (4.3%) and marriage (1.4%).

In a summary of main findings of the 1981/82 Rural Household Budget Survey, it is reported that rural households' savings have an APS of 36.6% and this varied from district to district (Republic of Kenya,1988). This further supports the potentiality of savings in rural areas. The APS was found to significantly increase with income as expected from economic literature. Fitting a semi log regression model, a 10% increase in income was associated with a 3.34% increase in the APS. Therefore, programs intended to boost rural incomes should have a positive impact on savings.

Kagira (1988), conducted an empirical study to identify the determinants of private savings in Kenya. Private savings was defined to include household and business

savings. Time series data was used for the period 1968-1988 and the estimated savings function was of the form:

$$PSAV_t = a + b\,BD_t + c\,FAI_t + d\,DINC_t + e\,TEXP_t + f\,TR_t + g\,R_t + E_t \quad \ldots\ldots\ldots\ldots\ldots (3.4)$$

Where PSAV is private saving, BD is distance to nearest bank , DINC is disposable income, FAI is the foreign aid inflow, TEXP is the total exports, TR is the tax rate and R is the rate of interest, all measured at year t.a, b, c, d, e, f, g are the coefficients of the explanatory variables, and E_t is the random error term.

Disposable income was disaggregated into current, permanent and transitory components and obtained a positive coefficient for current and permanent income while the transitory income had a negative coefficient. This means that transitory income is consumed hence depressing savings. Contrary to his hypothesis, the coefficient on export variable turned out to be negative and that on tax rate positive. Foreign aid inflow was found to have a positive impact on private savings. Bank distance coefficient had a negative sign and so did interest rate. Kagira's study however did not include demographic variables like age and dependency ratio that would determine savings. It also treated the determinants of household and business savings to be the same.

Mwega *et al* (1990), studied interest rate and savings mobilization in Kenya. The objective of the study was to test the hypothesis that interest rate has a significant positive effect on financial savings in Kenya. An extended linear model of the Keynesian savings function was used to test the responsiveness of private saving rate to real deposit rates on 1966-1985 annual data derived from the International Financial Statistics Yearbook. The coefficient was –0.295 with a t-statistic of 0.235.The conclusion reached was that real deposit rate had an insignificant impact on the saving rate in Kenya and disapproved the hypothesis.

In another development, Mwega (1991) carried out a study on the mobilization of domestic savings in Kenya for the period 1980 to 1990. The objective was to investigate the potential and constraints that Kenya faces in the mobilization of household, business and public savings and the scope of the financial and capital

markets in the country to efficiently allocate the mobilized savings to investment. In this study the contribution of interest rate was vital. Unlike the former study, this study found the effects of real interest rate to be mixed and therefore ambiguous, which is in line with economic theory. This can be explained by the fact that the former study used only the real deposit rate an d the later used several interest rates.

Asele (1997), studied the economic determinants of financial savings in commercial banks in Kenya, covering the period 1968 to 1995.The study defined financial savings as savings deposits in commercial banks. Time series data was used to estimate an extended Keynesian savings function. The results obtained showed that real disposable income, nominal exchange rate, number of cheques cleared (proxy for innovations in the financial sector, and lagged commercial banks' deposits were found to be significant determinants of private savings in Kenya. The study excluded demographic variables as the potential determinants of savings in Kenya.

2.2.3 Overview of the Literature

Permanent income hypothesis makes use of permanent income in its tests. With the difficulty in estimation of permanent income, it is apparent that the most important parameter is determined by the data to be used and there are no predetermined values for this parameter. This renders the hypothesis arbitrary. Again, in the permanent income hypothesis, uncertainty variable like inflation has been pointed out as determining private savings. The effect of inflation on savings is unclear. High inflation for instance creates uncertainty about the future economic variables e.g. incomes and the real rates of return. This will encourage savings for precautionary motive or discourage it due to substitution effect on the lower rate of return. Studies like the one done by Lahiri (1988) had mixed results on the effect of inflation on savings.

Like the PIH, the Relative income hypothesis uses the previous peak income, which is assumed to keep expenditure of an individual from falling in the face of income drops. Under this hypothesis individuals are taken to be concerned about their relative well being and not absolute well being. Consumption (and hence savings) levels of individuals are not to a large extent determined by an individual's level of income, but by the level of other individuals' consumption. Individual households and firms in this

sense seek to determine their consumption levels using other households and firms respectively. Past incomes are therefore used to finance high levels of consumption and future expected incomes may not have any impact on present levels of consumption and savings.

The Keynesian or absolute income hypothesis on the other hand assumes short periods of analysis when structural changes in the economy do not figure more importantly. It is again recommended for developed economies with high underemployment and tight liquidity constraints forcing consumers to rely on current income. This calls the relevance of this theory into question.

The life cycle hypothesis makes use of the discounted labor earnings of an individual. However in contrast to the infinite life assumed by the concept of permanent income, the LCH establishes a relationship between consumption and lifetime resources for a given age of an individual. The allocation between consumption and savings will be affected by his position in the lifetime and not by the extent of his total resources. Despite the similarities with PIH, this hypothesis is better able to explain saving determination in developing countries. Apart from making explicit acknowledgement of saving as a motive, it also provides interesting reasons, which explain possible structural changes in the average propensity to save.

It can be noted from the literature reviewed that most studies did not cover the determinants of private savings adequately. The cross sectional studies captured several variables except demographic variables (except for Lillydahl, 1976 who studied demographic determinants of savings in Nairobi urban area). Several studies reviewed also employed time series data (like Asele, 1997,Mwega, 1991,Kagira, 1988) and the simple Keynesian savings function(s) were employed in most of the studies. So far, the determinants of private savings captured include inflation, government savings, income growth, income, foreign capital inflow, lagged private savings and tax rate that were used in time series analysis.

This study extended literature on savings in Kenya in a number of ways: First, it included more explanatory variables like dependency ratios and financial sector development indicators excluded by previous studies, second, it analyzed savings for

sample period, 1980 to 2003 using time series data, to capture effects of demographic variables and recent financial sector developments. Different measures of financial sector development were used to explore the sensitivity of estimation results.

CHAPTER THREE

THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 Theoretical framework

The literature reviewed in the previous chapter identified the various factors determining private savings in various countries. This chapter presents a framework of analysis on the basis of these studies, and involves adopting a model that would help demonstrate the responsiveness of certain key variables that influence both household and business savings (private savings) in Kenya.

The Life cycle hypothesis, the Relative income hypothesis, the Keynesian absolute income hypothesis, and the permanent income hypothesis and previous studies (Kivilcim, 1995, Kagira 1988, Mwega 1990, and Mwega 1991) provide a basis to identify the variables that may affect Private savings (PRIVSAV). The life cycle hypothesis is important in the analysis of the structural changes in the demographics in Kenya. The variables can be categorized as: Demographic variables (two dependency ratios), financial variables (real interest rate, financial sector development indicator), Uncertainty Variable (inflation rate), Income variables (per capita income growth, real gross disposable per capita income), Government policy variables (tax rate, government savings), savings inertia (lagged private savings) and current account deficit).

A general 'hybrid' function accommodating all the hypotheses that explain private savings and the variables obtained therefrom, can therefore be given following Asele (1997), Kivilcim (1995) and Roger Kelly & Mavrotas (2003) as:

PRIVSAV=f(INGR,RGDI,CADT,INFL,GOVSAV,INCTAX,FSDx,DR1,DR2,RSPRD,
).....(3.1)

Where,

PRIVSAV-Private savings

INGR-Per Capita income growth

RGDI-Real gross disposable per capita income

CAD-Current account deficit

INFL-Inflation rate

GOVSAV - Government savings.

INCTAX-Income tax rate

FSDx-Financial sector development indicator or 'financial depth' given either as:

RSPRD-Real interest rate spread.

DMCA-The ratio of the assets of commercial banks to those of central bank.

M2GDP-This the ratio of broad money supply to GDP

LLGDP-Ratio of liquid liabilities to GDP

DR1-Dependency ratio1

DR2-Dependency ratio2.

3.2 Hypotheses

In this section the working hypotheses of the study are provided. These hypotheses are drawn from the theoretical model and the literature reviewed. They include:

(i) Interest rate spread, RSPRD sign is not known priori

(ii) Inflation rate (INFL), Per Capita Income growth term (INGR),Dependency ratio, DR2 (above 65), Real Gross disposable income,(RGDI) Positive terms of trade, TOT, are expected to have positive relationships with private savings.

(iii) Income tax rate, INCTAX, Dependency ratio, DR1 (below 14), the ratio of deposit money banks assets to central bank assets, DMCA, Government savings, GOVSAV, Current account deficit, CAD are expected to be negatively related to private savings

3.3 Definition and measurement of variables

Introduction

The definitions and measurement of variables used in this study are given in this section. All monetary values are in millions of Kenya shillings.

Private saving, (PRIVSAV). This is the proportion of GDP saved by households and business firms in the economy. It was measured by Gross National savings less public savings, and given as a percentage of GDP.

The ratio of M2 money to GDP (M2GDP)- This is used as measure of the relative size of the financial sector. It is the ratio of the broad money supply in the economy to GDP, in each respective year.

Inflation rate (INFL)-This is the persistent increase or decrease in the average price of goods and services. It was proxied by the changes in consumer price index with 1980 as the base year.

Liquid Liabilities to GDP (LLGDP)- This is the measure of the absolute size of the financial sector based on liabilities. It equals currency plus demand and interest bearing liabilities of banks and other financial intermediaries divided by GDP.

Interest rate spread (RSPRD) Is the difference between lending rate and deposits rate in a given year. It was used as a proxy for the measure of the financial sector development in the economy.

Per Capita income growth (INGR)- Is the year-to-year percentage change in average gross domestic income in the economy. It is calculated as percentage change in the ratio of Gross Domestic Income to the total population.

Tax rate (INCTAX)- This the proportion of income paid to the government as taxes as stated in the fiscal policy framework, and affects both the households and the businesses. It was proxied by the income tax.

Ratio of assets of commercial banks to assets of central bank (DMCA)- This is a relative size measure of the importance of the parts of the financial sector relative to each other.

