ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF GRADUATE STUDIES

DETERMINANTS OF PRIVATE SAVING IN ETHIOPIA

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ADDIS ABABA, ETHIOPIA

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DETERMINANTS OF PRIVATE SAVING IN ETHIOPIA

A Thesis Submitted in partial fulfillment of the requirements for the Degree of Master of Science in Development Economics

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STATEMENT OF DECLARATION

I, Assefa Tafese, hereby declare that this Master thesis "Determinants of Private Saving in Ethiopia" is my original work. I have conducted the study independently with the support and guidance of my Advisor Zelalem Gutu (PhD). Any academic or other resources use in this research has been properly cited. I further confirm that this research has not been submitted for the purpose of receiving a degree or diploma from this or any other university.

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This is to certify that the thesis conducted by Assefa Tafese, titled “Determinants of Private Saving in Ethiopia” and submitted in partial fulfillment of the requirements for the degree of Master of Science in Development Economics complies with the University's regulations and satisfies the acceptable requirements for originality and quality.

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LISTS OF ACRONYMS AND ABBREVIATION

ADF	Augmented Dickey Fuller
ADR	Age dependency ratio
AIH	Absolute Income Hypothesis
APC	Average propensity to consume
ARDL	Autoregressive Distributed Lag
BDR	Budget deficit ratio
CSA	Central Statistical Agency
DR	Deposit interest rate
ECM	Error Model Correction Model
ECM	Error Correction Model
GDP	Gross Domestic Product,
INF	Inflation
LCH	Life-Cycle Hypothesis
M_2	Financial, deepening
MoF	Ministry of Finance
MPC	Marginal Propensity to Consume
MPS	Marginal propensity to save
NBE	National Bank of Ethiopia
PCE	Private consumption expenditure
PIH	Permanent Income Hypothesis
PS	Private saving
PCI	Per capita income
SLS	Spread
RIH	Relative Income Hypothesis
RIR	Real interest rate
URB	Degree of urbanization
VAR	Vector Autoregressive

Abstract

The objective of this paper was to investigate the determinants of private saving in Ethiopia using time series annual data form 1991/92-2019/20. The study applies the augmented Dickey Fuller test for stationarity and Johansson co-integration test used to determine whether there is a long run relationship between variables. Vector error correction model is applied to estimate both short and long run models related with private saving in Ethiopia.

The estimated results indicate that, Inflation (IF), Real interest rate (RIR), age dependency ratio (ADR) and private final consumption expenditure (PCE) affect private saving negatively. While Deposit interest (DR) and per capita income (PCI) are affect private saving positively in the long run. Inflation (IF),deposit interest rate (DR) and real interest (RIR) are significant determinants of private saving both in the long run and short run, whereas age dependency ratio, per capita income and private consumption expenditure are significantly affect private saving in the long run.

The findings of the study underlined ensure stable and low inflation rates which would help improve real incomes. The government should continue its effort to push for increases economic growth which will translate to increased incomes and savings.

Key words: Private saving, Income, Economic Growth and Error Correction Model

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Evidences show that plenty of studies have been conducted on the importance, trend, as well as role of saving to a country. The classical economic thought, represented by Adam Smith, and David Ricardo gives great importance of saving, believing that each capital is productive and it results from savings.

Life Cycle Hypothesis model proves the role of the demographic variables on saving rate. The evolution of life expectancy caused, together with other demographic variables, the intensification of the demographic ageing process. The individuals become more aware that they will live longer (or at least they see that those around them do) and adapt their saving behavior correspondingly. In the models, the dependency ratios are the main demographic variables considered as determinants of saving (Handa, 2009).

There are many reasons to consider dependency ratio is essential for explaining differences in savings behavior and economic growth in Ethiopia. The argument present as follows, Economic agents have negative savings when young and have low or no income, positive savings during their productive years and, again, negative savings when they are old and retired (Modigliani, 1970). As children constitute a major charge for parents and do not contribute to production, an increase in their share in the population is expected to reduce the private savings rate (Mankiw, 2010).

Higher rate of savings in a country is converted into higher investment depends on well-connected financial structure in form of financial institutions, assets and markets that link savers and investors by linking the information gap and the transaction costs that may be involved (Tesha, 2013). In many sub-Saharan African countries, the rate of economic growth has been impeded by the low level of savings mobilization making them depend on foreign assistance in form of loans and aid to cover their current account deficit (Tesha, 2013).

The long-debated correlation between savings and growth rate of income provides a strong motivation in designing policies to endorse savings and investment which in turn improve economic growth through capital formation (Ozcan *et al.* 2003). In doing so, analyzing the determinants of saving more careful is so critical in understanding the nature and behavior of domestic savings.

The saving varies from region to region, country to country, individual to individual, this would result variations in investment and capital formation by which the economic growth may also be

ended up with great variation. With regard to saving variation, according to Adewuvi *et al.* (2007), over the past thirty years, on average, East Asia saves more than 30% of Gross National Disposable income, while Sub-Saharan Africa saves less than 15%.

Low domestic savings creates constraints for private investors who need finance to support the huge demand of private investment required for the country's accelerating growth and development. Cash on the hand of individuals, potentially feeds the shadow economy. An economy system must be able to produce capital in order to satisfy the wants and needs of its people. If there is enough saving in a country, it leads to reduce lending rate and increase financial accessibility (Ethiopian Business Review Magazine 2020).

Mobilizing domestic saving and its efficient uses help a country to achieve sustainable development and get free of dependence on external resource for investment. Ethiopia is one of the developing countries whose economic performance is mostly dependent on external resources as recently the debt of the country stretched more than 50% of Gross Domestic Product which is high debt burden and need to manage in the long run. According to the 2019 fiscal year Ministry of Finance report, the total debt of the country was reached US$ 53.4 billion, out of which 27.7 billion is external debt which forced the Country to pay US$ 1.2 billion annually in the past two years. Gross domestic savings (% of GDP) in Ethiopia was reported at 20.91 % in 2020, according to the World Bank. Ethiopia's economy grew by 6.1% in 2020, down from 8.4% in 2019. In 2020 inflation reached 20.6%, well above the 8% target, due to supply chain disruptions and expansionary monetary policy the official exchange rate was devalued by about 20% (World Economic outlook 2021).

It is a large amount since the country is under critical foreign currency shortage. In order to reduce the huge amount of external debt burden and assist investment the government should focus on the domestic resource mobilization. (Ministry of Finance (MoF, 2019).

According to Romme (2003) who did a study on South Africa and found that private savings rate has a direct effect on economic growth through private investment. The lower interest rate is an opportunity to ensure access to financial service to those vulnerable and economically weak groups of the society as well as address the financial needs of the missed middle group.

In Ethiopia Domestic saving to GDP ratio reached 24 percent while investment to GDP ratio reached 39 percent. As a result domestic resource mobilization in Ethiopia needs an extra work and coordination. Even if domestic saving specially private saving is the most important for domestic finance, different factors affect domestic saving which might be differ from country to country, hence this study aims to examine factors affecting private saving in Ethiopia.

1.2 Statement of the Problem

The role of savings to economic growth has been under scored in various literatures. Having considered the importance of savings for investment, the question of what determines the magnitude and trends as well as contributions of savings to growth in a country, cross country and regional level has been issue of concern for researchers, institutions and all stake holders. A study by Eric and Mwai (2015) in Kenya, showed that Gross Domestic Product, Inflation and Age-dependency ratio were significant determinants of gross domestic savings whereas real interest rates was not a significant factor of gross domestic savings.

Marcel & Gabriel (2016) found that increase in inflation results in decrease in private savings contrary to the theory of precautionary motives for saving which implies lower inflation in Kenya raises growth which in turn increases savings in the country. But real interest rate was insignificant. According to the study conducted by, Sebastian (2007), GDP per capita, interest rate spread, domestic inflation rate and real interest rate significantly affects saving in Nigeria. In the case of Tanzania private saving is responsive to real per capita GDP and external savings and nonresponsive to real deposit rate and public saving, (David 2013).

Biswajit Maitra (2017) examines macroeconomic determinants of saving in India and the role of savings in promoting economic growth over the period of five decades. Involving annual time series data set of economic growth, net domestic savings, interest rate, by using some econometric tests, found that income growth has a positive impact whereas the dependency ratio has adverse impact on savings both in the short-run and in the long-run.

Demographic factors such as age dependency ratio, labor participation growth rate, unemployment rate, employment rate, rural population, population growth rate, urban population and others affect saving (Coasin et al. 2015). Dependency of youth has positive correlation to saving; it can be interpreted that people who have young dependent individuals have to have more savings than older people because of education costs, and additionally urbanization forces people to save more to be able to guarantee their children's futures, (Coasin et al. 2015).

Investment contributes to growth in collective economy. But the investment cannot increase without increasing in the amount of saving. Thus, savings play a major role in providing the countries capacity for investment and national income, similarly it also affect the potential of economic growth.

In the sense that for economic policy-making purposes, it is important that economic planners or policy makers have to accurate and rational decision about the importance of saving and investment, the behavior of people towards investment and saving and the method by which

saving can be improved for investment. Economic planners would also need to know about the intentions of saving and investment in order to setting demands accordingly.

Haile (2013), investigate the determinants of domestic saving in Ethiopia using time series annual data form 1970/71-2010/11, used ARDL bounds testing Approach and Error correction model (ECM). The Estimated results discovered that growth rate of income (gPCI), budget deficit ratio (BDR) and inflation rate (INF) were statistically significant short run and long run determinants of domestic saving in Ethiopia, Genet (2017) examined determinant of domestic saving estimated using co-integration and Error Correction Models. The Results of the study show broad money to GDP ratio, inflation rate and age dependency ratio play a significant role in determining the gross domestic savings in Ethiopia.

3Tizita (2019), analyzed the Determinants of Private Saving in Ethiopia, In the long run, the study found that level of real per capital income, terms of trade, interest rate, urbanization ratio, bank branch and the dummy variable for political instability are positively affecting private savings except terms of trade are statistically significant . Edosa & Debeli (2021), investigate the Determinants of National Saving in Ethiopia. Autoregressive distributed lag (ARDL) approach to co-integration and error correction model (ECM) has applied to analyze the short-run and long run relationship between the explained and explanatory variables.

In connection with this, as in the case of various countries, it is believed that different factors attributed to domestic saving growth and trends in Ethiopia which is not well analyzed so far. Most of previous studies concentrated on analyzing the determinants of total or national savings without separating private from public savings with old data. Regardless of the fact that private savings play the key role in growth and development, therefore this study conducted to fill this gap through detail assessment of the impact of selected macroeconomic variables (inflation, deposit interest rate, real interest rate, per capita income and private consumption expenditure) and age dependency ratio. This study applied VAR model and ECM which is a recent advance in econometrics, the study also added recent data not used in previous studies.

1.3 Research Objectives

1.3.1 General Objective

The primary objective of this study is to empirically analyze factors affecting private saving in Ethiopia.

1.3.2 Specific objectives

- To identify determinant of private saving in Ethiopia
- To examine the long run and short run determinants of private saving in Ethiopia.

1.4 Hypothesis of the Study

In accordance with objective of the study the following hypotheses are formulated for investigation. Hypotheses of the study focus on the theories related to saving that has been developed over the years by different researchers, scholars and empirical studies related to saving. The theories of the literature reviews are used to establish expectations for the relationship of the different determinants of saving. Therefore based on the objective, the study has developed the following hypotheses.

H_0: $b_{1i}=b_{2i}=$----------$b_{6i}=0$ *(where i=1, 2, 3----6)*

H_1: $b_{1i}\neq b_{2i}$ -----------$\neq b_{6i}\neq 0$

H_0, the null hypothesis indicates that the coefficients or effect of the independent variables are all equal to zero , implying that the effect is not different from zero.

H_1, the alternative hypothesis indicates that the coefficients are different from zero; indicate that the independent variables affect the dependent variable (private saving).

1.5 Significance of the study

The Ethiopian financial sector is one of the areas which are under early stage of development. Therefore, more studies are need for further improvement and growth so, this study contribute empirical analyses which helps for policy makers to make informed decisions on the area The outcome of the study may serve as literature for other researchers who have endeavor to conduct further research works in the area of private saving in the country. It also contributes to the available store of knowledge to the already existing knowledge in the area of the saving.

1.6 Scope of the study

The study has planned to employ time serious data spanning from 1991 to 2020. This period is chosen because there was government change and the economy is shifted from command economy to market lead economy.

Following the economic reform, private commercial banks were allowed to carry out banking business which has its own contribution on private saving. Hence this study mainly focused on selected variables, inflation rate (INF), per capita income (PCI), real interest rate (RIR), deposit interest rate (DR), Age dependency ratio as a percentage of working population (ADR) and Private consumption expenditure (PCE).

1.7 Limitation of the study

The limitation of this study is that data constraint, this means that data collected from different governmental institution is some show inconsistency as well as collecting data is not smooth.

There are other important factors, factors that can explain the growth of private saving. This issue itself is a topic for further research and is not addressed in this study.

1.8 Definition and Concept of Terms

Per capita income: is a measure of the amount of money earned per person in a nation or geographic region. Per capita income can be used to determine the average per-person income for an area and to evaluate the standard of living and quality of life of the population (Mishkin 2010).

Private consumption expenditure (PCE): The proportion of expenditure spent on consumption from income.

Deposit interest rate (DR): implies that when there is deposit money at the bank, the bank may earn interest on that money especially in savings accounts or certificates of deposit. The deposit interest rate is the rate of interest that investors pay to borrow money, (Mankiw, 2010).

Private saving (PS): private saving is taken as the difference between total savings and public savings (NBE).

Inflation (IF): It shows a consistent rise in price level. High inflation rates do not encourage higher savings. It is reasonable to expect that savings will fall with inflation as people shift their resources into real assets to escape the loss of money value. When prices of commodities increase steadily, people have to spend more on consumption which decreases the rate of domestic savings. So, it is expected that there is a negative relationship between inflation and national savings (Mishkin 2010).

Real interest rate (RIR): is the difference between nominal interest rate on savings deposit and annual inflation rate. The real interest rate is the nominal interest rate corrected for the effects of inflation, (Mankiw, 2010).

Age dependency ration (ADR): Age dependency ratio is the ratio of the sum of people younger than 15 and those older than 64 to the working age population. It is the ratio of dependents younger than 15 or older than 64 to the working-age population (15-64 years), (World Bank, 2011).

The VAR model: is very use full starting pint in the analysis of the interrelationships between different time serious variables. The literature on unit roots studies stationary time serious which is in first difference. The theory of co-integration explains how to study the interrelationship between the long run trends in the variables. (Gujarati, 2004).

Deposit interest rate: implies that when there is deposit money at the bank, the bank may earn interest on that money especially in savings accounts or certificates of deposit. The deposit interest rate is the rate of interest that investors pay to borrow money, (Mankiw, 2010).

1.9 Organization of the Thesis

This paper comprised five sections. The first part discusses an introduction to the topic and clarifies the research question that is going to be carefully addressed in the paper. The second part deals with the theory. It, discusses exiting theoretical literature and empirical works related to the topic. The third part describes the data and explains the methodology used for the entire analysis. The fourth part presents the results and discusses. Finally, the fifth part concludes remarks and important policy implications.

CHAPTER TWO: RELATED LITERATURE

This segment presents analysis of both empirical and theoretical literatures on domestic private savings, from this first part deals with review of theoretical literatures, which have direct or indirect relevance on the area of the research. The empirical evidence has been done in both developing and developed countries in overall and over Africa. It is followed by a common overview around the literatures. For the purpose of this study the term private saving equals the part of national saving excluding public (government) saving and not spent for consumption.

2.1 Related Theoretical Literature Review

Theoretically, there are various factors that affect saving performance of a country. Roughly talking, estimating those factors which could affect the structures of savings of economic mediators both at macro and micro bases, is not simple assignment as someone can consider. It is because of the data problems and/or the lack of reliable data on the area and the effect of variables which is not included a certain model is large. More essentially, the unit measurement consistency in a particular country is also another issue. The above mentioned problems are worse in developing countries.

However there are various academic efforts were exert to identify the key elements which affect saving behavior of economic agents. Of which the most important elements have been documented in many studies those related to income, (fiscal policy), Monterey policy (lending interest rate, real interest rate, the extent of financial sector development (Broad money supply to GDP ratio), macroeconomic stability (inflation) and demographic variables such as age dependency ratio, population growth rate, urban population, rural population are among other factors.

In economics, there are different theories which are supposed to explain the area of savings. Among which the most broadly used can be noticed onto the following classes. These are Relative Income Hypothesis (RIH) by Duesenberry (1949) Absolute Income Hypothesis (AIH) by Keynes (1936), Life-Cycle Hypothesis (LCH) by Modigliani (1963) and Permanent Income Hypothesis (PIH) by Friedman (1957).

2.1.1 Duesenberry Relative Income Hypothesis

James Duesenberry (1949) a household consumption function is subject to on a household's income in relation to other household income, as a result, for any given relative income distribution, the amount of income saved by a household will incline to be different, invariant,

and increasing function of its percentile position in the income spreading. Relative Income Hypothesis adopts that the amount of income saved will be independent of the absolute level of income.

This infers that the MPS (marginal propensity to save) of an individual would be greater if his /her percentile position in the income distribution is higher. According to the this theory consumption function is found to be dependent not only depend on the given level of disposable and/or absolute income level of a household but also on the other household‘s income level and previous consumption level, cited (Mankiw 2010).

2.1.2 The Keynesian Theory of Absolute Income Hypothesis

In both of the developed and developing countries, income is found as the back bone, which has a big role in determining saving rates of individuals, family and countries, amongst others. In the 1930s, the argument, raised Keynesian economists, was that consumption and savings are non-decreasing function of absolute or current disposable income, as Keynes (1936). Keynes (1936) had been tried to associate consumption and savings with income level through the idea of Marginal Propensity to Consume (MPC), although his intuitive model had not been tested or supported by data in both long-run and short-run cases due to the reason that the predicted MPC result is found to be lower than what was found using Ordinary Least Square (OLS) cited (Mankiw 2010).

To elaborate more, the short-run estimation result shows the average propensity to consume (APC), is higher than Marginal Propensity to Consume (MPC), and whereas in the long run the estimated result of the APC is found to be the same with the MPC. Here the central point is that, under normal condition, consumption is supposed to increase by decreasing rate, while the other side of consumption, that is saving is in a situation to increase by an increasing rate every time when disposable income increases, cited Mankiw (2010).

On the other hand, saving is assumed to be zero or negative when zero level of income is proposed (i.e., that consumption can be subsidized through borrowing/dissaving), given that specific amount of income is perceived, Marginal Propensity of Saving (MPS) is found to be positive but less than one. This implies that saving has a stable and positive relationship with disposable income and/or positive absolute income as claimed by Keynes (1936). In generally, the Keynesian saving function takes the linear form with constant MPS. Therefore we can express the saving function as follows: $S\ a + bY + cY^2$ Where; b is the constant MPS, this

function assumes that a < 0, 0 < b <1 and c > 0 implying that as the level of income rises, the average propensity to save also rises. (Mikesell and Zinser 1973), Mankiw (2010).

2.1.3 Permanent Income Hypothesis

The contradiction of Keynes's analysis with data about the consumption function and current income hypothesis give direction for scholars to look for detailed estimation across the course of their relationships (Romer 1996). Based on this in 1957, Friedman has come up with his new philosophy of the so-called Permanent Income Hypothesis (PIH).

The central idea of his theory is that measuring predictable long-term income (permanent income) is the key determinant factor for consumption and/or saving manners of economic agents, instead of merely depends on upon the absolute or current income as the case which was argued by Keynes (1936). In this argument that consumers are rational and they seek to optimize their lifetime utility subject to the constraint that all their lifetime resources must be spent. Friedman decomposes current income into two parts temporary income and permanent income. Transitory income has been defined as the difference between actual income and permanent income over a specified period of time and permanent income is defined as the lifetime income an individual is projected to earn out of the physical and human assets that he holds, cited (Mankiw & Mishkin 2010).

In this perception, the consumption function, in particular, is independent of the temporary income since it simply varies with past experience that is by permanent income; saving, on the other hand, could simply look dependent upon both permanent and transitory income (Tesha, et al 2013). As pointed out by Arok (2012), this kind of practice is, sometimes, known as consumption smoothing due to the reason that when there is transitory income saving of individuals may be grater their average saving, on the other hand they could also borrow in times of low current income.

Permanent-income hypothesis Rather than focusing on the life cycle per se, Friedman discussed the general problem challenged by households when their income fluctuates over time, whether due to life-cycle effects, business cycles, or other factors. He considered large number of households and distinguished between a "normal" level of income that they expect over their lives, which is called permanent income, and (positive or negative) deviations from that level, which he named temporary income, Cited (Handa, 2009)

Similarly, Friedman distinguished permanent consumption, which is the part of consumption that is steady and planned, from unexpected spending or temporary consumption, such as

unexpected medical bills or temporary college tuition fee. Friedman argues that permanent income will be proportional to permanent consumption. Households will propose to spend in an average period a fraction (equal to one or slightly less) of their average lifetime income. He further assumed that both transitory and permanent consumption are independent of temporary income and that transitory consumption in any period is independent of permanent income, cited (Mankiw & Mishkin 2010).

2.1.4 The Life-Cycle Model

The other model that deals with the consumption function is the Life-Cycle Hypothesis (LCH). This theory was predominantly modified into implementation by Ando and Franco Modigliani (1963), it‘s more or less parallel or near similar with the permanent income hypothesis, however there one difference that is, the Life-Cycle Hypothesis assumes the natural variation of income in a certain (defined) time horizon, while the permanent income hypothesis focused on the overall variations in income over the unspecified lifetime.

> According to the life-cycle theory, income growth is assumed to be one of the outstanding factors of the behavior of domestic savings. This hypothetical scheme is also in a position to get emphasis through the modern empirical studies. Because it tries to capitalize on the present value of lifetime utility of individual‘s from inter-temporal consumption from end to end lifetime budget constraint of that individual.

In a manner that LCH allows to predict a stable saving and consumption decision at any time in point subject to the initial resource and lifetime labor income of a given individual or household. To this impact, according to the Life-Cycle Hypothesis, lifetime of an individual has been grouped into three categories: youth time period, working age and retirement time period, (Mankiw, 2010).

In accordance, the middle age or working lifetime is supposed to be a period for accumulating a large or high saving, while the other two age groups, particularly those who retired are positioned into borrowing and/or dissaving periods, and this borrowing encourages for higher interest rates as documented Arok (2012). The higher interest rate that originates from higher demand, leads to increase the opportunity cost of current consumption as related with upcoming consumption, which is discourages current consumption.

In general the Life-Cycle Hypothesis, which is proposed by Modigliani and his colleagues (1967), focuses on the argument where income growth and aggregate saving have an increasing

function. This means that greater income growth will lead to increase the total income of working age groups.

To this effect, aggregate saving will get increases following the growth of income. As cited in Ozcan*et al*., (2003); unless and otherwise this inference will not be reputable as a matter of fact since forward looking individuals will expect future higher income and they are demanding more current consumption. If this is the case, saving rate will go downturn simply due to the fact that it‘s adversely correlated with consumption level. This implies that, keeping other things remain constant; the higher portion of income growth is compensated through. Life-cycle model Modigliani's model underlined how saving could be used to transfer purchasing power from one chapter of life to another. In early life, income of a person is usually low relative to future working years. Income typically summits in the last part of the working life, then drops at retirement.

Consumers who desire to smooth consumption would demand to borrow during the early low-income period, repay these loans and build up wealth during the high-income years, then spend off the accumulated savings during retirement. Implicit in the life-cycle approach is the idea of a lifetime income constraint that links consumption at various dates during the lifetime.

The slope of the budget constraint, which determines the tradeoff between period *t* consumption and period $t + 1$ consumption, is $-(1 + r)$, where r is the real interest rate at which consumers lend and borrow. The position of the budget constraint determined by the present value of lifetime earnings, which is usually simply called wealth. In terms of the modern utility-maximization model, wealth is $\Omega o = Ao + \sum_{t=0}^{T} Yt/(1 + r)^t$.

where Ω_0 is the stock of wealth (human and nonhuman) as of time zero, A_0 is the value of current nonhuman (financial or physical) assets, Yt for t = 0, 1, 2, ..., T is the expected amount of real labor income over the lifetime, and r is the real interest rate. The early empirical tests of the life-cycle model were tests of whether interest rate and wealth explained consumption better than current disposable income.

2.1.5 Saving and Economic Growth

Early theories of economic growth focus on the role of savings as a source of capital accumulation and, hence, growth. Similarly Keynesian economics the aggregate demand-based theory also focused on aggregate expenditure, which has a direct implication to savings. Low national savings rate is one of the critical obstacles to achieving higher and sustainable economic

growth. Classical and neoclassical models are emphasize saving is a main deriver for long run economic growth. Positive change in saving rate could promote the growth rate. For this reason saving is one of the factors for economic growth, accumulated saving is the source for capital which leads to increase investment implies higher, output and more employment these would enhance economic growth (Solow, 1956).

Keynesian aggregate demand models focus on final consumption spending in enhancing the current economic growth rate; based on growth theories (Harrod-Domar, 1939). Also (Solow-Swan, 1956) models verify the critical importance of saving in generating future economic growth by a means of investment.

Therefore, excessive consumption spending may counter low economic growth in the short-run, however in the long-run the growth solution for any country crucially vested in in adequate saving. The level of national saving has important implications for the economy; it provides a source of funds for domestic investment, which in turn is a key driver of labour productivity and higher future living standards, (GDO, 2001).

In addition, the AK and Solow growth models are put emphasis on capital accumulation to bring economic growth; whereby presenting as higher saving is a prerequisite to promote growth by the reason that higher savings would increase higher economic growth. According to the Solow‘s model, savings has no permanent effect on economic growth beyond it does result for moving an old steady state growth rate of per capita into new steady state growth rate of per capita.

In other sayings, an increase in the rate of saving has a level influence on income per person: it origins a period of fast growth, but finally that growth slow as the new steady state is reached. Thus, although a high saving rate leads a high steady-state level of output, saving by itself cannot generate consistent economic growth.

Regardless of that, it is however; positively affecting the living standards permanently and this may end up with steady sate amount of capital stock per worker, which in turn might also have a decisive impact on output per worker in the long run. Contrary Aghion and Howitt (2005), more recent models give attention to innovation as the main engine of growth (Romer, 1990; and Aghion and Howitt, 1992), either disregard capital accumulation, in which case there is no role for saving even in a closed economy, or they ignore on the complementarities between innovation and capital accumulation (Howitt and Aghion, 1998), in which occasion the equilibrium growth rate depends positively upon domestic saving.

In any case, savings play a significant role in the economies of many countries. As noted by

Kodom (2013), available research and evidence points to a positive relationship between economic growth and savings. This approaches that higher income has been showing to precede economic growth to this effect savings mobilization in a country is an important indicator of growth in a given economy.

2.1.6 Saving and Interest Rate

The classical theory of demand and supply theory of interest, keeps that the rate of interest is determined by the demand and the supply of funds by businessmen and households respectively. The supply of funds is ruled by the time preference and the demand for capital by the predictable productivity of capital. Shaw (1973) and McKinnon (1973) argue that for developing countries, the net impact of a change in real interest rate on saving is likely to be positive. This is because, in the typical developing economy where there is no well functioned financial market and quasi-monetary assets usually account for a greater proportion of household saving compared to that in developed countries.