Dependency Ratio (DR1)- This is the ratio of the number of persons below the age of 18 to the total labor force. Age 18 is chosen since it is the minimum age limit for a Kenyan to be employed as stated by the law of Kenya.

Dependency Ratio (DR2)- This is the ratio of the number of persons above the age of 64 to the total labor force in the country. This is the formal definition of old age or elderly dependency ratio according to government reports.

Government savings (GOVSAV)- This is also called public (dis) savings. It is the excess of total government revenue and grants over total public expenditure.

Current account deficit (CAD) – It is the net of total national expenditure over total national income. It is measured by the net of merchandise trade (total exports and total imports) and net transfers (Lesiit, 1990)

Real Gross Disposable per capita income (RGPDI)-This served as a measure of private disposable income at constant prices. It was derived as real gross private

disposable income (or gross private disposable income divided by CPI) divided by population.

3.4 Data type and sources.

To achieve the objectives of the study, secondary quantitative annual time series data for the period covering 1980 to 2003 was used. Data on variables in the model were collected from the International Financial statistics, World Bank publications (for demographic variables), economic surveys and Statistical Abstracts, Central bank of Kenya annual reports and the Central Bank of Kenya annual Bulletins (for other variables).

3.5 Estimation and Testing Procedures

3.5.1 Unit root testing

When studying econometric relationships using time series data, there is concern about spurious regressions when data series used are non-stationary. Any time series data can be thought of as being generated by a stochastic or random process; and a concrete set of data can be regarded as a particular sample of the underlying stochastic process. Time series data can be stationary or non-stationary, but usually exhibit non-stationary characteristics. In the classical linear regression, the use of non-stationary variables is likely to give misleading results and that the asymptotic properties do not apply. Therefore it was important to determine the stationarity conditions of the variables in the model. A series is considered stationary when it has no trend i.e. when its mean and variance are constant overtime (Enders, 1995).

Testing for stationarity first involved testing for the order of integration of each variable using the Augmented Dickey-Fuller (ADF) unit root tests (Gujarati, 1995). This involved the test of a null hypothesis of non-stationarity against alternative of stationarity on models depicting random walk, random walk with a drift or random walk with a drift and a trend, (if prior preceding models fail to have a unit root). If the null was rejected, a series had a unit root and was said to be integrated of order zero, I (0); if not, the series was not stationary at levels but could be made stationary after differencing p times, I (p). The ADF, unlike the DF unit root test considers

autocorrelation of the error term. Assuming no autocorrelations of the error term biases the tests and hence its control ensures that the error term is a white noise. This made it necessary to make inference on the order of integration. The ADF unit root test uses the autoregressive equations given as:

(i) ADF with both trend and intercept

$\Delta Y_t = \alpha + BT + PY_{t-1} + \sum \delta_i \Delta Y_{t-1} + u_t$ ..... (3.2)

(ii) ADF with an intercept but no trend

$\Delta Y_t = \alpha + PY_{t-1} + \sum \delta_i \Delta Y_{t-1} + u_t$ ..... (3.3)

The equations 3.2 and 3.3 are used to test a null hypothesis that $p = 1$ (existence of a unit root) against the alternative hypothesis that $p < 0$. Upon estimation, if computed t statistic is greater than the critical statistic the null $p = 1$ is rejected, indicating that the series is stationary. If the null hypothesis is not rejected, this indicates that Y_t is non-stationary.

3.5.2 Cointegration test

The procedure for testing for cointegration is similar to that of testing for the order of integration of variables. This analysis was made necessary when some of the variables in the specified model were discovered to be non stationary at levels. Cointegration implies long run relationship of economic variables that is the economic variables may drift apart from each other in the short run but remain converged to each other in the long-run (Banerjee *et al.*1993). In testing for co integration, the Engle and Granger two-step estimation procedure was used. Ordinary Least Squares, OLS regression was run on the ADF unit root tests and residuals u_t were retrieved therefrom. Using the residuals, a test of the hypothesis of non-cointegration against the alternative of cointegration is done by performing a unit root test on the residual (Engle and Granger, 1987). The stationarity of the residuals was tested using the ordinary DF test based on the Engle and Granger test which involves testing the significance of the coefficient $|p|$ in the OLS regression of:

$\Delta u_t = p\, u_t + \varepsilon_t$ ..... (3.4)

Where u_t is the residual. The test postulates that if the residuals obtained from the OLS estimation of the variables integrated of the same order are stationary, then the series are cointegrated.

3.5.3 Estimation of VAR system of Equations

From equation 3.1, it is possible to identify the model to be estimated using the VAR system of equations (given in Appendix I). The adoption of the VAR is based on the notion that economic theory may not be sufficient to determine the right specification. According to Sims, (1980) if there is any true simultaneity among a set of variables, the variables should be treated on an equal footing; there should not be any a priori distinction between the endogenous and the exogenous variables. The use of VAR is therefore justified since it is possible to analyse the response overtime of any variable in the set to either its own innovation or to the innovations of other variables in the system of the VAR equations. The specification for the general VAR model for equation 3.1 (in vector form) can be given as:

$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + \ldots\ldots\ldots + A_p X_{t-p} + e_t$ .....(3.5)

Where

X_t -an (n×1) vector containing each of the 16 variables included in the VAR that is INGR, RGDI, CAD, INFL, GOVSAV, TR, FSDx, DR1, DR2, and PRIVSAV.

A_0 –An (n×1) vector of intercept terms.

$A_1, A_2 \ldots\ldots A_P$ -(n×n) matrix of coefficients

And e_t was an n ×1 vector of error terms with zero mean, constant variance and equations errors were contemporaneously correlated.

The specification for the VAR models requires an important decision to be made regarding the selection of the appropriate lag length (p). In this study, p will be chosen using the Akaike Information Criterion, AIC or the Schwarz Bayesian Criterion, SBC. For time series models such as 3.1 OLS procedures result in consistent, asymptotically efficient, normally distributed estimates that are not different from Maximum likelihood estimates (Mills, 1990 and Hamilton, 1994).

Moreover, in the VAR models, all the right-hand-side variables are assumed predetermined and are identical in all equations, and the error terms are assumed to be uncorrelated with constant variance but are correlated across equations. Therefore, OLS was used to estimate each VAR equation one at a time. The restricted reduced form VAR system of equations is given in Appendix II.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents descriptive statistics of all the variables and empirical estimation results of the hybrid private savings model outlined in chapter three. Prior to model estimation, time series properties of the data were determined using Augmented Dickey-Fuller (ADF) tests for stationarity. The variables that are found to be non-stationary are made stationary by differencing. If the dependent variable together with some or all the independent variables is found to be non stationary at levels, this will prompt a test for cointegration on basis of their order of integration. This will necessitate the use of Error Correction model incase cointegration exists; otherwise the Ordinary Least Squares will be employed.

4.2 Descriptive statistics

In this section, the general descriptions of all the variables used in the study are provided. The statistics on the mean, the maximum and the minimum values for each variable are stated.

Table 4.1

	PRIVSAV	CAD	DMCA	GOVSAV	INCTAX	INF	INGR
Mean	0.14061	-0.038	0.164	0.83	29.73	13.17	0.041
Maximum	0.2281	0.027	0.391	4.78	34.30	54.70	2.00
Minimum	0.07840	-0.143	0.060	-4.61	25.10	2.49	-3.30
Observations	24	24	24	24	24	24	24

	DEPR	DR1	DR2	RGPDI	M2GDP	RSPRD	LLGDP	TOT
Mean	10.74	1.4855	0.0832	20.576	0.419	9.657	0.108	88.725
Maximum	23.46	1.6101	0.0877	60.515	0.530	21.05	0.307	197.1
Minimum	1.38	1.307	0.0759	4.1326	0.299	2.5	0.581	45.54
Observations	24	24	24	24	24	24	24	24

Sources of Basic Data: African Development indicators (various), CBK Quarterly Statistical Bulletins, and Republic of Kenya, *Statistical Abstract*, *Various issues*, Nairobi: Government printer.

Besides the descriptive statistics outlined in the Table 4.1 above, the time profiles of the variables are presented in Appendix B, showing the trends of each variable over the sample period of the study.

4.3 Econometric Results

4.3.1 Unit Root Tests

In this section, the time series characteristics of the variables were examined to establish their stationarity conditions. The time profiles of the variables in the model over the sample period 1980 to 2002 suggest that government savings (GOVSAV), per capita income growth (INGR) and the ratio of M2 money to GDP (M2GDP) depict constant means and constant variances overtime. However, current account deficit(CAD), the ratio of banks assets to assets of central bank(DMCA), young age dependency ratio(DR1), old age dependency ratio (DR2), income tax(INCTAX), inflation rate (INFL), the ratio of liquid liabilities to GDP (LLGDP), private savings (PRIVSAV), real gross private disposable income (RGPDI), interest rate spread (RSPRD) and the terms of trade (TOT) over the sample period are characterized by fluctuations and volatility. Fluctuations and volatility of the variables suggest that the variables exhibit non-constant means and variances. According to Harris (1995), this is evidence of the existence of either deterministic or stochastic trends.

However, the use of eyeball inspection to make decisions on whether a series is stationary or not may be misleading. This study employed a widely accepted test for stationarity, the Augmented Dickey-Fuller (ADF) unit root tests to formally test for stationarity of the variables.

4.3.1.2 Augmented Dickey Fuller (ADF) Tests

The unit root test results based on *Eviews 5* are reported in Appendix C. According to Enders (1995), the probability of rejecting the null hypothesis when it is false is low. Because of this, the unit root tests are performed at different lag lengths up to 4 lags. The results show that current account deficit, government savings, inflation, per capita income growth and real gross private disposable income are stationary at levels, hence are I(0). However, deposit rate, terms of trade interest rate spread, private savings, the ratio of M2 money to GDP, income tax both dependency ratios, the deposit rate and the

ratio of banks' assets to those of central bank, are non stationary at levels. The tests establish that the non stationary variables become stationary after differencing once that is are I(1)s, except for the dependency ratios which become stationary after differencing twice, implying that they are I(2)s.To establish whether the non stationary variables are cointegrated, the next section outlines the cointegration test results.

4.3.2 Cointegration test

Cointegration test tested for the existence of a long run relationship between the variables integrated of the same order. Since the dependent variable (PRIVSAV) for this study was an I(1), cointegration test was performed including only the variables that are also I(1)s, that is deposit rate(DEPR),Terms of trade(TOT),interest rate spread(RSPRD) and the ratio of M2 money to GDP (M2GDP) were used to test for cointegration. The Engle and Granger residual-based test for cointegration is used where OLS estimation is performed on the equation 4.1 below:

$DPRIVSAV=ß_0 + ß_1\ DM2GDP+ ß_2\ DDEPR+ ß_3\ DRSPRD+ ß_0\ DTOT + u_t$.....(4.1)

The results of cointegration test are posted in Appendix D. They show that the residuals of the OLS estimation of the I(1) variables are not stationary, implying absence of cointegration. The variables therefore did not have a long run relationship and hence a short run model was estimated using variables at their stationary conditions. This means that the long run characteristics of the data were lost.

4.4 Estimation of the Aggregate Domestic Private Savings Model

As a starting point OLS estimation of the private savings model 3.1 is carried out to determine the parsimony of the model. The results of the estimation are posted in Table 4.1.

Table 4.1: Initial Estimation Results of the Aggregate Private Savings Model 3.1

Explanatory Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.988682	3.950741	0.756486	0.4710
CAD	138.0191	39.47193	3.496641	0.0081
D2DR1	-276.0869	156.1336	-1.768274	0.1150
D2DR2	79.43470	126.7389	0.626759	0.5483
DDEPR	0.490904	0.486203	1.009669	0.3422
DINCTAX	0.023728	0.644405	0.036822	0.9715
DM2GDP	-63.30288	23.58723	-2.683777	0.0278

DDMCA	-33.22282	14.54832	-2.283619	0.0518
DRSPRD	-0.384114	0.262117	-1.465429	0.1810
DTOT	-0.023209	0.024301	-0.955055	0.3675
GOVSAV	-0.555400	0.330363	-1.681183	0.1312
LLGDP	10.15105	29.27386	0.346762	0.7377
INGR	0.894239	0.452419	1.976575	0.0835
INFL	0.080520	0.117969	0.682552	0.5142
Adjusted R-squared	0.755017	Akaike info criterion		4.738923
S.E. of regression	2.270408	F-statistic		5.978486
Durbin-Watson stat	2.058523	Probability(F-statistic)		0.008148

To establish whether this model best fits the data, diagnostic tests are performed and the eventual results are reported below:

Table 4.2: Diagnostic test results on residuals of the Model 3.1

TEST		
Jarque-Bera Normality test	Test statistic	1.6482
	Probability	0.4386
Ramsey RESET stability test	Test statistic	0.2270
	Probability	0.6482
Breusch-Godfrey serial correlation LM test	Test statistic	1.6118
	Probability	0.2753

From Table 4.2, the Jarque-Bera test for normality, which tests the null hypothesis that the residuals of the estimated model are normal against an alternative that the residuals are not normal, depicts a probability of 0.4386.This is an indication that the null hypothesis is not rejected and that the residuals are normal. Under the Ramsey RESET test for stability, a probability of 0.6482 means that the null hypothesis of no stability is not rejected.This implies that the model is not stable. On the other hand, the Breusch-Godfrey serial correlation LM test tests the null that the variables in model are not serially correlated against an alternative hypothesis that they are serially correlated. The results show that the probability of accepting the null hypothesis is 27.53%. This indicates that the variables in the model are not serially correlated. This model does not pass the stability test and hence is not consistent, indicating presence of multicollinearity or high correlation between the variables used .To control for multicollinearity a correlation matrix is used to trim the model.

4.4.1 Correlations matrix

From diagnostic tests results depicted in Table 4.2, it was necessary to trim the model using the correlations matrix and the variables that are highly correlated are omitted based on their importance to the achievement of the objectives of this study. Following the correlations matrix given in Appendix E, interest rate spread was found to be highly correlated with young age dependency ratio (-0.843), old age dependency ratio (-0.8559), income tax (-0.8162) and real gross private disposable income (-0.7995). Besides, income tax was highly correlated with young age dependency ratio and old age dependency ratios with levels of –0.849 and 0.973 respectively. On the other hand, the ratio of M2 money to GDP was highly correlated with young age dependency ratio (-0.8131) and real gross private disposable income (-0.8355). Furthermore, real gross private disposable income was highly correlated with young age dependency ratio (0.8823) and the terms of trade correlated highly with young age dependency ratio and old age dependency ratio at levels of –0.8383 and –0.8515 respectively. Due to their high correlations with other variables and their relatively less importance to the study, the real interest rate spread, income tax, terms of trade, and real gross private disposable income were dropped from the model.

4.4.2 Significant Lag Selection Using VAR

To establish the significant lags of the variables to use in the model estimation, Vector Auto Regression (VAR) was estimated. Two lags of each variable were included since a short run model is to be estimated and also because the sample period is relatively short. The estimation results of the VAR model are reported in Appendix F. The results show that no lagged variables are significant in explaining private savings except for the second lag of per capita income growth.

4.4.2 Estimation results of the Trimmed model

The trimmed model arrived at in 4.4.1 was estimated over the 1980-2003 period, and the results are reported in Table 4.3. The ordinary least square estimation procedure was used to obtain the results and Eviews 5 was used for estimation.

Table 4.3: Estimation Results of the Aggregate Private Savings Model

Explanatory Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.806570	3.340577	2.336893	0.0521

D2DR1	-121.6401	82.57733	-1.473044	0.1842
D2DR2	156.4130	78.53175	1.991717	0.0867
DDMCA	-15.47530	9.209313	-1.680397	0.1368
CAD	187.2424	29.78726	6.285990	0.0004
GOVSAV	-0.304703	0.184642	-1.650233	0.1429
INFL	-0.131488	0.086445	-1.521060	0.1721
INGR	0.745399	0.270168	2.759019	0.0281
INGR(-2)	1.466253	0.508641	2.882690	0.0236
LLGDP	-0.849128	30.67989	-0.027677	0.9787
DM2GDP	-52.47019	11.35925	-4.619161	0.0024
DDEPR	1.369740	0.308065	4.446262	0.0030
DM1	6.090782	1.902118	3.202105	0.0150
DM	-0.432999	2.525447	-0.171454	0.8687
DM3	-5.447394	5.878666	-0.926638	0.3849
Adjusted R-squared	0.911891	Akaike info criterion		3.673686
S.E. of regression	1.361589	F-statistic		16.52439
Durbin-Watson statistic	2.841926	Probability (F-statistic)		0.000512

4.5 Diagnostic tests

The Ramsey RESET & CUSUM stability tests, the Jarque-Bera normality test and the Breusch-Godfrey serial correlation tests were performed on the results in Table 4.3.The diagnostic test results are shown in Appendix G. The Jarque-Bera test of the normality of residuals has a probability value of 0.8982.The test is carried out with a null hypothesis that the residuals are normally distributed against an alternative that the residuals are not normally distributed. The value 0.8982 is the probability of not rejecting the null and hence the residuals are normally distributed, implying that the linear model estimated is consistent.

The Breusch-Godfrey test for the absence of serial correlation has a probability value of 0.0017.This is the probability of not rejecting the null hypothesis that there is no serial correlation between the variables. This is an indication that there exists serial correlation among the variables. The presence of serial correlation was expected given the different measures of financial sector development and the use of two related dependency ratios in the estimation. On the other hand, the Ramsey RESET stability test tests the null hypothesis that the model is not stable against that of stability. This is a test of structural change, based essentially on the model's ability to predict correctly within the sample period used to estimate it. Since it is uncertain when structural change might have taken place in the economy, the CUSUM test was also used. The

results indicate that the model passed stability test since the CUSUM stays well within the 5% significance boundaries. The Ramsey RESET stability test indicates that the probability of accepting the null hypothesis of instability is 0.4724.This implies that the null can not be rejected and hence the model is rejected ($p<0.50$) and hence the model is more stable than model 3.1

4.6 Discussion of Results

The estimation results reported in Table 4.3 have an adjusted R-squared of 0.9118, implying that 91.18% of the variations in private savings in Kenya are explained by the explanatory variables used in the aggregate private savings model. The F-statistic was 16.524 and the probability of not rejecting the null hypothesis that there is no statistically significant relationship existing between the dependent variable (PRIVSAV) and the independent variables, is 0.000512.This implies that there is significant relationship between the dependent variable and the independent variables. The coefficients represent the short run aggregate private savings model with private savings as a ratio of GDP. The dummy variables; DM, DM1, DM3, were introduced in the function to capture the extreme values operating in the periods 1986,1995,1997,1998 and 2002.

Among the dummy variables only one was found to be significant i.e. the dummy controlling for 1995,1997,1998 and 2002,implying that the shocks on these years, which are exogenous to the model affect the private savings rate. This dummy (DM1) has a positive coefficient implying that whatever political, economic or social shock occurred in Kenya in these years had a positive implication on private savings rate. These shocks among others included withholding of aid by foreign donor countries, which led to foreign exchange shortage in the economy and the depreciation of the domestic currency.The rise in private savings rate may be due to the public making savings through the buying of treasury bills as the government borrows from the public to offset the shortage of foreign exchange.

The coefficient of current account deficit (CAD) variable has a positive sign, against the expectation and is statistically significant. These results suggest that an increase in the ratio of current account deficit to GDP, through an increase in the deficit (given as negative values) of the current account will lead to an increase in private savings in

the economy. An increase in the deficit in real values means more funds are flowing into the country through foreign exchange earnings and net capital inflow. It is possible that these funds will be saved awaiting investment in the economy, thus private savings increase.

Turning to effect of dependency ratios, the coefficient of young age dependency ratio (D2DR1) is negative and in agreement with theoretical expectations though statistically insignificant. The old age dependency ratio (D2DR2) has a positive and statistically significant coefficient. This is in agreement with theoretical expectation. The results suggest that an increase in this ratio through an increase in the life expectancy will led to an increase in the private savings by the labor force perhaps to cater for the increasing number of the old aged population.