Theoretically, the effect of interest rates on savings have a tendency to be unclear-cut issue being subject to theoretically offsetting negative transformation and progressive income effects the latter reflecting the fact that the private sector is a net creditor in financial resources. Actually, human asset is much larger than financial asset for a typical human and individual wealth varies inversely with the rate of interest suggesting that the negative substitution effect should offset. However, consumers may not plan their lifetime consumption pattern but instead they respond primarily to current income.

For demarcated benefit plans, higher interest rates increase the income available to pay pensions, allowing lower contributions (Bernheim and Shoven 1988). Empirical investigation has reported mixed results, paralleling the theoretical ambiguity. For instance, using data on saving for developed countries, Bosworth (1993) founds a positive interest rate coefficient in time-series estimation for individual countries, but a negative coefficient in panel (cross country) estimation.

For developing countries, Giovannini (1985) found that in most cases the real interest rate elasticity is zero, while Schmidt-Hebbel *et.al* (1992) also found no clear effects on saving. But Ogaki *et.al* (1995) on the other hand, finds positive interest rate effects that vary with income but are still small. Given that financial liberalization may have improved the interest rate effects, the effect of liberalization on saving behavior can operate at least two channels.

First, financial development may deliver channels for financial saving, thereby raising saving rates, and a channel that has been emphasized in the development literature (McKinnon 1973 and

Shaw 1973). However, although financial liberalization commonly affects the form that saving takes and also the effectiveness of investment, it need not raise the level of saving (De Gregorio and Guidotti 1994). The second phase includes the liberalization of consumer access to bank credit, as occurred in a number of industrial countries in the 1980s. The attraction for getting the saving from the surplus sector is interest payment, which must be reasonable and acceptable to the owner of the money.

2.1.7 Inflation and Saving

Inflation is explained as continuous rise over time in the fundamental price level of goods and services in an economy. This continuous rise in prices of goods and services translates to the monetary unit purchasing less goods and services. Hence it can be concluded that inflation mirrors decreasing purchasing power per unit of the country‘s currency, reduced value of goods and services in the medium of exchange and unit of account within the economy (Fischer, 1993).

2.1.8 Saving and Consumption Smoothing

Choices by individuals and families about their saving are one of established fundamental determinates of national savings. These decision makers split the current increment to their resources between consumption, the satisfaction of current wants, and savings that intern will affect their ability to satisfy wants in the future. Any model of rational decision making by savers must, therefore, focus very clearly on the trade-off between satisfying wants now and later with in this limitation, however, there is widespread latitude for different specifications of consumer’s aims and the constraints they face in attaining them.

Household savings is a major component and factors of saving in developing countries and many economists see saving as the source of fund for economic growth, so that encouraging saving proves a fundamental component of a policy for growth.

According to Tochukwu (2009), the life –cycle hypothesis theory more focus on what happens in developed economies but while the circumstances of developing countries are different from developed countries, family size in developing countries tend to be larger than those in developed ones, and there is a greater tendency for several generations to live together as result household has no need for retirement saving because resources are shared between dependents and workers.

Households in developing countries tend to be poor and large. Most of them are engaged in agricultural activities and their income prospects are much more uncertain. It has a great impact

on saving and consumption. Saving provides a barrier between uncertain and unpredictable income and an already low level of consumption. So saving in developing countries is inter temporal smoothing saving, not life-cycle intergenerational saving. The analysis is different, and become issues of welfare, which are focused on the protection of consumption, particularly whose consumption levels may not be far above subsistence.

2.2 Empirical Literature Review

In line with the potential determinants of saving, there are numbers of empirical works which have been done in both developing and developed countries. Accordingly those empirical studies have been deployed or applied different methodological approaches. They used techniques like error correction and co-integration models, which allow for heterogeneity in parameters and differences across countries, to determine the long-run determinants of saving rates, others have been used panel data estimation technique in order for getting free of the problem of omitted variables bias and would also allow for the inclusion of country specific characteristic features, on the other hand.

With respect to factors which have been incorporated in the area of savings behaviors, many studies have mainly focused on the association amongst savings and demographic variables such as dependency ratio and life expectancy, while majority of others have gave much attention on the macroeconomic variables including real interest rate, income, money supply, terms of trade current account balance and etc.

Samantaraya and Patra (2014) examine the determinants of savings in India from the period 1971-72 to 2011-12 by applied ARDL approach to cointegration on a set of variables including, real interest rate, gross domestic product, dependency ratio, inflation, gross fiscal deficit, net barter terms of trade, and some others they finds that that GDP, interest rate, dependency ratio, and inflation have statistically significant influence on household savings in India, both in the long run and short run.

The results of the estimated saving rate model supposed that income, young population, age dependency ratio, urban population and rural population are found to have positive effect on gross domestic savings. Hence, the age structure of the population has a different role in explaining the general national savings rates.

As studied by Coale and Hoover (1958), Mason (1988), and Higgins (1998), demographic factors are believed to be significantly associated with the saving rates historically. Moreover,

life cycle hypothesis of Modigliani (1966) also advocates the possible negative correlation between old age dependency ratio and saving rate, by stating that individuals prefer to spend their entire income evenly throughout their lives. Moreover, as life cycle hypothesis supported by Modigliani (1970) signifies, elderly population is expected to save less than working-age population.

For young age dependency ratio, as investigated by Fry and Mason (1982) and Mason (1988). The presence of children naturally accelerates the consumption of households and hampers households from saving their income (Mason 1988). Increases in the dependency ratio may put significant upward pressure on government spending on education and health needed to improve the quality of life. This may be involving a reduction in public savings if fiscal policies remained unchanged. Old age dependency ratio is negatively associated with domestic saving rate, as economic problem due to larger proportion of non-working population hampers the economy from generating savings. On the other hand financial deepening which is measured by broad money supply to GDP ratio, on have a negative effect on saving rates, other explanatory factors such as inflation and old population are found to have no any significant effect on the saving rates.

A study conducted by Kudaisi (2013) on the determinants of gross domestic savings in the region of West Africa over the time covered from 1980-2006, the results somehow seems opposite to Aric‘s findings; in a sense that gross domestic saving rate is negatively associated with size the size of dependency ratio and interest rate, while growth of GDP has a positive impact on; but, all of these variables are show to be statistically insignificant for this regard.
Though, the other macroeconomic variables such as government budget surplus and inflation rate in one corner, and the financial market development on the other hand, are found in a position to have a statistically significant and positive effect on domestic saving, and as far as terms of trade and the real interest rate concerned, it‘s reported as there is no reasonable impact in determining the saving rate over the West African countries.

Adu Larbi (2013) examined the determinants of savings in Ghana and found that financial liberalization, inflation and per capita income have a positive relationship with savings. Haile (2012) investigated the determinants of domestic saving in Ethiopia using time series data form 1970/71-2010/11 by applied ARDL bounds testing Approach and ECM to capture both short run and long run relationships.

The estimated results showed that growth rate of income, budget deficit ratio and inflation rate

were statistically significant in both short run and long run. On the other hand current account deficit, deposit interest rate, and financial depth were found to be statistically insignificant in the long run. However, in the short run, financial depth and deposit interest rate were found to have statistically significant in explaining domestic savings in Ethiopia.

Kidane (2009) explore the determinants of gross domestic saving in Ethiopia using co-integration and error correction econometric model, and employ data for the time series analysis of period 1971-2009. Found that that growth of per capital income have significant and positive effect on domestic saving while the current per capital income level is significant but negatively correlated with domestic saving in the long run, insignificant in the short run model.

The financial variables represented by development of broad money supply and real deposit rate do not show any impact in improving the domestic saving. Inflation rate has negative effect and dependence ratio has a significant negative effect saving in Ethiopia. According to Ayalew (2013), in the past four decades the average domestic saving rate was only 7.9% of the GDP during the three consecutive governments of Ethiopia over the study period reveals that the average saving rate was 13.8% of GDP.

According to Myers and Brealey (2003, cited in Jembere 2014) it is a decline in the purchasing power of money (market value) as a result of persistent rise in prices. Actual value of money declines resulting in loss to creditors and benefit to debtors. From the monetarist observation inflation is demand pull and an exogenous rise in money supply is the causality. In the short run an upsurge in money supply encourages demand above supply of goods and services which causes prices to rise until the market adjusts to the equilibrium. The study carry out by Mohammad and Mahdi (2010, cited in Jembere 2014) showed that in Latin America the effect of inflation on saving and time deposit to GDP was significantly negative.

In this case the classical belief is that, because bank assets and liabilities are expressed in monetary terms and because these assets will generally grow in line with growth in money supply, banks are comparatively protected from the effects of inflation. In general monetary policy works by controlling the cost and accessibility of credit.

Yohannes (2014) investigate time series analysis of the determinants of gross national saving in Ethiopia using autoregressive distributed lag and error correction econometric modeling, and by deployed data for the period 1971-2011. The estimation results shows that Current account deficit and financial development are significant determinants of gross national saving in Ethiopia in the long run, while other explanatory variables such as gross national disposable

income, budget deficit, dependency ratio, and inflation, approximated by consumer price index, reported as they were statistically insignificant determinants of gross national saving in Ethiopia over the long run.

The study also showed that variables such as financial development, current account deficit, budget deficit and gross national disposable income, were statistically significant in determining gross national saving in the short run, while consumer price index and dependency ratio are not.

A study conducted the determinants of domestic savings in West Africa during 1980-2006.

The estimation result indicate the size of effect of the dependency ratio, and interest rate on domestic savings is found out negative and insignificant, while inflation rate are found to be statistically significant. And real interest rate, and terms of trade have insignificant impact on the level of saving in West Africa, (Bosede V. Kudaisi, 2013). Davis Adu Larbi, (2013), explored the determinants of private savings in Ghana using the Phillips and Ouliaris (1990) residual-based tests to determine the long run relationship between private savings and its determinants. The estimation results designate financial liberalization; per capita income and inflation were found to have a positive and significant relationship with private savings.

Tasnim Khan et al., (2013), investigates the impact of demographic factors on Private Saving in Pakistan, time series data from 1975-2008 and used co-integration analysis. The study finds that increase in per capita income, increase in years of education of both males and females, deepening of financial system and age are positively associated with higher saving rate but increase in dependency ratio has adverse impact on saving rate.

Cyril Ayetuoma Ogbokor et al., (2014), empirically investigate determinants of savings in Namibia through the use of co-integration and error correction mechanisms for the period running from 1991 to 2012. The results mention that inflation and income have positive influence on savings, whilst population growth rate has negative effects on savings. Additional, deposit rate and financial deepening have no significant effect on savings.

Mohamed Sayeda, (2014), examined the long run and short run relationships between private savings and economic growth in Bahrain, covers the period (1990-2013).used co-integration and Granger causality techniques. The test result indicates that a positive long run relationship between the study variables, while Granger causality test reveals that significant bilateral causality between the private savings and the economic growth.

Mohamed Sayedb, (2014), investigate the effect of interest rate, inflation rate and GDP on national savings rate ate in kingdom of Bahrain over the period 1990-2012 by applied

Augmented Dickey-Fuller unit root test and co-integration test to examine the long run relationship between the variables under study. The findings indicate that the Real GDP growth rate and nominal interest rate has positive and significant effect on national saving rate at 5% and 1% level on the long run and short run respectively.

Eric Perez Mwai Ndirangu & Willy Muturi , (2015), Investigate determinants of gross domestic savings in kenya (1970-2013) Ordinary Least Square (OLS) technique was applied to test the validity of the model and the relative importance of different variables which may have an impact on gross domestic savings. The estimated results revealed that Age-dependency ratio (ADEPR), gross domestic product (GDP), Inflation (INF) and were significant determinants of gross domestic savings whereas real interest rates (RIR) was not a significant determinant of gross domestic savings

Shee Kah et al., (2015), narrow down determinant of private saving, in Malaysia, from the period from 1985 to 2010. Used regression analysis (OLS) the result implies inflation rate has a significant and positive relationship with private savings.

Genet, (2017), examined the trend and major determinants of gross domestic savings rate (GDS) in Ethiopia used co-integration and error correction models to analyze the short and long run equilibrium among the variables. Results of the study indicate that age dependency ratio, inflation rate, and broad money to GDP ratio play a significant role in determining the gross domestic savings in Ethiopia while foreign aid and real interest rates was not a significant determinant of gross domestic savings.

Mojekwu, et al., (2017), examined the determinants of national savings in Nigeria for the period 1981-2015 using multiple regression models. The co-integration tests indicate the existence of a long run equilibrium relationship among the variables. The results of the study show that only financial deepening play significant role in contributing positively to national savings in Nigeria while the other variables are insignificant in determining national savings during the period under consideration.

Mongale et al, 2013), studied Household Savings in South Africa and applied Co-integrating Vector Autoregressive (CVAR) framework employed generalized impulse response function (GIRF) analysis and variance decomposition. The result of the study reveals that the rate of household savings was correlated with disposable income and real GDP is positive and

significant. The analysis indicates that there is a negative long run relationship between household savings and interest rate, but coefficient of interest rate was insignificant.

Chipote & Tsegaye, (2014), studied the Determinants of Household Savings in South Africa, Phillips Person Unit Root tests; Johansen Co-integration test and the Vector Error Correction Mechanism (VECM) were applied. Findings of the study showed that there is a negative relationship between household savings and the level of income, positive relationships exists between household savings and age dependency ratio, inflation and real interest rate but, age dependency ratio was not statistically significant.

The results of the study was opposite to a theoretical expectation, household savings and the level of income are negatively related, implying that South African households do not only save but increasingly rely on debt to finance their spending. On the other hand age dependency ratio, inflation and real interest rate have positive long run relationships with household savings rate.Adelakun, (2015) Investigation the Determinants of Savings and Investment in Nigeria used ECM and Found out that GDP is significant in savings determination in Nigeria as the result shows that interest rate has an inverse relationship with savings.

Talent et al, (2016) investigate the Determinants of Household Savings in South Africa used longitudinal survey. The results of the study indicate that household savings in South Africa are strongly driven by income, age structure, education achievement and employment status. Yet the causal nexus between savings and the household size was found to be negative, a sign that larger families compromise households savings prospects.

Salman & Ehsan (2016) examined the effect of Macroeconomic Determinants of Savings in Pakistan the stud has applied Ordinary Least Squares (OLS) multiple regression and Prais-Winsten estimation procedure with AR (1) serial correlation in a linear model. The estimation result indicates that national savings rate is positively related with real GDP growth rate and market capitalization growth rate. The evidence suggests that national savings rate is negatively related with federal debt and inflation.

Weldemariam (2016), investigate the 'Determinants of Gross Saving: an Empirical Evidence from East Africa, it has applied Panel Data approach, pooled OLS, fixed effects, and random effects models and the study reveals that gross domestic saving is positively and significantly associated with GDP per capita growth (gdpp) and degree of urbanization (urb)., while age dependency ratio has a negative effects inflation rate, working age group as a percentage of total

population (py), money and quasi money as a percentage of GDP (m_2), and government expenditure as a percentage of GDP (ggov) are found to be not statistically significant at all conventional levels.

Dereje Hailemariam (2017) examined the 'Determinants of Deposit in Ethiopian Private Commercial Banks it has applied Panel data approach, fixed effect versus random effect model. The result of this study showed that, among the macro-economic variables disposable income and real GDP has statistically significant impact on deposit of Ethiopian private commercial banks. Whereas deposit rate, population growth have no statistically significant impact on the determination of deposit of Ethiopian private commercial banks.

Tizita (2019), analyzed the Determinants of Private Saving in Ethiopia, In the long run, the study found that level of real per capital income, terms of trade, interest rate, urbanization ratio, bank branch and the dummy variable for political instability are positively affecting private savings except terms of trade are statistically significant . On the other hand the influence of inflation on private saving is negative and significant.

In addition, in the short run only level of per capital income, Urbanization ratio and bank branch at their difference are statistically significant in determining private saving, however bank branch has negative relationship in the short run with private saving in Ethiopia.

Olkamo (2021), carried out an Augmented Ducky-Fuller test to and co-integration bound test scheme was applied to see the long-run association between variables. The result has shown that budget deficit, inflation rate, working-age dependency ratio, and trade openness, and deposit interest rate negatively affect national saving. Whereas; the GDP growth rate and broad money supply were positively affected in the long run in Ethiopia.

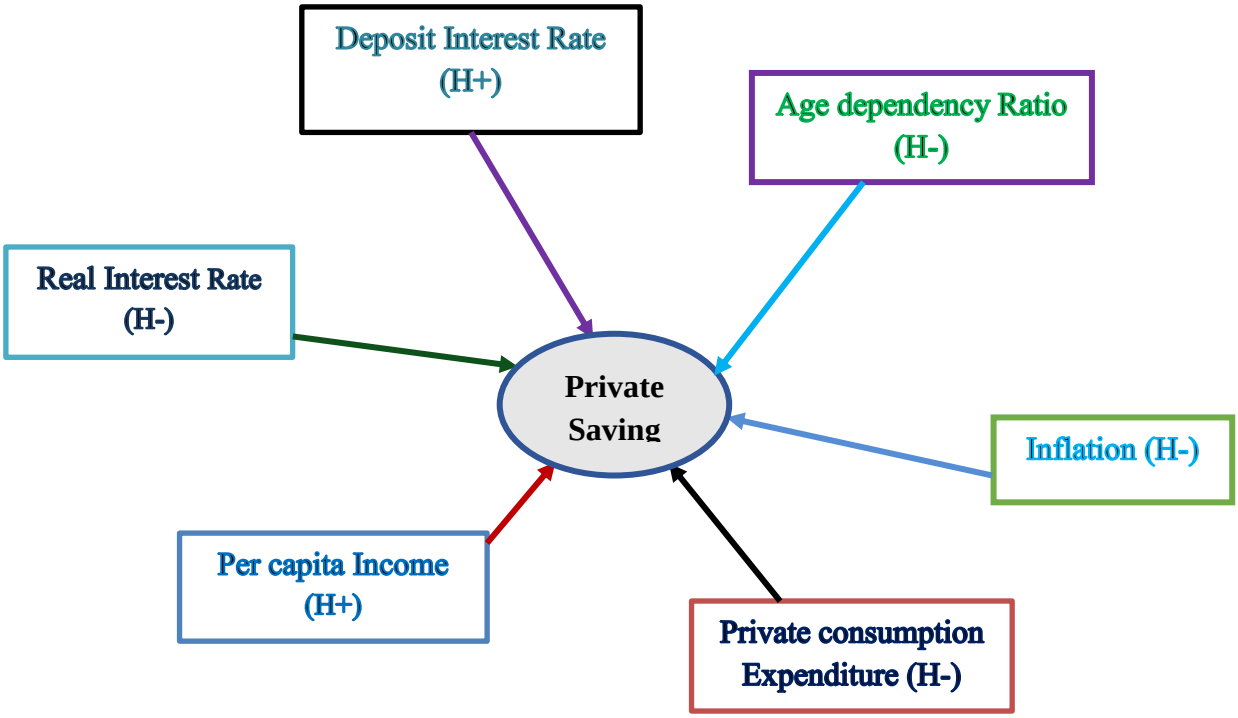
Edosa & Debeli (2021), investigate the Determinants of National Saving in Ethiopia. Autoregressive distributed lag (ARDL) approach to co-integration and error correction model (ECM) has applied to analyze the short-run and long run relationship between the explained and explanatory variables. The long-run model result revealed that, investment, the Real Gross Domestic Product, deposit rate and inflation have shown a similar relationship.

Accordingly, deposit rate inflation rate, Real Gross Domestic product and investment, were significantly and positively correlated with national saving. While, in the short-run, except deposit rate all explanatory variables affect national saving positively. Finally, as the model

result revealed, national saving responded to investment, the real gross domestic product, and deposit rate on the theoretically expected manner, however not for the inflation rate.

2.3 The conceptual framework of the study

The conceptual diagram of the relationship between the dependent variable (private saving in Ethiopia) and independent variables is depicted here below.



The conceptual schema of the relationship between the dependent variable (private saving) and independent variables (per capita income, private consumption expenditure, inflation, deposit interest rate, real interest rate and age dependency ratio) presented in the above frame. The development of any economy depends on capital accumulation (saving and the capacity of internal revenue collection) and converting saving to investment. Two key concerns for developing countries are how to inspire investment and increase the level of saving to fund increased investment. Therefore, investigate and examine the determinant or factors which is affection private saving and providing solutions to optimize saving can make a substantial contribution to the economic development of the a country and avert the wasteful of resources.

Mobilization of domestic resource (saving) is an important source of working fund for investment. Mobilization of saving is an indispensable factor to increase the sources of investment fund.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Approach and Method

3.1.1 Research approach

The researcher was investigated the factors affecting private saving, therefore the researcher employed quantitative research methodology to address the research questions. Considering the research objective and problem along with the perspective of the different research approaches, the quantitative nature of the data collected, quantitative research approach is found to be appropriate for this study. Quantitative research is a logical and scientific investigation of quantitative properties and phenomena and their relationships (C.R. Kothari, 2004).

3.1.2 Research Design

Research design provides a logical organization for research, data gathering and analysis. Or it is plan, structure and strategy of research the blueprint that will guide the research process. In other words, it is an action plan that guides a research from question to conclusion and includes steps for collecting, analyzing and interpreting evidences according to pre-established propositions, units of analysis, logic for linking the data to the propositions and application of a set of criteria for interpreting the findings (Geoffrey, 2005).

This research would be used non experimental research design because non-experimental research designs are carried out in natural settings; it does not involve manipulation of the situation, event, circumstances or people. A researcher cannot control, influence or change the predictor variable or subjects, but instead, relies on interpretation, observation or interactions to come to a conclusion (Geoffrey, 2005). In general the study used descriptive research and diagnostic research design.

3.1.3 Data type, source and method of data collection

Secondary data source is used for this study from 1991-2020. The required data are obtained from the National Bank of Ethiopia (NBE), Ministry of Finance (MoF), Central Statistical Agency (CSA) and World Bank Data base.

3.2 Method of Data analysis

The study construed as a combination of a VAR model and a vector error correction model (ECM). A VEC model is a special form of the VAR for order of integration I (1) variables which are co-integrated (Griffiths et al. 2008. Specifically this VAR methodology enables to estimate the correlation between private saving, inflation, real interest rate, age dependency ratio, deposit interest rate, per capita income and private consumption expenditure.

The study analyzes the long-run and short-run relationship between dependent and independent variables during the period 1991 to 2020. Tiwari (2011) maintains that before conducting estimation certain pre-estimations like unit root and co-integration are required because without them conclusions drawn from this study may not be valid. Unit root testing should be seen as a mandatory exercise to be carried out prior to model estimation.

Descriptive statistics and econometric model were employed to analyze the collected data. The descriptive statistics was used to summarize trends of different variables through graphs. The study was applied econometric models to estimate the coefficients of variables. It uses co-integration method and Error Correction Model to show the influence of major macroeconomic and demographic factors on private saving. The commonly augmented Dickey-Fuller (ADF) unit root tests for determining the variables' orders of integration was applied.

3.3 Model Specification

Since the data set is a time series, stationarity of the variables is essential to evade spurious regression In addition, regression of non-stationary time series on another non-stationary time series may lead to counterfeit regression. In order to check for the existence of long run relationship, in the model a unit root test on the residuals from the regression has been conducted by using Augmented Dickey Fuller (ADF) test. To estimate the impact of factors affecting on private saving in Ethiopia in relation to this the following general empirical research model was developed:

$Yit = \beta 0 + \Sigma \beta kXit + \varepsilon it$

Where:

i denote independent variables .

t denotes years ranging from 1991 to 2020 (time-series dimension).

Y_{it} represents the mean value of dependent variable (private saving)

β_0 is the intercept

β_K represents the coefficients of the *X* variable

X_{it} represents the explanatory variables (PCI, RIR, DR, ADR, IF, PCE).

εit is the error term.

The above general empirical research model would be changed in to the study variables to analyze the effect of the above specified variables on the dependent variable.

*PS= f (*PCI, RIR, DR, ADR, IF, PCE,*)* ---------- *(1)*

$LnPSt = \beta o + \beta_1 LnPCIt + \beta_2 RIRt + \beta_3 lnDRt + \beta 4IFt + \beta_5 lnPCEt + \beta_6 lnADRt +$

et … … … … …. (2)

$$\Delta LnPst = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LnPCIt + \sum_{i=1}^{q} \beta_2 \Delta RIRt + \sum_{i=1}^{q} \beta_3 \Delta LnDRt + \sum_{i=1}^{q} \beta_4 \Delta IFt + \sum_{i=1}^{q} \beta_5 \Delta \ln PCEt + \sum_{i=1}^{q} \beta_6 \Delta \ln ADRt + e_t$$

Where; β0 is an intercept term and β1, β2, β3, β4, β5 and β6 are the long run coefficients

lnPSt= Natural logarithm of Private Saving at period t

lnPCEt= Natural logarithm of Consumption Expenditure at period t (-)

lnPCIt= Natural logarithm of Per capita income at period t (-)

RIRt= Real interest rate at period t (-/+)

lnDRt= Natural logarithm of Deposit rate at period t (+)

IFt= Inflation at period t (-)

lnADRt= Natural logarithm of Age dependency ratio at period t (-)

$$\Delta \ln pst = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta PCIt + \sum_{i=1}^{q} \beta_2 \Delta RIRt + \sum_{i=1}^{q} \beta_3 \Delta LnDRt + \sum_{i=1}^{q} \beta_4 \Delta IFt + \sum_{i=1}^{q} \beta_5 \Delta LnPCEt + \sum_{i=1}^{q} \beta_6 \Delta LnADRt + \lambda ECT + e_t$$

Where: -

Δ implies the different operators;

β_0 denotes the constant term;

β_1 – β_6 implies the short-term dynamics of the variables;

εt denotes the error term

The first part of the equation (colored in green) represents the first short run equation while, the second part of the equation (colored in blue) represents the long run equation. The causal effect of the short-run equation is represented by the t-statistics of the explanatory variables (short run coefficients); meanwhile the long-run causal effect is captured by the significance of the parameter λ.

In order to control the size of data and obtain consistent and reliable estimates log -log model approach was used. Econometric results of the study were support the existence of a short-run dynamic adjustment and the long run equilibrium relationship between these variables.

The study tests for the time series properties of the variables as most economic variables have been shown to be non -stationary. For valid estimation and inference to be made, a set of non-stationary variables must be co-integrated, which means that a linear combination of these

variables must be stationary. The commonly used augmented Dickey-Fuller (ADF) unit root tests for determining the variables' orders of integration was applied. VAR model is applied simply because it is more suitable for the analysis as the direction of the causal relationship between variables and it is also expected that past values of variables could have a significant impact on their current values.

The VAR model is very use full starting pint in the analysis of the interrelationships between different time serious variables. The literature on unit roots studies stationary time serious which is in first difference. The theory of co-integration explains how to study the interrelationship between the long run trends in the variables. The VAR model is easy to estimate because possible to use the OLS method (Gujarati, 2004).

Vector Autoregressive (VAR) model allows the feedback or reverse causality among the dependent and independent variables using their own past values. The VAR model is one effective, flexible, and easy to use model for the investigation of multivariate time series. It is the extension of the univariate autoregressive model to vigorous multivariate time series. The VAR model has verified to be especial useful for describing the dynamic performance of economic and financial time series and for forecasting (Gujarati, 2004).

Forecasts from VAR models are relatively flexible because they can be made restrictive on the potential future pathways of specified variables in the model. In addition to data explanation and forecasting, the VAR model is also used for structural interpretation and policy analysis. In structural analysis, convinced assumptions about the fundamental structure of the data under investigation are enacted, and the resulting causal impacts of unexpected shocks or innovations to specified variables on the variables in the model are summarized. These causal relationship impacts are usually summarized with forecast error variance decompositions and impulse response functions.