The variables found to be statistically insignificant include government savings as a ratio of GDP in Kenya (GOVSAV),inflation rate(INFL), the two indicators of financial sector development that is the ratio of the assets of banks to those of central bank(DDMCA), and the ratio of liquid liabilities to GDP(LLGDP) which measures the absolute size of the financial sector were also found to be insignificant determinants of private savings.

Per capita income growth (INGR) on the other hand, had a positive and statistically significant coefficient. This was in line with the findings of Kivilcim(1995) and Asele(1997). This empirical finding implies that an increase in per capita income growth will increase the ratio of private savings to GDP in the economy. The finding agrees with expectations of the simple Keynesian savings theory. The second lag of per capita income growth (INGR (-2)) also is statistically significant with a positive coefficient. This is consistent with the findings of Klaus et al(1991) and in contrast to results of Kivilcim(1995). This suggests that in Kenya, an improvement in the growth of per capita income now will go a long way in increasing the private savings ratio after two years apart from having immediate effect.

Another indicator of financial sector development is the measure of the relative size of the financial sector that is the ratio of the M2 money to GDP (DM2GDP),which had a negative and statistically significant coefficient. The finding was partly consistent with

the results of Kelly and Mavrotas (2003) who found all the measures of financial sector development to be significant. This variable had a negative and significant coefficient. The sign is in contrast to the hypothesis in chapter 3.This suggests that increasing the money supply, M2 in the economy will induce inflation and reduce rates of interest assuming a state of equilibrium in the money-market. The reduction in the rates of interest together with increased inflation will bring about a reduction in the private savings in the economy .A reduction in the rates of interest will act as a disincentive for individuals and private firms to save.

The Deposit rate of interest (DEPR), has a positive and a significant coefficient, which is in agreement with the expectations of the study but contrasts the findings of Mwega et al (1990). This empirical finding implies that an increase in deposit rate will encourage commercial banks to save with CBK. This leads to high returns to commercial banks hence increasing their assets, which in turn translate to an improvement of services to depositors with commercial banks and hence encourage potential savers to save and / or increase savings of existing savers.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Summary and Conclusions

The aggregate private savings to GDP ratio in Kenya has show substantial fluctuation over the years. This study has explored the determinants of domestic aggregate private savings in Kenya over the period 1980 to 2003.The aim was to identify the economic, demographic and the measures of financial sector development that significantly influence aggregate private savings in Kenya.

Based on the permanent income hypothesis, Relative income hypothesis, the Keynesian savings theory and the Life Cycle hypothesis of consumption and savings, a 'hybrid' model was specified. Prior to model estimation, time series properties of data were established using the Augmented Dickey-Fuller test for unit roots. Some variables were found to be stationary at levels and others had to be differenced to be stationary. The private savings ratio was found to be stationary after differencing once, an issue that prompted a test for cointegration. However, there was no evidence of cointegration, hence a short run aggregate private savings model was estimated using Ordinary Least square method.

The model estimated had a good fit, as adjusted R-squared was 0.9118 and also passed the following diagnostic tests; normality test, and the Ramsey RESET stability test. The empirical findings of this study indicate that the current account deficit is the most significant economic variable that determines private savings ratio in Kenya over the sample period 1980 to 2003. Other statistically significant economic explanatory variables include per capita income growth, per capita income growth lagged two periods, and deposit rate at central bank and a dummy interactive term, DM1. The significant dummy variable suggests that shocks exogenous to the model affect the changes in private savings in Kenya.

Moreover, the demographic variable that was found to significantly influence private savings in Kenya was old age dependency ratio. The ratio of M2 money to GDP, an

indicator of financial sector development is also found to influence aggregate private savings significantly.

5.2 Policy Recommendations

From the empirical findings of this study, policy implications can be drawn. The empirical evidence presented in this paper reports that domestic aggregate private savings in Kenya have a significant positive relationship with the current account deficit, that is, the sum of net exports and net capital inflow. In a bid to increase private savings in the economy and boost investment levels, this can be achieved through continued implementation of the Interim Poverty Reduction Strategy Paper (2001-2004) which advocates for the provision of a favorable macroeconomic environment that will encourage inflow of capital and discourage capital flight. Furthermore, the government can continue to focus on export promotion strategies to increase exports and encourage reduction of non-essential imports.

Evidence from this study also suggests that economic factors like per capita income growth, and deposit rates have significant influence on private savings and that increase in these variables could increase the savings ratio in the Kenyan economy. The policy makers can undertake to increase per capita income growth by improving productivity of workers.

Adoption of a strict monetary policy to maintain money supply within manageable levels and ensure stable and low inflation rates will help improve real incomes and will also cause development in the financial sector and hence improve private savings in the economy.

In addition, state interest is recommended in the old age dependency ratio, which was found to have significant and positive influence on private savings in the economy. From the empirical findings this study recommends the improvement of health care provision by the government for the entire population. This will go a long way in improving the life expectancy and hence improve this dependency ratio. This partly will motivate workers to save for the old age.

5.3 Limitation of the study

The major limitation encountered in carrying out this study was unavailability of data for different variables from one source. The data for some of the variables were collected from different sources and the unavailability of consistent data for demographic variables for a long enough period was a limiting factor to the choice of sample period besides capturing the reform period. In addition, this study did not include all the possible explanatory variables of private savings because of the specific objectives the study was interested to achieve.

5.4 Suggestions for further Research

The results of the estimations in this study may suffer from short sample bias. In addition, as more time series data become available coupled with structural changes in the economy, one should continue to consider whether there are fundamentally different determinants of domestic aggregate private savings in Kenya, as this seems to imply and given their important policy implications. Despite lower dependency ratio being insignificant in explaining private savings in Kenya, it would be important to consider the quality of life lived by the population below the age of 18 against the private savings in the country. Future research should consider to model with more alternative possible determinants of private savings.

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APPENDICES

Appendix A: Raw Basic Data

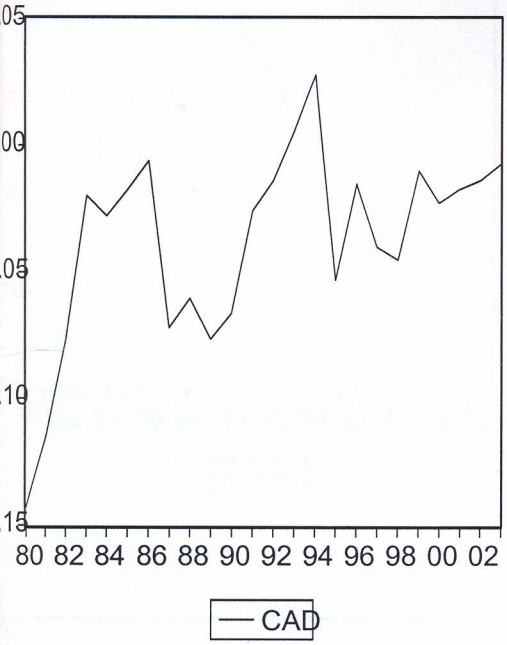
Table A-1 : Raw Basic Data

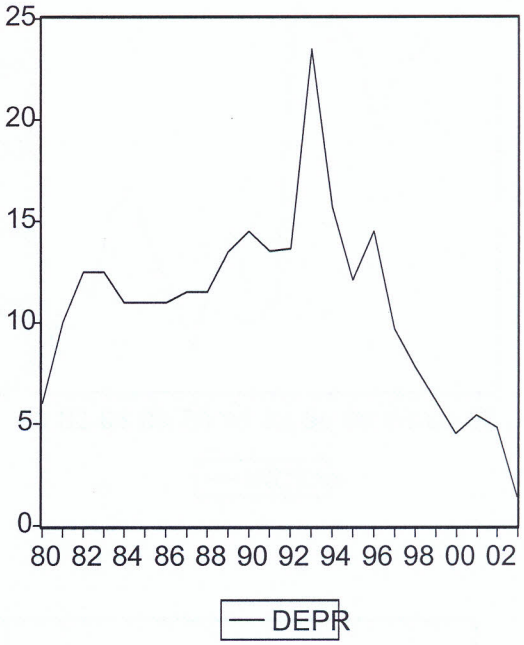
YEAR	CAD	DEPR	DMCA	DR1	DR2	INCTAX	INFL	INGR	LLGDP
1980	-0.14	6	0.12	1.28	0.26	28.50	12.75	-0.10	0.08
1981	-0.11	10	0.19	1.27	0.26	25.20	20.37	1.59	0.05
1982	-0.07	12.5	0.12	1.27	0.26	26.80	14.73	-0.50	0.10
1983	-0.01	12.5	0.06	1.27	0.26	26.40	9.71	-0.75	0.10
1984	-0.02	11	0.06	1.26	0.26	28.50	10.84	-3.30	0.09
1985	-0.01	11	0.06	1.26	0.26	29.20	10.44	1.50	0.10
1986	-0.00	11	0.12	1.26	0.26	27.40	6.60	2.00	0.09
1987	-0.07	11.5	0.11	1.26	0.26	26.50	9.66	1.40	0.08
1988	-0.06	11.5	0.09	1.26	0.26	25.10	13.63	1.80	0.08
1989	-0.07	13.5	0.09	1.26	0.26	26.90	13.57	1.80	0.08
1990	-0.06	14.5	0.09	1.25	0.25	27.90	20.07	1.70	0.09
1991	-0.02	13.5	0.07	1.24	0.23	25.90	14.47	-1.10	0.09
1992	-0.01	13.6	0.11	1.22	0.21	26.20	33.66	-2.60	0.11
1993	0.00	23.5	0.14	1.21	0.19	33.80	54.70	-2.70	0.30
1994	0.02	15.7	0.39	1.19	0.18	33.20	6.67	0.20	0.08
1995	-0.05	12.1	0.34	1.18	0.16	33.30	6.82	1.90	0.07
1996	-0.01	14.5	0.31	1.16	0.15	32.60	10.83	1.80	0.14
1997	-0.04	9.73	0.23	1.14	0.14	30.40	8.34	-0.25	0.12
1998	-0.04	7.83	0.23	1.12	0.13	32.20	2.49	-0.70	0.11
1999	-0.00	6.15	0.22	1.10	0.11	32.40	7.98	-1.00	0.10
2000	-0.02	4.51	0.18	1.09	0.11	33.10	7.55	-2.60	0.11
2001	-0.01	5.42	0.17	1.06	0.11	33.60	4.36	-1.40	0.09
2002	-0.01	4.83	0.16	1.04	0.10	34.10	9.13	1.20	0.11
2003	-0.00	1.38	0.17	1.03	0.10	34.30	6.72	1.10	0.10