The optimal lag length for the VAR model is determined by using the Schwartz Bayesian Information Criterion (SBIC and the Akaike Information Criterion (AIC) and). Engle and Granger (1987) test is used to determine the direction of causality between dependent and independent variables.

3.4 Description of Variables

Private saving (PS): private saving is taken as the difference between total savings and public savings.

Inflation (IF): It shows a consistent rise in price level. High inflation rates do not encourage higher savings. It is reasonable to expect that savings will fall with inflation as people shift their resources into real assets to escape the loss of money value. When prices of commodities increase steadily, people have to spend more on consumption which decreases the rate of domestic savings. So, it is expected that there is a negative relationship between inflation and national savings (Mishkin 2010).

Per capita income (PCI): is used to measure the living standard of the peoples by dividing total real GDP to total population.

Real interest rate (RIR): is the difference between nominal interest rate on savings deposit and annual inflation rate. The real interest rate is the nominal interest rate corrected for the effects of inflation, (Mankiw, 2010).

Age dependency ration (ADR): Age dependency ratio is the ratio of the sum of people younger than 15 and those older than 64 to the working age population. It is the ratio of dependents younger than 15 or older than 64 to the working-age population (15-64 years). This implication gives perception into the amount of people of non-working age compared to the number of those of working age. The data is calculated as the proportion of dependents per 100 working-age population. Following the life cycle model, the retired population is expected to be dissaving while young dependents should cause households to have higher consumption levels and thus lower saving rates. It is expected that an increase in age dependency ratio will lead to a decrease in national savings (World Bank, 2011).

Private consumption expenditure (PCE): The proportion of expenditure spent on consumption from income.

Deposit interest rate (DR): implies that when there is deposit money at the bank, the bank may earn interest on that money especially in savings accounts or certificates of deposit. The deposit interest rate is the rate of interest that investors pay to borrow money, (Mankiw, 2010). Deposit interest rate is the price at which present and future income can be exchanged. According to classical economists, saving is the direct function of interest rate. Consequently, savings tend to rise with an increase in the rate of interest as present consumption is being shifted to the future and vice versa. This is known as the substitution effect. Therefore, it is expected that there is a positive relationship between interest rate and national savings.

Table 3.1 Variable definition, source, measurement and expected sign

Variable	Definition	Unit of measurement	Source	Expected sign
LnPS	Private saving	In Billions of Birr	NBE	
IF	Inflation	Percentage	NBE	Negative
lnDR	Deposit rate	percentage	NBE	Positive
LnPCE	Private consumption Expenditure	In thousands of Birr	NBE	Negative
LnPCI	Per capita income	In thousands of Birr	NBE	Positive
RIR	Real interest rate	percentage	NBE	Either Negative or positive
LnDR	Age dependency ratio	Percentage	WB	Negative

CHAPTER 4: RESULTS AND DISCUSSIONS

This chapter presents and discussed the results of empirical analysis based on the econometric framework given in chapter three. To analyze the performance of different variables during the study period, the study used tables and graphs. On the other hand standard econometrical technique employed to analyze the relationship between the dependent and independent variables under the study period.

The paper also construed as a combination of a VAR model and a vector error correction model (VECM). A VEC model is a special form of the VAR for order of Integration I (1) variables which are co-integrated (Griffiths et al. 2008. Specifically this VAR methodology enable us to estimate the correlation between private saving inflation, real interest rate, deposit interest rate, age dependency ratio, per capita income and private consumption expenditure.

The study analyzes the long-run and short-run relationship between dependent and independent variables during the period 1991 to 2020. Tiwari (2011) maintains that before conducting static and dynamic analysis certain pre-estimations like unit root and co-integration are required because without them conclusions drawn from this study may not be valid.

4.1 Descriptive Analysis

Descriptive analysis is the analysis of data that helps to describe, show or summarize data in a meaningful way. This is because it allows making conclusions beyond the data that have been analyzed or to reach conclusions regarding any hypotheses might have made. For this reason it was conducted by using graphs to detect the movements in the value of each variable over time and to analyze the causes of such movements.

In this section summary statistics (mean, standard deviation, coefficient of variation), distributive summary (skewness and kurtosis) and normality distribution of all variables are discussed. The result of summary statistics and summary distribution are presented in tabular form below. The result from the Jarque-bera test indicates an acceptance of the null hypothesis that the random variables are normally distributed because the JB statistics are greater than critical values at 5% level. The probability value of the model also confirms that the null hypothesis of variables being normally distributed except two variables.

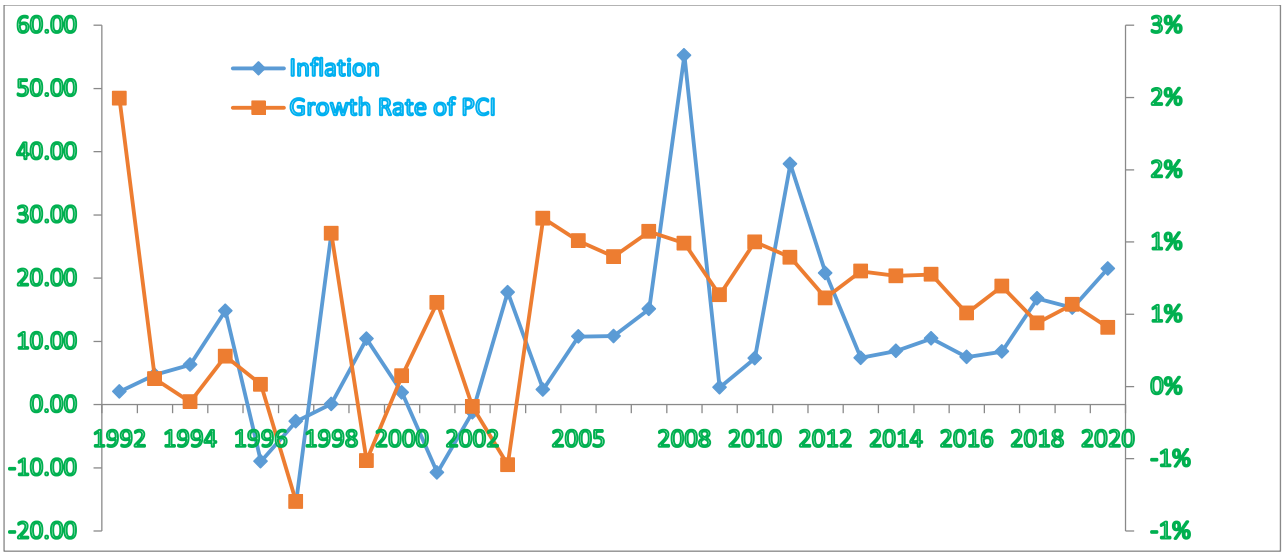
Table 4.1: present descriptive statistics of variables, also, many of the explanatory variables have higher between than within variation, while almost all of the statistically significant explanatory variables are found to have higher variation within.

Table 4.1: summary of descriptive statistics

Measurement	*LNPRIVATE SAVING*	*INFLATION*	*LNADR*	*LNDR*	*LNPCE*	*LNPCI*	*RIR*
Mean	10.58766	10.11499	4.42711	1.64014	11.9976	8.14946	-4.5633
Median	10.29868	8.361798	4.44235	1.60944	11.4792	7.67958	-3.3618
Maximum	13.59702	55.24131	4.5326	2.30259	14.6746	10.4296	18.9987
Minimum	7.763927	-10.7734	4.23411	1.09861	10.4044	6.83896	-51.241
Std. Dev.	1.727969	13.02587	0.10095	0.38937	1.46269	1.22535	13.6217
Skewness	0.228922	1.556119	-0.6253	0.1679	0.45362	0.51628	-1.4188
Kurtosis	1.894728	6.663356	2.11825	2.15632	1.64999	1.73602	6.49363
Jarque-Bera	1.729424	27.92	2.82911	0.99634	3.19679	3.21882	24.478
Probability	0.421173	0.000001	0.24303	0.60764	0.20222	0.20001	5E-06
Sum	307.0421	293.3347	128.386	47.5639	347.93	236.335	-132.34
Sum Sq. Dev.	83.60453	4750.85	0.28537	4.24513	59.905	42.0415	5195.4
Observations	29	29	29	29	29	29	29

The standard deviation is a measure of variability from the mean or centre. From the above table observation real interest rate (RIR has the greatest variability (13.6) followed by inflation (13.0) respectively. While age dependency ratio (LnADR) has the smallest variability (0.10) and deposit interest rate (0.38) from the mean. Meaning deposit interest rate is almost consistent throughout the study period while real interest rate is volatile due to high or fast increase in inflation. Maximum, minimum, median and mean shows the highest growth rate, smallest growth rate, middle growth rate and the average growth rate for each variable respectively. As indicated the above table the smallest mean is recorded on deposit interest rate it implies that the there is no significant change in deposit interest rate throughout the study period. The maximum growth is recorded on inflation. The growth of personal expenditure and personal per-capita income is presented in the following figure.

Fig 4.1: The trend of per capita Income growth and inflation



The smallest mean is recorded on real interest rate, which is negative meaning the deposit interest rate is constant while inflation is increasing from time to time by alarming rate. In this scenario the depositors are looser since the purchasing power of money is declined. Inflation rates trended upward after 2004 and this could be attributed to post-election 2005 development financing. Following this failed election and the government violence on civilians, donors protested by reducing aid as well as changing its mode of delivery from budget support to provision of basic services directly(Alemayaehu, 2020).

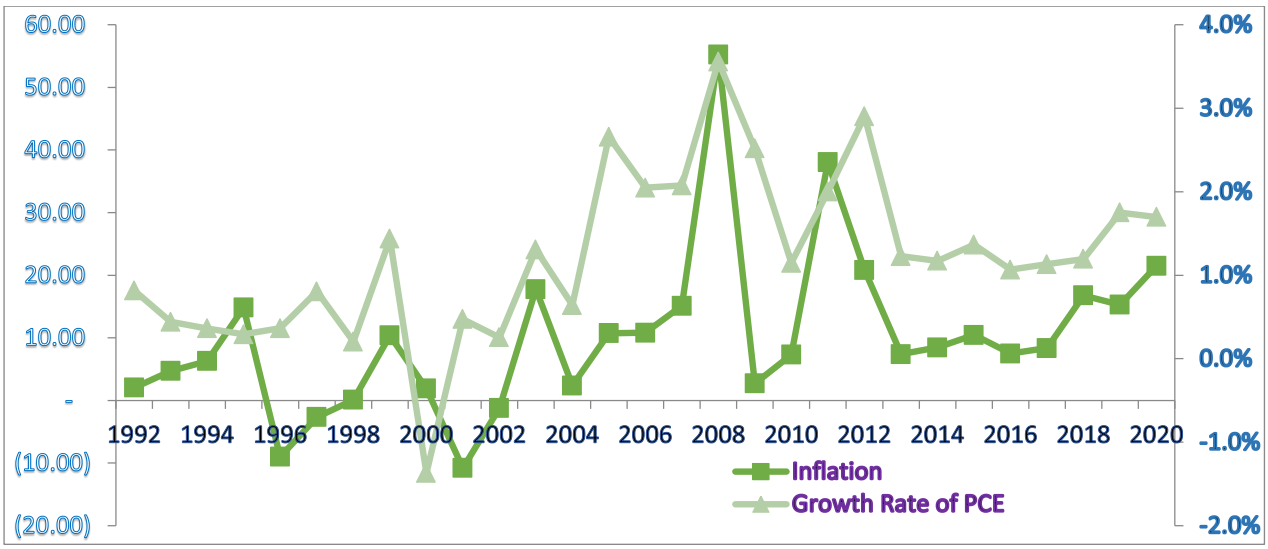
Inflation has accelerated from single digits to double digits after 2004, of official inflation records average 2.5 percent up until 2004 and 15.1 percent thereafter. After 2004, inflation rates surged, which could be attributed to post-election 2005 growth funding, which was accompanied by global financial crisis in 2007-2009. The government was unable to secure sufficient international support, because of widespread political uncertainty; it resorted to inflationary finance, or money production as a source of funding (Atinafu, 2020).

Inflation is growing rapidly, as seen in the graph below, while personal savings remains reasonably constant. Similarly, inflation is already increasing for the three years, which might be due to political instability. Inflation rate grown by 10.11 % on yearly base and per capita income has increased by 9.13 %, which is lower than the rate of inflation, meaning that consumption expenditure has increased due to inflation; it has negative effect on household saving.

Between 2002 and 2007 the broad money supply (M2)8 has, on average, grown by 16 percent. This growth rate became about 30 percent per annum between 2007 and 2019. As a result, the broad money has increased in size from 61 billion Birr in 2007 to 910 billion Birr in 2019 – a 15-fold increase in just 12 years. The most important forces behind inflation are found to be a sharp rise in food demand triggered by an alarming rise in money supply, exchange rate depreciation through significant devaluation, and lagging food output growth that cannot cope with the inflationary impact of the lax monetary and fiscal policy as well as the devaluation policy pursued (Alemayaehu,2020). The effect of the repeated devaluation was to fuel inflation directly through raising the price of imports and indirectly by raising the import bill of the government, which is a big spender in the economy, without addressing its stated objective. The latter led to further fiscal deficit and monetization of this deficit and indebtedness. Empirical results about the inflationary effect of devaluation offers supporting evidence for this phenomenon. Thus, a policy of devaluation needs to be avoided till it is preceded by significant export and food production growth (Alemayaehu, 2020)

The average growth of personal consumption expenditure is higher than the average growth of personal per-capita income.

Fig 4.2: The trend of Inflation and private consumption expenditure



Food expenditures constitute a lion's share of household expenditures in Ethiopia; its share in total expenditures was 57 percent. This did not change much today, being about 54 percent in 2019. Thus, the effect of a rise in food price on general price level and social welfare is significant. Generally, food inflation increased faster than the general inflation during the period under analysis. Three different factors may have played role in this: first productivity growth was

law in agriculture (and became equivalent to the population growth rate of 2.5 percent in the last five years); second, whatever increase in output attained is accompanied by a decline in marketed supply following the improvement in access to credit and market information which has reduced the farmers' need to take whatever surplus output they have to the market place immediately after harvesting (Alemayaehu,2020). The level of income in Ethiopia is very low, most of a given increase in income is likely to be spent on food, followed by the non-food basic goods.

As indicated in the above graph inflation is decline in 1996 and 2001 and highly increases from 2004 to 2009. Contrary private saving is smooth or consistent throughout the study period. Specially after 2006 increasing in a high rate it may due to the financial crisis of 2008 in the developed countries.

Ethiopia has experienced the fastest economic growth in Africa in the last two decades as government stated, but this has been accompanied by double-digit inflation for the majority with that time (Atinafu, 2020). A government in a high-inflation country is more ready to accomplish price controls and reform tax and trade regimes, raising potential instability and affecting investment and growth. Fisher (1930) supports this view, arguing that inflation is an indicator of the overall ability of the government to manage the economy. He further points out that the nominal interest rate should (approximately) equal the sum of the ex-ante real interest rate and the anticipated inflation rate.

Inflation can have a negative effect on growth because it can be considered as a tax on investment, raising the profitability required for investment and reducing the real interest rate relevant for saving. The real interest rate, according to Fisher, is a nominal interest rate adjusted for inflation. In a high-inflationary setting, predicting future macroeconomic conditions becomes more problematic. As inflation rates rise, the price of consumption rises in regard to a leisure-inducing change from consumption to leisure, reducing supply of labour.

Alemayehu (2020) examine challenge of inflation and financing development in Ethiopia found that the most important factors behind food price rises in the long-run are inroad money supply and inflation expectation. Large amount of money entered circulation because of the government printed and supply money for budget deficit, government borrowing, and large public expenditure on infrastructure which increase money supply not backed with production leads to higher inflation.

As observed in the above graph the trend of private saving and age dependency ratio is consistent up to 2000 after this year the gap between private saving and age dependency is increasing. To the recent year the level of private saving is increasing while age dependency ratio is consistent and decline.

4.2 Econometrics Model Results

4.2.1 Stationary Test

According to Gujarati (2009), a variable is said to be stationary if its mean, variance and covariance are time invariant or time inconsistent, it depends on lag length. If a given series contains unit root, then the series is said to be non-stationary otherwise, it is called stationary. Among the different methods of testing stationary of time series, the unit root test, for its recently developed and widely used test of stationary.

The Dickey Fuller (DF) test and Augmented Dickey Fuller (ADF) test are the two among others and that are used to test for the existence of unit roots. In this study therefore, the variables are tested for unit root using Augmented Dickey Fuller (ADF) test is used. The Dickey Fuller (DF) test is applicable if error terms are uncorrelated. If the error terms are correlated, DF test is useless. Augmented Dickey Fuller (ADF) test solve this problem by "augmenting" the equation(s) of DF test by adding the lagged values of the dependent variable(s) Gujarati, (2009). To test the unit root property of the variables, the study employed Augmented Dickey Fuller test (ADF).

The Assumption of Homoscedasticity:- The variance of the errors should be constant; this assumption is called homoscedasticity assumption. If the errors or the residuals have no a constant variance, they are said to be heteroscedastic. The researcher uses Breusch Godfrey test (BG test) for heteroskedasticity. In this test the null hypothesis is that there is no evidence for the presence of heteroskedasticity (homoscedasticity does exist) and the alternate hypothesis is that there is evidence for the existence of heteroskedasticity. Therefore, if this hypothesis is rejected it is said to be the variance of the errors are no longer constant or the assumption of homoscedasticity is violated, (Gujarati, 2009).

The Assumption of Autocorrelation: - Covariance between the errors terms overtime is zero. The null hypothesis for this test is the error at the current time and the error at previous time is independent of one another (there is no autocorrelation) and the alternative hypothesis is that the error at the current time is dependent on the error of the previous time(there is evidence for the

presence of autocorrelation). Therefore if the null hypothesis is rejected then it is said that there is an evidence for the presence of autocorrelation. For further test of autocorrelation the researcher used Breusch-Godfrey DW test, Gujarati (2009).

The Independent Variables are Non Stochastic OLS estimator is consistent and unbiased in the presence of stochastic explanatory variables, provided that the independent variables are not correlated with the error term of the estimation equation. However, if one or more of the independent variables is correlated with the error term, the OLS estimator will not even be consistent. The independent variables are not correlated with error term of the estimation equation is the assumption that is violated if the constant term does not exist. This study has a constant term in its model, therefore it can be concluded that it protected from the violation of assumptions.

The Assumption of Disturbance is Normally Distributed:- The study used Bera Jarque (BJ) normality test to check normality. In addition p-value and value of kurtosis used to detect whether normality exists or not. The researcher has also used kurtosis value to test for non - normality and from the literature the normal distribution had a kurtosis value of 3. A normal distribution is not skewed and has a coefficient of kurtosis of 3. For the residuals to be normally distributing jarque Bera value should not be significant (Gujirati, 2009).

4.2.2 Unit Root Test

When estimating a model with time series variables, it is essential to ensure that all variables in the model are stationary, which means that they are integrated of the same order or not. This is done by conducting a unit root test on each variable to find the order of integration. A stationary variable has a time invariant constant variance zero mean and covariance. Estimation based on non-stationary variables may lead to spurious results with high R^2 and t-statistics, but without any coherent economic meaning and inconsistent parameter estimator. This is called spurious regression.

A basic theory of the Classical Linear Regression model requires all variables to be stationary. The violation of this assumption leads to false regression. To avoid this gap, the unit root test with and without trend is accompanied on all variables to find out whether they are stationary or non-stationary (Gujarati, 2009. The Augmented Dickey-Fuller (ADF) method was conducted to check for a unit root for all variables in both levels and first differences.

There is a common agreement that many macroeconomic variables are non-stationary in character i.e. their mean and variance subject to time. Regression on one non-stationary sequence can generate a problem of counterfeit regression. Therefore, a statistical interpretation is made with the inference that a relationship occurs even when there is none. Therefore, in order to avoid the problem of spurious regression results this may emanate from estimation of non-stationary macroeconomic time series, variables.

Table 4.2: Results of Augmented Dickey Fuller (ADF) test (Unit-Root Test)

Variable	Intercept	**P value**	Trend and ntercept	**P value**	No Trend o Intercept	**P value**	Order of ıtion
LPS	-1.231135	0.64350	-1.161083	0.8960	4.376118	1.00000	I(1)
D(LPS)	-5.662380*	0.00010	-5.770756*	0.0005	-0.804162	0.35660	
LPCE	2.780137	1.00000	-1.862181	0.6469	2.648889	0.99700	I(1)
D(LPCE)	-2.829148*	0.06750	-3.610981*	0.0477	-0.508749	0.48620	
LPCI	2.038122	0.99980	-2.163057	0.4905	4.949743	1.00000	I(1)
D(LPCI)	-3.827752*	0.00740	-4.722460*	0.0042	-0.498657	0.48990	
RIR	-1.875306	0.33770	-2.40856	0.3666	0.878389	0.89260	I(1)
D(RIR)	-4.657059*	0.00100	-4.471831*	0.0074	-1.006836	0.27330	
INF	-1.734392	0.4030	-2.644963	0.2660	-0.755453	0.3793	I(1)
D(INF)	-7.639270*	0.0000	-7.475695*	0.0000	-7.761131*	0.0000	
LADR	-0.789894	0.80650	-1.692854	0.7276	-1.126752	0.22980	I(1)
D(LADR)	-5.203047*	0.00020	-5.169246*	0.0015	-5.063925*	0.00000	
LADR	-1.692047	0.42420	-1.718509	0.7160	0.033122	0.68500	I(1)
D(LDR)	-6.743125*	0.00000	-7.091459*	0.0000	-6.911875*	0.00000	

Note: * denotes rejection of the null hypothesis at 1%, 5% and 10% significance level.

The test has shown that all variables are non-stationary at level. Accordingly the study concludes that all variables included in the private saving model are I (1). Hence, it is conceivable to employ Johansen method to test co integration.

4.2.3 Causality Test

Before estimating the model Granger causality test has been taken to determine the causation between dependent and independent. The existence of Granger Causality between dependent and independent variables implies that there is a long-run relationship dependent and independent variables, and hence the variables are co integrated.

Table 4.3 depict the results of Granger causality dependent and independent variable

Sample: 1991 -2020 Lags: 3

Table 4.3 Causality Test

Null Hypothesis *(H0)*	**Obs**	**F-atistic**	**Prob.**	**Result**
INFLATION does not Granger Cause LNPRIVATSAVING	26	3.94379	0.0241	Reject *H0*
LNPRIVATSAVING does not Granger Cause INFLATION		0.41106	0.7469	Fail to Reject *H0*
LNPCE does not Granger Cause LNPRIVATSAVING	26	2.20681	0.1206	Fail to Reject *H0*
LNPRIVATSAVING does not Granger Cause LNPCE		8.04359	0.0012	Reject *H0*
RIR does not Granger Cause LNPRIVATSAVING	26	4.74913	0.0123	Reject *H0*
LNPRIVATSAVING does not Granger Cause RIR		0.34766	0.7912	Fail to Reject *H0*
LNPCI does not Granger Cause LNPRIVATE_SAVING	26	1.51198	0.2436	Fail to Reject *H0*
LNPRIVATE_SAVING does not Granger Cause LNPCI		13.4234	0.00006	Reject *H0*

Source: EViews9 output

The long-run relationship between the variables indicates that there is Granger-causality in at least one direction. Test statistics in table 4.6 show that the null hypothesis inflation does not granger causality private saving is rejected at 5% significance level. However, the null hypothesis private saving does not granger cause inflation unable to reject with given period at 5% significance level. This proves that there is no feedback from private saving to inflation.

The null hypothesis real interest rate does not granger private saving is rejected at 5% level of significance; while private saving does not granger causality real interest rate is accepted at 5% level of significance. This implies that there is no feedback from private saving to real interest rate. Private saving des not granger cause private saving is reject, meaning one way causality from saving to private consumption expenditure.

The null hypothesis per capita income does not granger private saving accepted at 5% level of significance; while private saving does not granger causality per capita income is rejected at 5% level of significance, meaning there is one way causality from saving to per capita income. This result also helps in choice of dependent and independent variable for threshold model specification.

4.3 Results for Co-Integration Test and Vector Error Correction Model

4.3.1 VAR Lag Length Selection Criteria

The Johansen co-integration test outcome is very attentive to the number of lags included for the endogenous variables in the estimation of the VAR. This requires the determination of maximum lag order prior to the test of co-integration. The optimal lag order is determined with the Final Prediction Error (FPE), Likelihood Ratio test statistics (LR), the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SIC), and the Hannan - Quinn Information Criterion (HQ). As shown in table 4.3, LR, FPE, and AIC suggest an optimal lag of two, all at a 5% level of significance.

Table 4.4 VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-100.64	NA	6.85e-06	7.973330	8.309288	8.073228
1	97.95472	279.5036	1.20e-10	-3.107757	-0.420095	-2.308574
2	201.0389	91.63040*	5.17e-12*	-7.113994*	-2.074629*	-5.615527*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error SC: Schwarz information criterion
AIC: Akaike information criterion HQ: Hannan-Quinn information criterion

Source: EViews9 output

From the above table the study selected 2 as optimal lag with the majority of the criterion and it assumed it has the minimum information criterion.

4.3.2 The Johansen Co-Integration Test Result

Many time series are non-stationary but 'move together' over time - that is, there exist some influences on the series, which imply that the two series are bound by some relationship in the long run. The idea behind co integration is that a linear combination of two or more non-stationary series may be stationary (Engle and Granger, 1987). Variables may differ from their relationship in the short run, however their connection would return in the long run.

The stationarity test demonstrated that all variables are not stationary at level and integrated order (I) and it implies that any estimation using this level data will lead to wrong conclusion and policy implication. However, the Granger illustration proposition states that it is possible for non-stationary variables to create a stationary relationship if they are co-integrated. This would imply that there is a meaningful long run relationship among the variables. Thus, the presence of and the number of such co-integrating relationships are checked using the trace and the maximum Eigen value methods, (Wooldridge, 2013).

Table 4.5 Unrestricted Co-integration Rank Test (Trace)

Hypothesized No.of CE(s)	Eigenvalue	Trace Statistic	0.05 Crtical Value	Prob.**
None *	0.959824	277.4855	125.6154	0.0000
At most 1 *	0.945703	190.6942	95.75366	0.0000
At most 2*	0.89192	112.0356	69.81889	0.0000
At most 3*	0.534924	51.96385	47.85613	0.0196
At most 4	0.502283	31.29389	29.79707	0.0334
At most 5	0.369028	12.45533	15.49471	0.1364
At most 6	0.000815	0.022022	3.841466	0.8819

Trace test indicates 5 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: EViews9 output

The difference between the eigenvalue and trace test is the trace tests tend to have more distorted size whereas their power is in some situation superior that of the eigenvalue tests.

Trace test indicates 5 co-integrating equation(s) at the 0.05 level,* denotes rejection of the hypothesis at the 0.05 level and **MacKinnon-Haug-Michelis (1999) p-values.

Table 4.6 Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE (s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.959824	86.79135	46.23142	0.0000
At most 1 *	0.945703	78.65855	40.07757	0.0000
At most 2*	0.891920	60.07176	33.87687	0.0000
At most 3	0.534924	20.66996	27.58434	0.2967
At most 4	0.502283	18.83856	21.13162	0.1016
At most 5	0.369028	12.43331	14.26460	0.0954
At most 6	0.000815	0.022022	3.841466	0.8819

Max-eigenvalue test indicates 3 co-integrating eqn(s) at the 0.05

* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: EViews9 output

Max-eigenvalue test indicates 3 co-integrating equation(s) at the 0.05 level,* denotes rejection of the hypothesis at the 0.05 level and **MacKinnon-Haug-Michelis (1999) p-values.