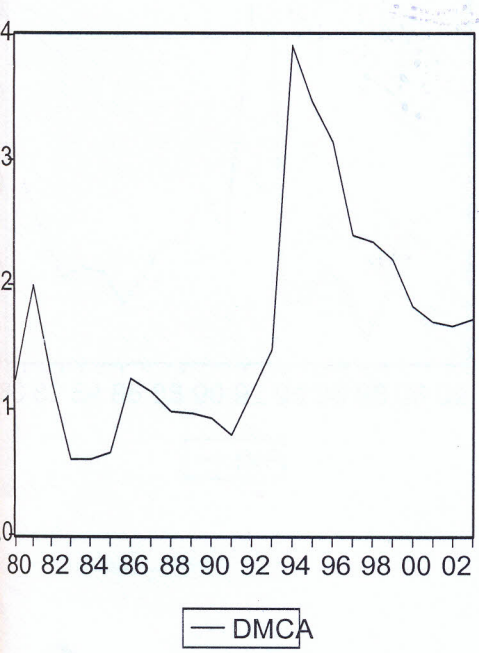
le A-1: Raw Basic Data (Cont..)

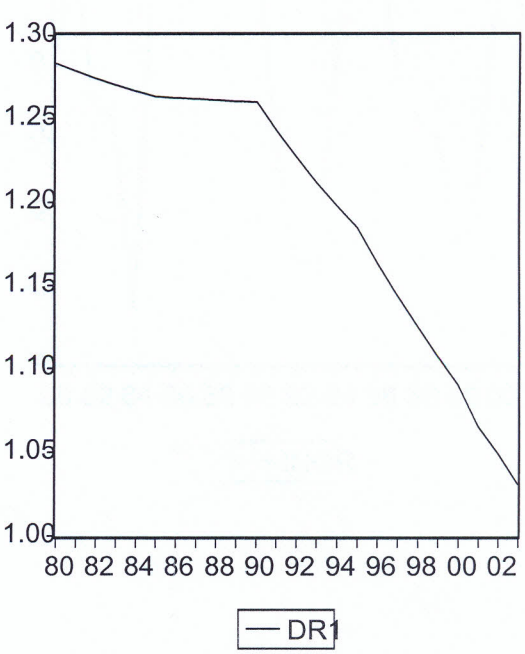
YEAR	M2GDP	PRIVSAV	RGPDI	RSPRD	TOT
1980	0.29	13.13	60.51	5	53.8
1981	0.36	19.53	51.52	4	57.6
1982	0.37	14.83	44.18	3.5	63.2
1983	0.35	22.81	39.93	2.5	72
1984	0.36	18.53	36.36	3	70.8
1985	0.33	22.49	33.17	3	67.8
1986	0.39	20.64	31.69	3	73.8
1987	0.42	15.85	29.25	2.5	55.2
1988	0.41	15.43	26.14	3.5	53.9
1989	0.37	13.02	23.34	4.5	45.5
1990	0.35	9.39	19.63	4.5	48.9
1991	0.38	10.57	18.30	6.43	61.6
1992	0.43	9.61	13.69	8.71	77.7
1993	0.43	20.73	8.34	15.09	72.7
1994	0.46	11.86	7.79	15.2	102
1995	0.43	8.86	7.03	21.05	100
1996	0.53	13.08	6.94	14.09	104
1997	0.51	7.84	6.37	20.12	109
1998	0.47	9.18	6.14	18.3	105
1999	0.46	9.12	5.47	19.04	94.5
2000	0.43	9.02	4.94	15.09	94.5
2001	0.44	11.74	4.57	14.07	196.6
2002	0.48	14.38	4.29	13.51	152.2
2003	0.48	15.83	4.13	12.09	197.1

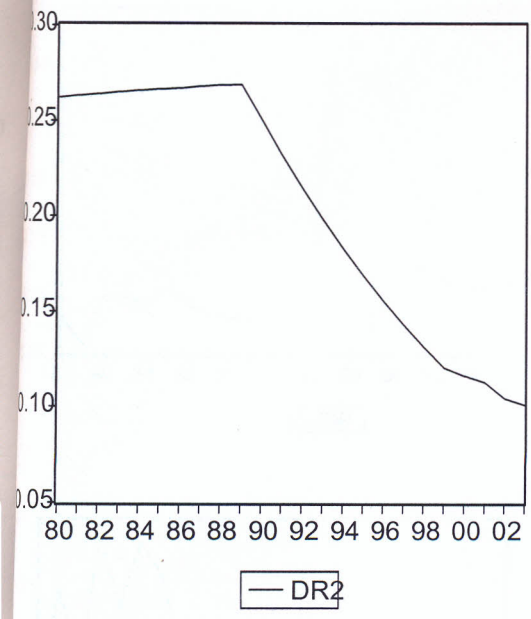
Appendix B. Time profiles of variables







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.10
.05
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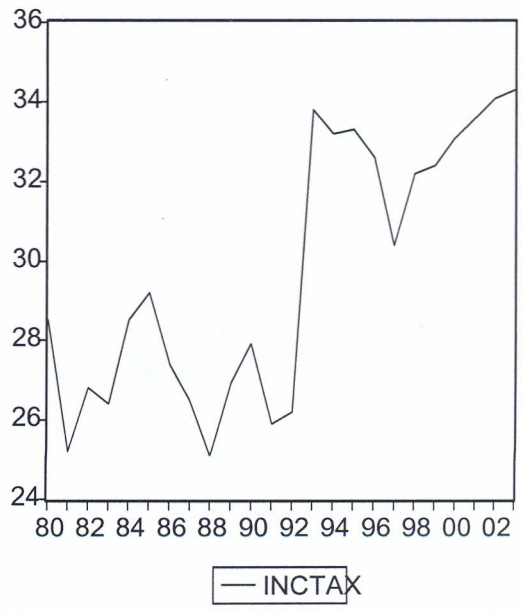
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34
32
30
28
26
24
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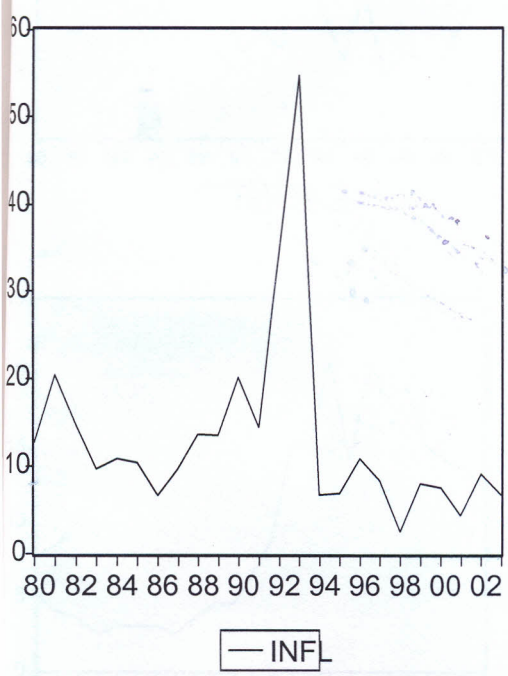
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30
20
10
0
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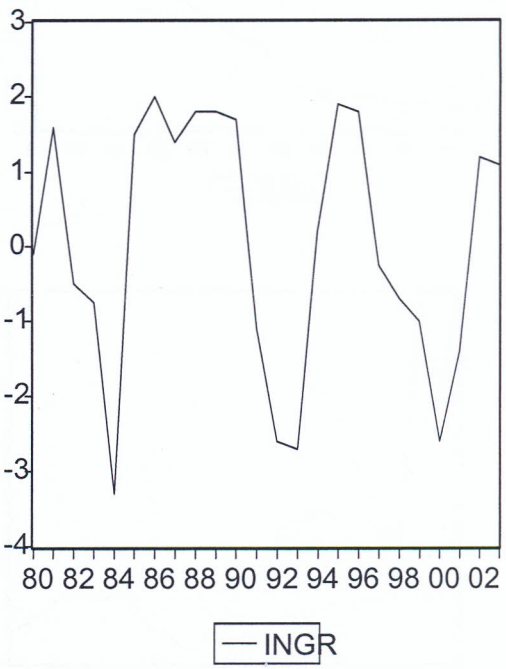
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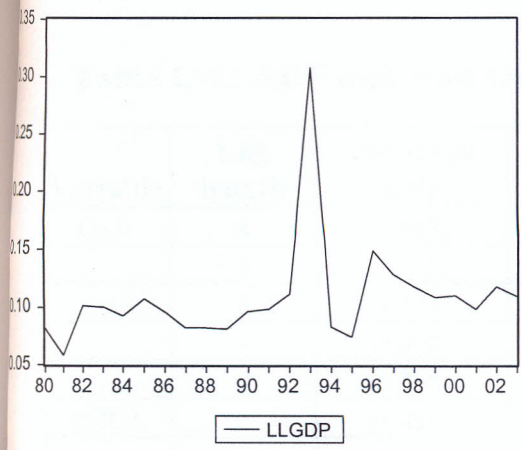
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0.10
0.05
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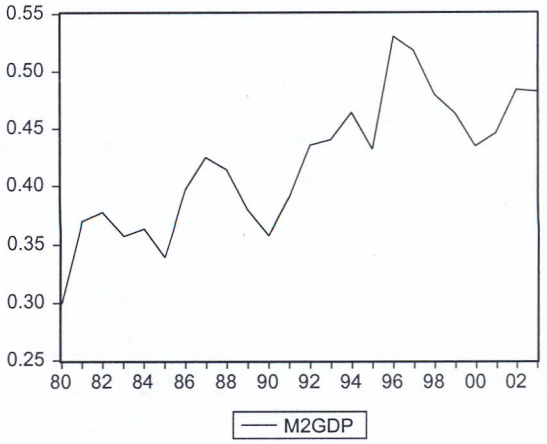
LLGDP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0.30
0.25
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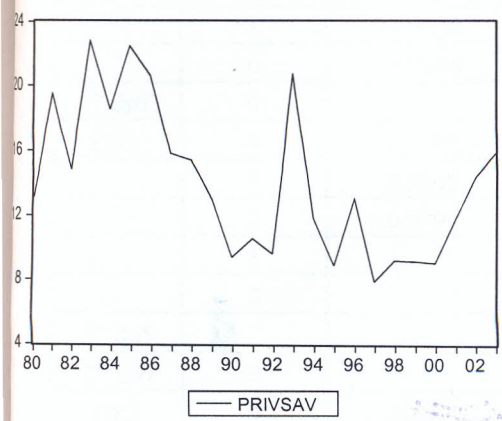
M2GDP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20
16
12
8
4
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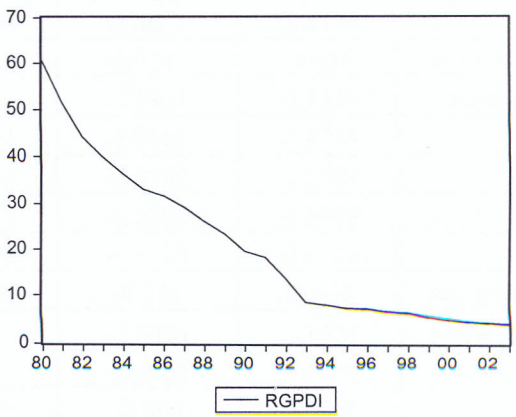
PRIVSAV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40
30
20
10
0
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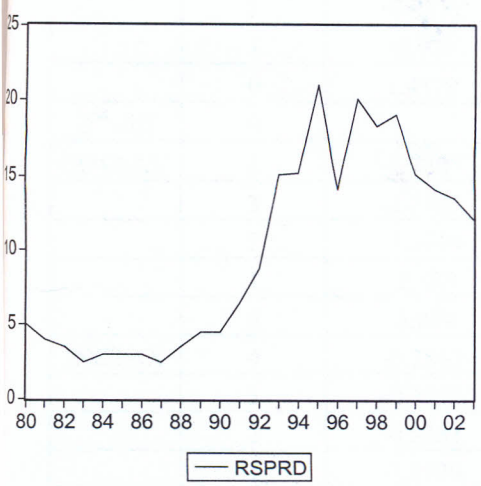
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15
10
5
0
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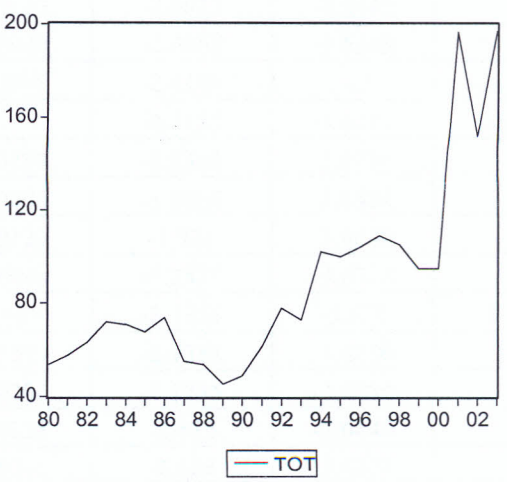
RSPRD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160
120
80
40
80 82 84 86 88 90 92 94 96 98 00 02
TOT