The Johansen co integrating test conclude, there is two co integrating vector for model by testing trace and maximum Eigen value test. The result in the table above shows the null hypothesis of no co integrating vector is rejected by both trace and max at 5 % level of significance that means there is a long run relationship among the variables. And avoid both the spurious and inconsistent regression problems which otherwise would have occurred with the regression of

non- stationary variables. It clarifies that the variables will converge to an equilibrium steady state level in the long run that justifies to the analyses of cause and effect correlation among the dependent and explanatory variables.

The study has found number of co-integrated equations using trace statistics and maximum Eigen value statistics. According to probabilities given in tables 4.4 and 4.5, the analysis rejects the null hypothesis that there is no co-integrated vector (r=0) at 5 percent level of significance in favour of the specific alternative , there is at most 3 co-integrated vector (r= 3). The implication is that a linear combination of all the six series is found to be stationary and that there is a stable long-run relationship between the series.

4.4 Vector Error Correction Model

4.4.1 Regression Analysis

The relationship between one variable and five independent variables is regressed using econometric software called EViews9. The dependent variable is total private saving proportion to total domestic saving and the five independent variables include deposit interest rate, rate of inflation, private consumption expenditure, per capita income, real interest rate and age dependency ratio.

4.4.1.1 Long Run Model Estimate

The long run estimates of the model is reported in table 4.10, confirms, the null hypothesis of no significance (effect) is rejected for all variables included in the model. This suggests that the above six mentioned variables are statistically significant in influencing private saving in the long run.

The results show that four variables (inflation, real interest rate age dependency ratio and private consumption expenditure) has negative coefficient and two variables (Per capita income and deposit rate) has positive coefficient. The interpretation of each variable is expressed in the following manner. A one percent increase in inflation rate is lead to decrease private saving by 33.7 percent on average in the long run under citreous paribus condition. Negative impact of inflation rate on savings suggests that, in Ethiopia, higher anticipated inflation reduces private saving. In this regard, the results imply that lower inflation raises growth which in turn increases savings.

One percent increase in private final consumption expenditure leads to decline or decrease private saving on average in the long run by 2.279 percent under citrus paribus condition. Keeping other things remain constant a one percent increase in real interest rate and age

dependency ratio leads to decrease private saving by 35.4 and 2.321 percent on average respectively in the long run.

On the other hand keeping other things remain constant a one percent increase in deposit interest rate and per capita income leads to increase private saving by 2.305 and 0.930 percent on average in the long run respectively. Inflation, deposit rate, and real interest are statistically significant both in the long run and short run, while age dependency ratio, per capita income, private consumption expenditure are significantly affect private saving in the long run not in the short run.

Table 4.7 Vector Error Correction long Run Relationship

Variable	Coefficient	Standard	T-statistic	Conclusion
INFLATION(-1)	-0.337447	(0.06270)	[-5.38227]	Significant
LNADR(-1)	-2.320908	(0.31736)	[-7.31323]	Significant
LNDR(-1)	2.305254	(0.38428)	[5.99891]	Significant
LNPCE(-1)	-2.279458	(0.15241)	[-14.9560]	Significant
LNPCI(-1)	0.930378	(0.18208)	[5.10962]	Significant
RIR(-1)	-0.354906	(0.06304)	[-5.62957]	Significant
C	17.43265	*	*	

Source: EViews9 output, Standard errors in ( ) & t-statistics in [ ]

LnPS=17.43C-0.33IF-2.32LNADR+2.30LNDR-2.27LNPCE+0.93LNPCI-0.35RIR

[-5.38] [-7.31] [5.99] [-14.9] [5.10] [-5.62]

4.4.1.2 Short Run Model Estimate

The coefficient of the error correction term for the equation is negative and significant, high absolute t-statistic of 10.5.This tells that there is a reasonable adjustment towards the long run steady state. This means that error correction model is well specified and also confirms the findings on the co-integration of the variables. This guarantees that although the actual private saving may temporarily deviate from its long-run equilibrium value, it would gradually converge to its equilibrium. The estimated coefficient of -0.187 suggests that approximately 19% of the disequilibrium of the previous year comes back to long run equilibrium in the next year or the deviation of private saving from its equilibrium value is eliminated every year by 19%.

The fact that ECM coefficient is significant and negative serves as evidence for the existence of co-integration relationship amongst the variables included in the model. It also points out to the presence of long term causal relations (no problem in the long run equilibrium relationship) between the dependent variable and the independent variables. Table 4.11 shows the short run relationship outcome of the error-correction model, from which the short-run impact of inflation,

private consumption expenditure, real interest rate, per capita income, and deposit rate and age dependency ratio on private saving can be analyzed.

Keeping other thing remain constant one percentage increase in inflation and real interest rate at lag one results 9% and 9.2% percent decline or decrease on average in private saving respectively in the short run. While under citreous paribus condition a one percent increase in deposit rate at lag one leads to increase private saving by 0.562 percent on average in the short run. Age dependency ratio, per capita income and private consumption expenditure are insignificant in the short run.

Table 4.8 Vector Error Correction model Short-run Relationship

Variables	Coefficient	Std. Error	t-Statistic	Prob.
ECM	-0.187322	0.017801	-10.52327	0.0000
D(LNPRIVATE_SAVING(-1))	-0.478279	0.116362	-4.110283	0.0007
D(INFLATION(-1))	-0.090589	0.01722	-5.26079	0.0001
D(LNADR(-1))	-0.090707	0.102513	-0.884836	0.3879
D(LNDR(-1))	0.562151	0.105343	5.336372	0.0000
D(LNPCE(-1))	-0.135208	0.075859	-1.782348	0.0916
D(LNPCI(-1))	-0.028112	0.043296	-0.649288	0.5244
D(RIR(-1))	-0.092595	0.017242	-5.37042	0.0000
C	0.325875	0.028422	11.46546	0.0000
R-squared	0.896997	F-statistic		19.59393
Adjusted R-squared	0.851217	Prob (F-statistic)		0.00000
S.E. of regression	0.025014	Durbin-Watson stat		1.615936

Source: EViews9 output

Coefficient of determination of the model the above table shows the results of regression analysis. An F statistics of 19.59 (with Probability >F= 0.0000) implies reject null hypotheses that all the explanatory variables have coefficients not different from zero. It also indicates the significance of the variables in explaining the model (the variables included in the model jointly explained the model).

R^2 measures the goodness of fit of the variables, to what extent the variation of the dependent variable is explained by the explanatory variable(s). R^2 is between 0 and 1; values close to 1 indicate good explanatory power. Based on this the coefficient of determination of R^2 0.851217means that 85.1% of the variation in private saving is explained by the independent variables included in the model. On the other hand the remaining 14.9% captured by error term.

The coefficient estimate of the constant of the regression is 0.325 shows that the value of dependent variable if all independent variable becomes zero. This indicate that private saving

will be increased by the 0.325 given all independent variable zero and this indicate that the dependent variable in the model is highly depends on the independent variables.

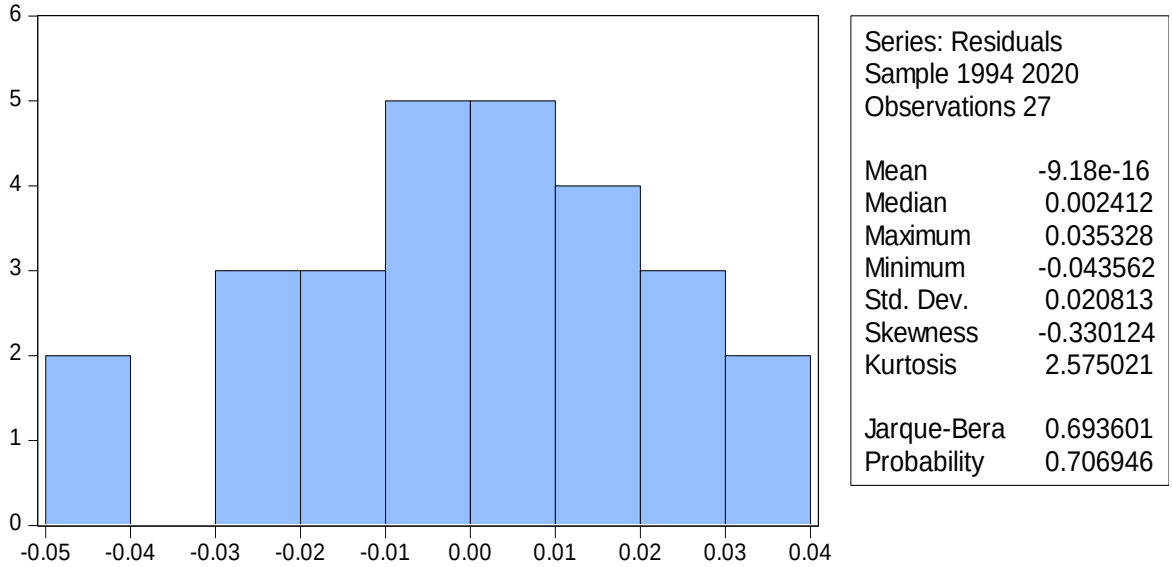
4.5 Normality Test

To testing the Normality Assumptions, graphical methods, such as histograms and normality plots, can be conducted to provide a visual inspection of the normal distribution of a data set prior to further interpretation of the regression analysis. Histograms can provide important information about the shape of a distribution. If most of the scores are gathered around the middle of the continuum and a gradual, symmetric decrease of frequency on either side of the center score occurs, it is considered a normal distribution. However, it the scores are not symmetric and are spread out away from the majority it is considered skewed (Gujarati, 2009)

If the tail (a small number of the distribution) is spread out to the right, it is considered positively skewed, and if the tail is spread out to the left, it is considered negatively skewed. Kurtosis is the shape of any or lack of peaks within a distribution. The distribution is regarded as normal when the value of kurtosis is 3 and skewness is 0. (Gujarati, 2009:132).

Ho: The residuals are normally distributed: H1: The residuals are not normally distributed

Fig 4.5: Non normality test of the multiple regression models



Source: EViews9 output for normality test

Bera-Jarque normality tests have been used for normality test. The kurtosis value is around 2.5 which is approaches to 3. Jarque-Bera‘s also indicates that the residuals are normally distributed having the value 0.7069 percent which is greater than 0.05. The p-value given at the bottom of

the normality test screen should be bigger than 0.05 to fail to reject the null hypothesis at the 5% level of significance based on this evidence.

4.6 Test for Heteroskedasticity

The test of heteroskedasticity is a test of the assumption of OLS estimator that says the variance of errors term is constant or residuals do not differ across observations. The study uses Breusch Godfrey test (BG test) to test for heteroskedasticity.

H_0: The assumption that there exists homoscedasticity H_1: There is no homoscedasticity (there is Heteroskedasticity).

Table 4.9: The Heteroskedasticity test of the multiple regressions

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.676007	Prob. F(14,12)	0.6768
Obs*R-squared	21.89475	Prob. Chi-Square(14)	**0.0808**
Scaled explained SS	7.663265	Prob. Chi-Square(14)	**0.9061**

Source: EViews9 output

In this study as shown in table 4.7, both the F-statistic and Chi-Square versions of the test statistic gave the same conclusion that there is no evidence for the presence of heteroskedasticity, since the p-values were in above of 0.05. The explained sum of squares from the auxiliary regression, also gave the same conclusion that there is no indication for the presence of heteroskedasticity problem, as the p-value was considerably in excess of 0.05. Therefore, EViews displays three different types of tests for heteroskedasticity and all fails to reject the null hypothesis of homoscedasticity presence or accept the null hypotheses there is no Heteroskedasticity problem. So it can be concluded that the variance of error term is constant or the assumption of CLRM is not violated.

4.7 Autocorrelation Test

The Durbin-Watson test tests the first order autocorrelation. For further test of autocorrelation the study uses Breusch-Godfrey test so that the autocorrelation that are not detected by DW test will be found. Moreover, BG test tests the autocorrelation of the residual and several lagged values of it.

H_0: There is no autocorrelation: H1: There is autocorrelation

Table 4.10: Autocorrelation test of multiple regressions

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.415823	Prob. F(2,16)	**0.6667**
Obs*R-squared	1.33406	Prob. Chi-Square(2)	**0.5132**

Source: Eviews9 output

According to the DW result of the study, there is no autocorrelation which occurred between the variables and their respective lagged value. The results as indicated by the probability values of both F-statistic and observed R-squared fail to reject the null hypothesis of no serial correlation.

In addition, DW test from the regression have a value of 1.615936 leads to conclude there is no evidence of the presence of autocorrelation. The test of autocorrelation of the residuals and several lagged value of it, Breusch-Godfrey test (BG test), show with two type of test and both accept the null hypothesis of no autocorrelation. Therefore, given these result it can be concluded that there is no confirmation for the presence of autocorrelation.