Appendix C: Unit root tests

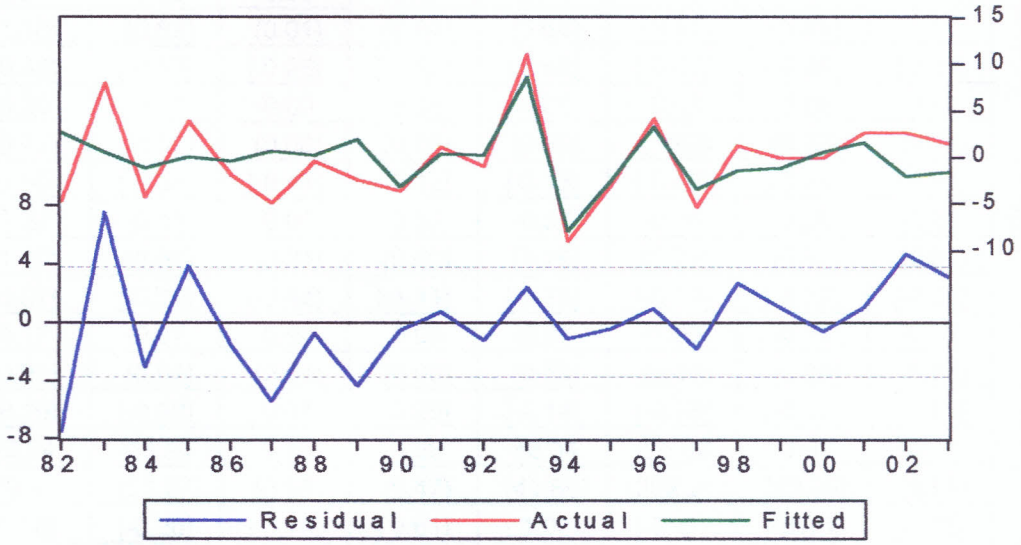
Table C-1: ADF unit root test results

Variable	Lag length	Intercept only	Critical value	Intercept + trend	Critical value	Verdict
CAD	4	-1.9432	-3.029	-3.8112	-3.6736	
	3	-2.971	-3.02	-5.3159	-3.6584	
	2	-3.2735	-3.0123	-3.6169	-3.6449	
	1	-3.4001	-3.0048	-3.3245	-3.6328	
	0	-3.4001	-2.998	-3.3625	-3.622	Stationary
DMCA	4	-1.4552	-3.0299	-1.682	-3.6736	
	3	-1.6104	-3.0206	-1.6699	-3.6584	
	2	-1.8857	-3.0123	-2.4349	-3.6449	
	1	-1.7854	-3.0048	-2.4651	-3.6328	
	0	-1.7598	-2.998	-1.9243	-3.622	non stationary
1st diff	0			-4.3837	-3.6328	stationary
DR1	4	0.2703	-3.0299	-1.8668	-3.6736	
	3	0.5245	-3.0206	-1.5709	-3.6584	
	2	0.6797	-3.0123	-1.3993	-3.6449	
	1	1.1155	-3.0048	-1.1718	-3.6328	
	0	5.4709	-2.998	-0.234	-3.622	non stationary
1st diff				-2.7434	-3.6328	non stationary
2nd diff	0			-5.4903	-3.6449	stationary
DR2	4	-0.8497	-3.0299	-2.866	-3.6736	
	3	-1.0728	-3.0206	-2.9003	-3.6584	
	2	-0.8871	-3.0123	-2.6822	-3.6449	
	1	-0.979	-3.0048	-2.6865	-3.6328	
	0	1.4179	-2.998	-2.4109	-3.622	non stationary
2nd diff	0			-4.3136	-3.6449	stationary
GOVSAV	4	-1.7297	-3.0299	-1.2349	-3.6736	
	3	-2.2103	-3.0206	-1.9066	-3.6584	
	2	-1.5044	-3.0123	-1.921	-3.6449	
	1	-2.483	-3.0048	-3.2531	-3.6328	
	0	-3.054	-2.998	-3.7353	-3.622	stationary
INCTAX	4	-0.2863	-3.0299	-2.1388	-3.6736	
	3	-0.7713	-3.0206	-2.1235	-3.6584	
	2	-0.8381	-3.0123	-2.432	-3.6449	
	1	-1.2739	-3.0048	-2.628	-3.6328	
	0	-1.2492	-2.998	-3.1858	-3.622	non stationary
1st diff	0			-5.305	-3.3628	stationary
INFL	4	-1.6913	-3.0299	-1.7391	-3.6736	
	3	-1.8018	-3.0206	-1.8436	-3.6584	
	2	-1.7382	-3.0123	-1.7738	-3.6449	
	1	-2.7416	-3.0048	-2.7444	-3.6328	
	0	-3.0922	-2.998	-3.1375	-3.622	stationary
INGR	4	-3.3931	-3.0299	-4.9976	-3.6736	

	3	-2.6561	-3.0206	-2.8171	-3.6584	
	2	-3.66	-3.0123	-3.7325	-3.6449	
	1	-3.4792	-3.0048	-3.3396	-3.6328	
	0	-2.8139	-2.998	-2.7581	-3.622	stationary
LLGDP	4	-1.7278	-3.0299	-1.7203	-3.6736	
	3	-2.0564	-3.0206	-2.0872	-3.6584	
	2	-2.4232	-3.0123	-2.4657	-3.6449	
	1	-3.8098	-3.0048	-3.9257	-3.6328	
	0	-4.6177	-2.998	-4.7738	-3.622	stationary
M2GDP	4	-1.1217	-3.0299	1.2247	-3.6736	
	3	-1.2897	-3.0206	-2.1116	-3.6584	
	2	-1.2371	-3.0123	-2.7674	-3.6449	
	1	-1.4325	-3.0048	-2.9532	-3.6328	
	0	-2.2006	-2.998	-3.1263	-3.622	non stationary
1st diff	0			-5.0257	-3.3628	stationary
PRIVSAV	4	-1.7044	-3.0299	-1.7516	-3.6736	
	3	-2.0198	-3.0206	-1.8074	-3.6584	
	2	-1.4779	-3.0123	-1.9178	-3.6449	
	1	-1.5989	-3.0048	-1.6878	-3.6328	
	0	-2.579	-2.998	-3.4796	-3.622	non stationary
1st diff	0			-7.7129	-3.3628	stationary
RSPRD	4	-1.5572	-3.0299	-1.7457	-3.6736	
	3	-1.5589	-3.0206	-1.6707	-3.6584	
	2	-1.4924	-3.0123	-1.6967	-3.6449	
	1	-0.8695	-3.0048	-0.8339	-3.6328	
	0	-1.143	-2.998	-1.6725	-3.622	non stationary
1st diff	0			-6.6018	-3.6328	stationary
TOT	4	0.8087	-3.0299	-0.9464	-3.6736	
	3	0.7868	-3.0206	-0.9323	-3.6584	
	2	0.686	-3.0123	-0.9141	-3.6449	
	1	0.6252	-3.0048	-0.9121	-3.6328	
	0	-0.5138	-2.998	-2.168	-3.622	non stationary
1st diff	0			-7.7464	-3.6328	stationary
RGPDI	4	-2.0698	-3.0299	-0.2315	-3.6736	
	3	-1.7077	-3.0206	-0.2925	-3.6584	
	2	-2.1476	-3.0123	-0.3454	-3.6449	
	1	-2.2436	-3.0048	-0.9791	-3.6328	
	0	-6.9955	-2.998	-2.6371	-3.622	stationary
depr	4	-0.7633	-3.0299	-0.8493	-3.6736	
	3	-0.4866	-3.0206	-0.7419	-3.6584	
	2	-0.0888	-3.0123	-0.6716	-3.6449	
	1	-0.7876	-3.0048	-1.3833	-3.6328	
	0	-1.3378	-2.998	-2.0015	-3.622	non stationary
1st diff	0			-5.8154	-3.6328	stationary

Appendix D: Cointegration Test

Figure B-1: Graph of Residuals of the cointegrating equation



Appendix E: Correlations Matrix

Table E-1: Correlations matrix

	CAD	DEPR	DR1	DR2	GOVSAV	INCTAX	INFL	INGR	LLGDP	M2GDP	PRIVSAV	RGPDI	RSPRD	TOT
CAD	1.00													
DEPR	0.14	1.00												
DR1	-0.46	0.58	1.00											
DR2	-0.46	0.48	0.97	1.00										
GOVSAV	0.21	-0.16	-0.43	-0.50	1.00									
INCTAX	0.51	-0.25	-0.82	-0.86	0.36	1.00								
INFL	0.02	0.67	0.30	0.24	-0.35	-0.13	1.00							
INGR	-0.29	-0.05	0.14	0.19	0.13	-0.14	-0.33	1.00						
LLGDP	0.41	0.48	-0.18	-0.23	-0.16	0.41	0.70	-0.39	1.00					
M2GDP	0.53	-0.12	-0.74	-0.79	0.53	0.63	-0.13	-0.01	0.31	1.00				
PRIVSAV	0.05	0.22	0.42	0.52	-0.74	-0.28	0.23	0.12	0.18	-0.43	1.00			
RGPDI	-0.68	0.07	0.79	0.82	-0.63	-0.72	0.05	0.13	-0.35	-0.83	0.54	1.00		
RSPRD	0.39	-0.15	-0.75	-0.86	0.57	0.81	-0.10	-0.19	0.32	0.77	-0.60	-0.79	1.00	
TOT	0.46	-0.56	-0.88	-0.82	0.18	0.74	-0.33	-0.07	0.08	0.62	-0.20	-0.62	0.57	1.00

Appendix F: VAR Estimation Results

Table F-1: Results of Estimation of VAR system of equations

	DPRIVSAV	DDEPR	DDMCA	CAD	GOVSAV	INFL	INGR	LLGDP
DPRIVSAV(-1)	-0.51	-0.08	0.00	-0.00	0.44	1.89	-0.12	0.00
	(1.18)	(0.82)	(0.01)	(0.00)	(0.64)	(3.11)	(0.46)	(0.01)
	[-0.43]	[-0.09]	[0.28]	[-0.02]	[0.68]	[0.60]	[-0.28]	[0.10]
DPRIVSAV(-2)	0.36	0.17	-0.00	-0.00	0.05	0.93	0.06	0.00
	(0.72)	(0.50)	(0.00)	(0.00)	(0.39)	(1.92)	(0.28)	(0.00)
	[0.50]	[0.33]	[-0.48]	[-0.12]	[0.13]	[0.48]	[0.24]	[0.93]
DDEPR(-1)	-1.22	-0.18	-0.00	-0.00	-0.57	-0.46	0.28	-0.00
	(1.40)	(0.97)	(0.01)	(0.00)	(0.76)	(3.71)	(0.54)	(0.01)
	[-0.87]	[-0.19]	[-0.44]	[-1.11]	[-0.75]	[-0.12]	[0.52]	[-0.25]
DDEPR(-2)	-0.17	-0.57	0.00	0.00	-0.07	-1.92	-0.13	-0.01
	(0.92)	(0.64)	(0.01)	(0.00)	(0.50)	(2.44)	(0.36)	(0.01)
	[-0.19]	[-0.89]	[0.87]	[0.25]	[-0.14]	[-0.78]	[-0.36]	[-1.69]
DDMCA(-1)	12.54	-13.94	0.49	0.28	43.34	-21.82	-2.62	-0.71
	(76.60)	(53.27)	(0.93)	(0.47)	(41.86)	(202.24)	(29.85)	(0.94)
	[0.16]	[-0.26]	[0.53]	[0.61]	[1.03]	[-0.10]	[-0.08]	[-0.75]
DDMCA(-2)	10.37	-9.97	-0.07	0.071	9.06	-40.00	-7.75	-0.22
	(28.24)	(19.64)	(0.34)	(0.17)	(15.43)	(74.58)	(11.01)	(0.35)
	[0.36]	[-0.50]	[-0.22]	[0.41]	[0.58]	[-0.53]	[-0.70]	[-0.64]
CAD(-1)	-47.47	10.52	-0.88	-0.28	-82.77	56.82	-20.70	0.62
	(133.15)	(92.60)	(1.61)	(0.81)	(72.76)	(351.52)	(51.89)	(1.65)
	[-0.35]	[0.11]	[-0.55]	[-0.34]	[-1.13]	[0.16]	[-0.39]	[0.37]
CAD(-2)	-43.17	5.56	0.83	-0.19	-16.41	54.11	40.62	-0.18
	(66.31)	(46.11)	(0.80)	(0.40)	(36.24)	(175.06)	(25.84)	(0.82)
	[-0.65]	[0.12]	[1.04]	[-0.47]	[-0.45]	[0.30]	[1.57]	[-0.22]
GOVSAV(-1)	-0.46	-0.19	-0.00	-0.00	0.10	0.95	0.03	-0.00
	(0.75)	(0.52)	(0.00)	(0.00)	(0.41)	(2.00)	(0.29)	(0.00)
	[-0.61]	[-0.37]	[-0.03]	[-0.18]	[0.26]	[0.47]	[0.11]	[-0.24]
GOVSAV(-2)	0.71	0.26	-0.00	0.00	-0.02	0.03	-0.21	0.00
	(0.70)	(0.49)	(0.00)	(0.00)	(0.38)	(1.86)	(0.27)	(0.00)
	[1.01]	[0.54]	[-0.24]	[0.51]	[-0.07]	[0.01]	[-0.76]	[0.50]
INFL(-1)	0.14	0.36	0.00	-0.00	0.00	1.70	-0.06	0.00
	(0.27)	(0.19)	(0.00)	(0.00)	(0.15)	(0.72)	(0.10)	(0.00)
	[0.53]	[1.89]	[0.32]	[-0.34]	[0.01]	[2.34]	[-0.63]	[2.42]
INFL(-2)	-0.03	0.05	4.62	0.00	-0.24	0.33	0.10	0.00
	(0.30)	(0.20)	(0.00)	(0.00)	(0.16)	(0.79)	(0.11)	(0.00)
	[-0.11]	[0.28]	[0.01]	[0.16]	[-1.51]	[0.42]	[0.90]	[0.41]
INGR(-1)	-0.69	0.04	-0.00	-0.00	-0.00	-0.65	0.63	0.01
	(1.07)	(0.74)	(0.01)	(0.00)	(0.58)	(2.82)	(0.41)	(0.01)
	[-0.64]	[0.06]	[-0.64]	[-1.05]	[-0.01]	[-0.23]	[1.52]	[0.88]
INGR(-2)	-1.46	-0.16	-0.00	-0.01	0.59	3.07	-0.42	-0.00
	(1.00)	(0.69)	(0.01)	(0.00)	(0.54)	(2.64)	(0.39)	(0.01)
	[-1.46]	[-0.24]	[-0.43]	[-1.65]	[1.08]	[1.16]	[-1.08]	[-0.15]
LLGDP(-1)	4.60	-105.28	0.89	0.68	60.69	-455.40	0.13	-1.61

	(98.10)	(68.23)	(1.19)	(0.60)	(53.61)	(259.00)	(38.23)	(1.21)
	[0.04]	[-1.54]	[0.74]	[1.13]	[1.13]	[-1.75]	[0.00]	[-1.33]
LLGDP(-2)	-77.60	-1.11	-0.96	-0.84	45.17	34.22	-15.44	0.74
	(121.28)	(84.35)	(1.47)	(0.74)	(66.28)	(320.19)	(47.26)	(1.50)
	[-0.63]	[-0.01]	[-0.65]	[-1.13]	[0.68]	[0.10]	[-0.32]	[0.49]
C	2.75	6.15	-0.00	-0.02	-10.35	36.02	2.15	0.09
	(9.43)	(6.56)	(0.11)	(0.05)	(5.15)	(24.90)	(3.67)	(0.11)
	[0.29]	[0.93]	[-0.02]	[-0.50]	[-2.00]	[1.44]	[0.58]	[0.78]
R-squared	0.866	0.870	0.896	0.851	0.853	0.852	0.867	0.813
Adj. R-squared	0.332	0.391	0.483	0.257	0.264	0.273	0.335	0.069
Sum sq. resides	56.08	27.12	0.00	0.00	16.75	390.88	8.51	0.00
S.E. equation	3.74	2.60	0.04	0.02	2.04	9.88	1.45	0.04
F-statistic	1.62	1.80	2.17	1.43	1.45	1.47	1.63	1.09
Log likelihood	-40.11	-32.48	52.51	66.85	-27.42	-60.49	-20.32	52.09
Akaike AIC	5.4392	4.7129	-3.3823	-4.7479	4.2308	7.3808	3.5546	-3.3420
Schwarz SC	6.2847	5.5585	-2.5367	-3.9023	5.0763	8.2263	4.4002	-2.4965
Mean dependent	0.0476	-0.5295	0.0023	-0.0274	1.1142	12.7770	1.0617	0.1119
S.D. dependent	4.5844	3.3380	0.0632	0.0266	2.3866	11.5995	1.7903	0.0481

Appendix G: Diagnostic test results

Table G-1: Diagnostic test results of the trimmed model

TEST		
Jarque-Bera Normality test	Test statistic	0.2146
	Probability	0.8982
Ramsey RESET stability test	Test statistic	0.5874
	Probability	0.4724
Breusch-Godfrey serial correlation test	Test statistic	29.2252
	Probability	0.0017

Figure G-1: CUSUM stability test

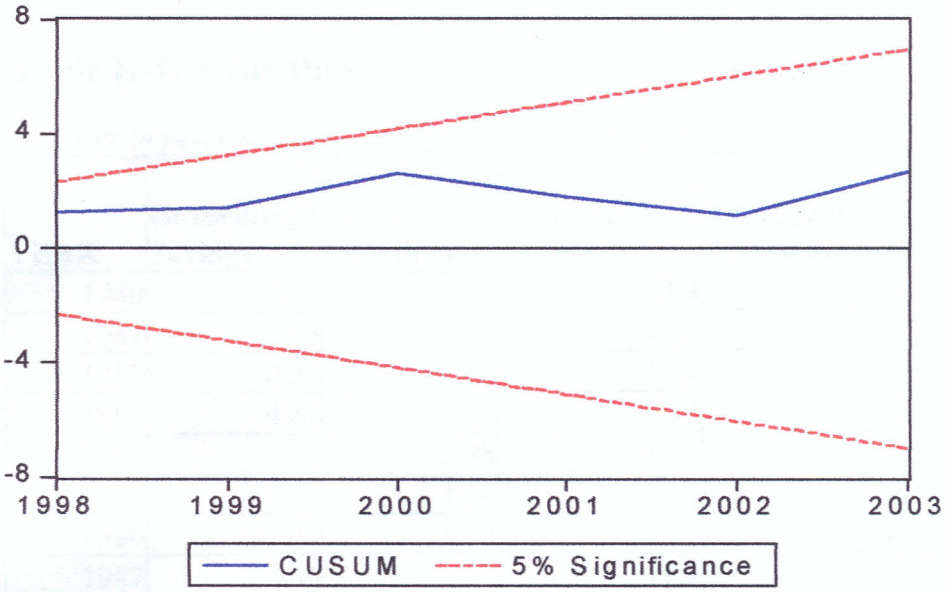
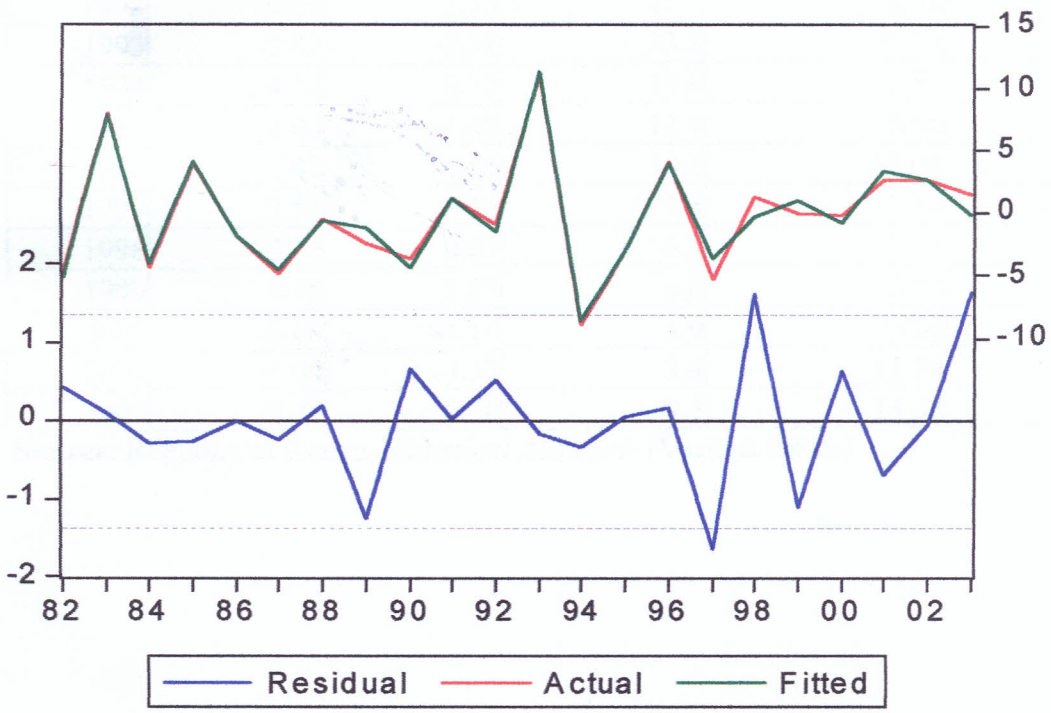


Figure G-2:Residuals graph of estimated Trimmed Model



Appendix H: Basic Data

Table H-1: Basic Data

(Figures in percentages of GDP, except for GDPGR)

YEAR	Government Savings	Government savings growth rate	Gross domestic savings	Aggregate Private savings	GDP Growth
1980	-2.43	0.8	13.4	13.13	5.6
1981	-1.63	0.80	19.6	19.53	4.3
1982	0.57	2.20	18.1	14.83	1.5
1983	-4.61	-5.18	20.4	22.81	2.4
1984	-1.63	2.98	19.4	18.53	1.8
1985	0.11	1.74	24.9	22.49	4.3
1986	-1.44	-1.55	21.9	20.64	7.1
1987	0.45	1.89	19.2	15.85	5.9
1988	1.07	0.61	19.7	15.43	6.2
1989	2.48	0.31	17.3	13.02	4.7
1990	1.71	0.34	14.4	9.39	4.2
1991	2.43	0.72	16.9	10.57	1.4
1992	0.09	-2.35	13.7	9.61	-0.8
1993	-2.43	-2.51	23.8	20.73	0.4
1994	4.34	6.77	19.6	11.86	2.6
1995	2.94	-1.40	12.4	8.86	4.4
1996	2.42	-0.53	13.1	13.08	4.1
1997	2.56	0.14	7.8	7.84	2.1
1998	3.22	0.67	6.8	9.18	1.6
1999	4.78	1.55	6.8	9.12	2.4
2000	3.68	-1.10	5.9	9.02	-0.2
2001	-0.64	-4.32	3.4	11.74	2.3
2002	-0.28	0.36	9.5	14.38	1.1

Source: Republic of Kenya, *Statistical Abstracts* (Various issues)

Appendix I: Reduced Form of VAR System of Equations

$$DPRIVSAV_t = ß_{1t} + ß_{2t}S_{j-t}^2 INGR_{t-j} + ß_{3t}S_{j-t}^2 DDEPR_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_5S_{j-t}^2 INFL_{t-j} + ß_6S_{j-t}^2 GOVSAV_{t-j} + ß_8S_{j-t}^2 DDMCA_{t-j} + ß_{15}S_{j-t}^2 LLGDP_{t-j} + e_{1t}$$

$$INGR_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_{5t}S_{j-t}^2 INFL_{t-j} + ß_{7t}S_{j-t}^2 GOVSAV_{t-j} + ß_{10t}S_{j-t}^2 DDMCA_{t-j} + ß_{11t}S_{j-t}^2 DDEPR_{t-j} + ß_{12t}S_{j-t}^2 LLGDP_{t-j} + e_{2t}$$

$$DDEPR_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_{5t}S_{j-t}^2 INFL_{t-j} + ß_{7t}S_{j-t}^2 GOVSAV_{t-j} + ß_{10t}S_{j-t}^2 DDMCA_{t-j} + ß_{11t}S_{j-t}^2 INGR_{t-j} + ß_{12t}S_{j-t}^2 LLGDP_{t-j} + e_{3t}$$

$$CAD_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 INGR_{t-j} + ß_{5t}S_{j-t}^2 INFL_{t-j} + ß_{7t}S_{j-t}^2 GOVSAV_{t-j} + ß_{10t}S_{j-t}^2 DDMCA_{t-j} + ß_{11t}S_{j-t}^2 DDEPR_{t-j} + ß_{12t}S_{j-t}^2 LLGDP_{t-j} + e_{4t}$$

$$INFL_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_{5t}S_{j-t}^2 INGR_{t-j} + ß_{7t}S_{j-t}^2 GOVSAV_{t-j} + ß_{10t}S_{j-t}^2 DDMCA_{t-j} + ß_{11t}S_{j-t}^2 DDEPR_{t-j} + ß_{12t}S_{j-t}^2 LLGDP_{t-j} + e_{5t}$$

$$GOVSAV_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_{5t}S_{j-t}^2 INFL_{t-j} + ß_{7t}S_{j-t}^2 INGR_{t-j} + ß_{10t}S_{j-t}^2 DDMCA_{t-j} + ß_{11t}S_{j-t}^2 DDEPR_{t-j} + ß_{12t}S_{j-t}^2 LLGDP_{t-j} + e_{6t}$$

$$DDMCA_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_{5t}S_{j-t}^2 INFL_{t-j} + ß_{7t}S_{j-t}^2 GOVSAV_{t-j} + ß_{10t}S_{j-t}^2 INGR_{t-j} + ß_{11t}S_{j-t}^2 DDEPR_{t-j} + ß_{12t}S_{j-t}^2 LLGDP_{t-j} + e_{7t}$$

$$LLGDP_t = ß_{1t} + ß_{2t}S_{j-t}^2 PRIVSAV_{t-j} + ß_{4t}S_{j-t}^2 CAD_{t-j} + ß_{5t}S_{j-t}^2 INFL_{t-j} + ß_{7t}S_{j-t}^2 GOVSAV_{t-j} + ß_{10t}S_{j-t}^2 DDMCA_{t-j} + ß_{11t}S_{j-t}^2 DDEPR_{t-j} + ß_{12t}S_{j-t}^2 INGR_{t-j} + e_{8t}$$