4.8 Test for Multicollinearity

The results of correlation tests are depicted by a correlation matrix table:

Table 4.11: Correlation matrixes

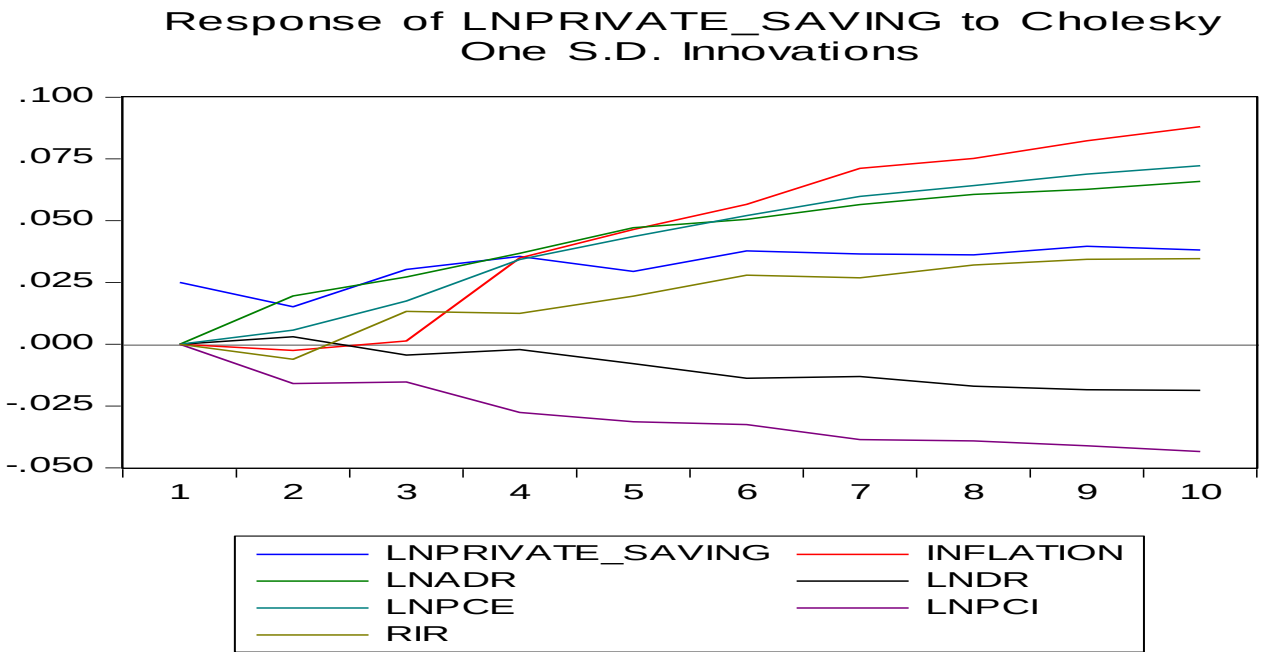
Variables	*INFLATION*	*LNADR*	*LNDR*	*LNPCE*	*LNPCI*	*RIR*
INFLATION	1					
LNADR	-0.0054	1				
LNDR	-0.1643	0.025546	1			
LNPCE	0.3900	-0.69408	-0.02852	1		
LNPCI	0.3619	-0.69506	0.038485	0.991356	1	
RIR	-0.9870	0.020237	0.317435	-0.39589	-0.35995	1

Source: EViews9 output

The correlation matrix presented in Table 4.9 it suggested that real interest rate and inflation strongly negatively correlated while private consumption is strongly positively correlated with private consumption expenditure. Inflation is positively correlated with private consumption expenditure and per capita income but weak. Private consumption expenditure is correlated negatively with real interest rate age dependency ratio and deposit rate. Per capita income is positively correlated with deposit rate and negatively correlated with real interest and age dependency ratio. According to the above table multicollinearity is not a serious problem.

In addition the study has also conducted model (VAR stability) and the result in the figure in the appendix part shows that all Roots of characteristic polynomial lie inside the unit circle which suggests that the VAR is stable.

Fig. 4.6: Impulse responses to a permanent increase in private saving



Source: EViews9 output

This figure illustrates the impact of an increase in inflation, age dependency ratio, deposit interest rate, real interest rate, per capita income and private consumption expenditure on private saving. The one standard deviation shock to inflation leads a gradual decline in private and real per capita income, on the other hand increase private consumption expenditure. Following the shock inflation is constant for some period but drastically increase after some period. Private saving is above all variables at the beginning and exceed by inflation, private consumption expenditure and age dependency ratio after some period and stabilize at appositive level. Deposit interest rate initially increase, but after a few period it started to decline with per capita income.

4.9 Variance Decomposition

Variance Decomposition tells us how much of a change in a variable is due to its own shock and how much of it is due to shocks to other variables.

Table 4.12 Variance Decomposition

Variance Decomposition of LNPRIVATE_SAVING:								
Period	S.E.	LNPRIVATE SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	0.025014	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.039677	54.34199	0.406936	24.18920	0.585824	2.053834	16.08102	2.341206
3	0.063035	44.63542	0.208066	28.30591	0.720118	8.479491	12.25646	5.394524
4	0.099567	30.65703	12.37856	25.01240	0.336017	15.27910	12.59160	3.745288
5	0.135949	21.15062	18.30787	25.44984	0.514563	18.45990	12.06563	4.051577
6	0.174377	17.55054	21.65711	23.88595	0.935516	20.12213	10.82383	5.024919
7	0.214427	14.51160	25.35815	22.74665	0.987067	21.09743	10.40411	4.894998
8	0.252158	12.54960	27.22316	22.23245	1.165994	21.73347	9.936306	5.159021
9	0.289495	11.39392	28.74107	21.55751	1.289884	22.14211	9.553634	5.321866
10	0.325619	10.37987	30.03644	21.13248	1.350386	22.42819	9.333328	5.339308

Source: EViews9 output

It also tells also the percentage of the fluctuation in a time series attributable to other variables at the 10 years of time horizons. Table 4.12 presents the forecast of variance decomposition of the seven variables. The variance decomposition measures the contributions of each type of shock to the forecast error variance and it also provides information about the relative importance of each random innovation (shock) in affecting the variables in the VAR. More specifically, it directs the volume of evidence each variable contributes to the other variables in the VECM model.

The column labeled S.E in Table 4.12 represents the forecast error of the variable for each forecast horizon (period). The forecast error emanates from the variation in the current and future values of the shocks to each variable in the system. The reported numbers in the remaining columns give the percentage of the forecast error in the household savings that can be contributed to innovations in the household savings itself and other variables at ten different time periods. Each row adds up to the value of a 100%.

From the table we realize that own shocks variation ranged from 10.4% to 100% over the ten years of forecast. This implies that from a contribution of 100% to variations in its forecast errors, the contribution of private saving fell to 21.1% in the medium term and 10.4% in the long term. The difference was therefore taken up by other variables. At period one private saving is 100% because the only source of the one period ahead variation is its own shock. In addition, the results indicate inflation is the most significant group for the error variance. Starting from the

seventh year, its shocks account for more than 25.4% in explaining the variance in private savings. In the same breath, the gradual increase can be seen in the contribution of deposit interest rate and real interest rate.

Their contributions however remain small compared to that of inflation, personal consumption expenditure, age dependency ratio and per capita income in explaining private savings may tend to be affected if there is a possible shock in one of the variables. Age dependency ratio appears to be third in line in terms of contribution of innovation to private saving. Its contributions increase from the 2^{nd} to the 3^{rd} year period and gradually decline to the 4^{th} period. Variance decomposition analysis shows that inflation constitutes the predominant source of variations in private saving, followed by private consumption expenditure and age dependency ratio.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

This study empirically examined the factors affecting private savings in Ethiopia for the period 1991-2020. In relation to pertinent theories such as: Permanent Income Hypothesis (PIH), Relative Income Hypothesis (RIH) and Life Cycle Hypothesis (LCH) framework. The study applies the augmented Dickey Fuller test for stationarity and Johansson co-integration test used to determine whether there is a long run relationship between variables. Vector error correction model is applied to estimate both short and long run models related with private saving in Ethiopia.

The finding of the study indicate that, Inflation, per capita income, real interest rate, deposit interest rate, private consumption expenditure and level of age dependency ratio affect private saving in Ethiopia in the long run which due attention the government and all concerned organs to enhance private savings thereby investment and economic growth as well. With regard to each variable effect, per capita income has a positive impact on private saving in Ethiopia at 5% level of significant in the long run. A one percent increase in per capita income leads to increase private saving by 0.930 percent on average in the long run.The result implies that an increase in per capita income growth will increase private savings in Ethiopia.

Real interest rate is negatively associated with private saving and statistically significant at 5% level of significant. A one percent increase in real interest rate leads to decrease private saving by 35.4% and 9.2 % on average both in the long run and short run respectively. The finding of the study indicate that, the ratio of age dependency to the total population has a negative association with private savings and statistically significant at 5% level of significance in Ethiopia. That is a one percent increase in age dependency ratio leads to decrease private saving by 2.321 percent on average in the long run

Similarly, the inflation rate exhibits negative and statistically significant at the 5% levels of significant in the long run. The result also indicate, as inflation increases across time by one percent, private saving lowers or decrease by 9% in the short run and 33.7 percent in the long run, meaning higher inflation could reduce private saving. The effect of inflation and real interest rate were higher in the long run rather than short run. Higher inflation lowers the credibility of the authorities and as a result discourages savings.

Besides, if people are consumption oriented, consumption function shifts upward, while saving function shifts downward. This finding contradicts the precautionary saving theory which states that as inflation rises, consumers will spend less so as to cushion for anticipated difficult times.

On the other hand, a one percent increase in deposit interest rate leads to increase in private saving by 2.305 and 0.562 percent on average in the long run and short run respectively. With regard to consumption verses saving, a one percent increase in private consumption expenditure leads to decline or decrease private saving on average in the long run by 2.279 percent.

5.2 Recommendations

On the basis of the study findings the following possible course of action are recommended to policy makers to enhance private saving in Ethiopia.

In the short run the government continues its support on basic goods; exempt basic goods from tariffs and tax while in the long run increase production or work on supply side by supporting agricultural sector.

The Government should apply strong population policy to reduce youth unemployment and increase deposit interest rate to encourage saving and narrow the gap between lending interest arte and deposit interest arte which benefit the mass.

Government and all concerned organ has to put in place continues effort to reduce rate of inflation to a single digit as much as possible which intern improve real interest arte and encourage private saving

It is advisable to give due attention key sectors of the economy such as agriculture, Industry, service and tourism as they are able to observe unemployed labor force to reduce youth dependency ratio and increase per capita income as well as ensure sustainable growth.

Government and all concerned organs has to work on job creation innovation initiative at national level which well have paramount importance in private saving, consumption as well as ensuring sustainable economic growth .

It is also advisable to increase disposable income by reducing income tax and make marginal increment to consumption tax to improve private saving in the long run.

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Appendix
Impulse response to Cholesky(d.d. adjusted) one s.d. innovation

Response of LNPRIVATE_SAVING:

Period	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	0.025014	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.015158	-0.002531	0.019514	0.003037	0.005686	-0.015911	-0.006071
3	0.030300	0.001364	0.027275	-0.004403	0.017453	-0.015292	0.013323
4	0.035576	0.034913	0.036809	-0.002167	0.034319	-0.027591	0.012528
5	0.029494	0.046439	0.047160	-0.007861	0.043556	-0.031332	0.019430
6	0.037783	0.056583	0.050590	-0.013761	0.052027	-0.032577	0.027913
7	0.036546	0.071232	0.056529	-0.013014	0.059848	-0.038632	0.026883
8	0.036156	0.075167	0.060643	-0.016957	0.064177	-0.039169	0.032088
9	0.039616	0.082326	0.062693	-0.018429	0.068831	-0.041094	0.034348
10	0.038166	0.088091	0.065876	-0.018729	0.072274	-0.043466	0.034656

Response of INFLATION:

Period	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	-5.433448	13.89680	0.000000	0.000000	0.000000	0.000000	0.000000
2	-6.102387	4.720842	-0.675939	-5.960014	-3.200923	2.282744	3.740962
3	-2.119785	4.663759	-1.964483	-4.283683	-2.770715	1.935973	3.152091
4	-4.626386	6.690415	-0.821025	-2.792564	-2.390108	0.655303	1.317103
5	-4.117672	4.794894	-1.09744	-4.26486	-2.815493	1.883567	3.196204
6	-3.275507	6.119422	-1.330435	-3.69656	-2.412483	1.315039	2.492122
7	-4.411338	5.979778	-0.896335	-3.580566	-2.499631	1.183467	2.253879
8	-3.705012	5.463539	-1.169284	-4.041959	-2.569526	1.607081	2.920491
9	-3.78576	6.147348	-1.096137	-3.648523	-2.397076	1.224583	2.393602
10	-4.093632	5.791869	-0.990228	-3.809392	-2.49622	1.363031	2.580794

Response of LNADR:

Period	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	-0.016066	0.018369	0.052036	0.000000	0.000000	0.000000	0.000000
2	-0.020683	0.022794	0.047082	0.005645	-0.004997	0.002298	-0.001641
3	-0.019711	0.010773	0.044878	-0.000248	-0.010204	0.005049	0.001630
4	-0.016852	0.009488	0.043048	0.002894	-0.010915	0.004673	-0.000433
5	-0.019257	0.009532	0.043358	0.004157	-0.011638	0.004324	-0.001964
6	-0.018627	0.007123	0.042439	0.003206	-0.012677	0.005642	-0.000811
7	-0.018347	0.007420	0.041918	0.004014	-0.012956	0.005333	-0.001893
8	-0.019263	0.006382	0.041876	0.004150	-0.013564	0.005579	-0.002145
9	-0.018693	0.005565	0.041359	0.004002	-0.013966	0.006018	-0.001908
10	-0.018935	0.005634	0.041242	0.004437	-0.014153	0.005842	-0.002505

Response of LNDR:

LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
0.042001	0.073107	0.010263	0.166914	0.000000	0.000000	0.000000
0.036486	0.123931	0.029796	0.122080	0.009387	-0.019724	0.028822
0.049745	0.124046	0.038194	0.107461	0.023952	-0.021069	0.054670
0.062998	0.166035	0.047643	0.108727	0.046744	-0.033572	0.058207
0.052599	0.188080	0.061473	0.104661	0.059884	-0.041397	0.061924
0.060522	0.195930	0.065977	0.094989	0.068836	-0.04084	0.074750
0.062290	0.214204	0.071884	0.095919	0.078572	-0.048001	0.073712
0.059538	0.220150	0.077697	0.092463	0.083886	-0.049775	0.078120
0.064183	0.226748	0.079851	0.089503	0.088981	-0.050925	0.082449
0.063201	0.234836	0.083420	0.089720	0.093426	-0.054279	0.082119

Response of LNPCE:

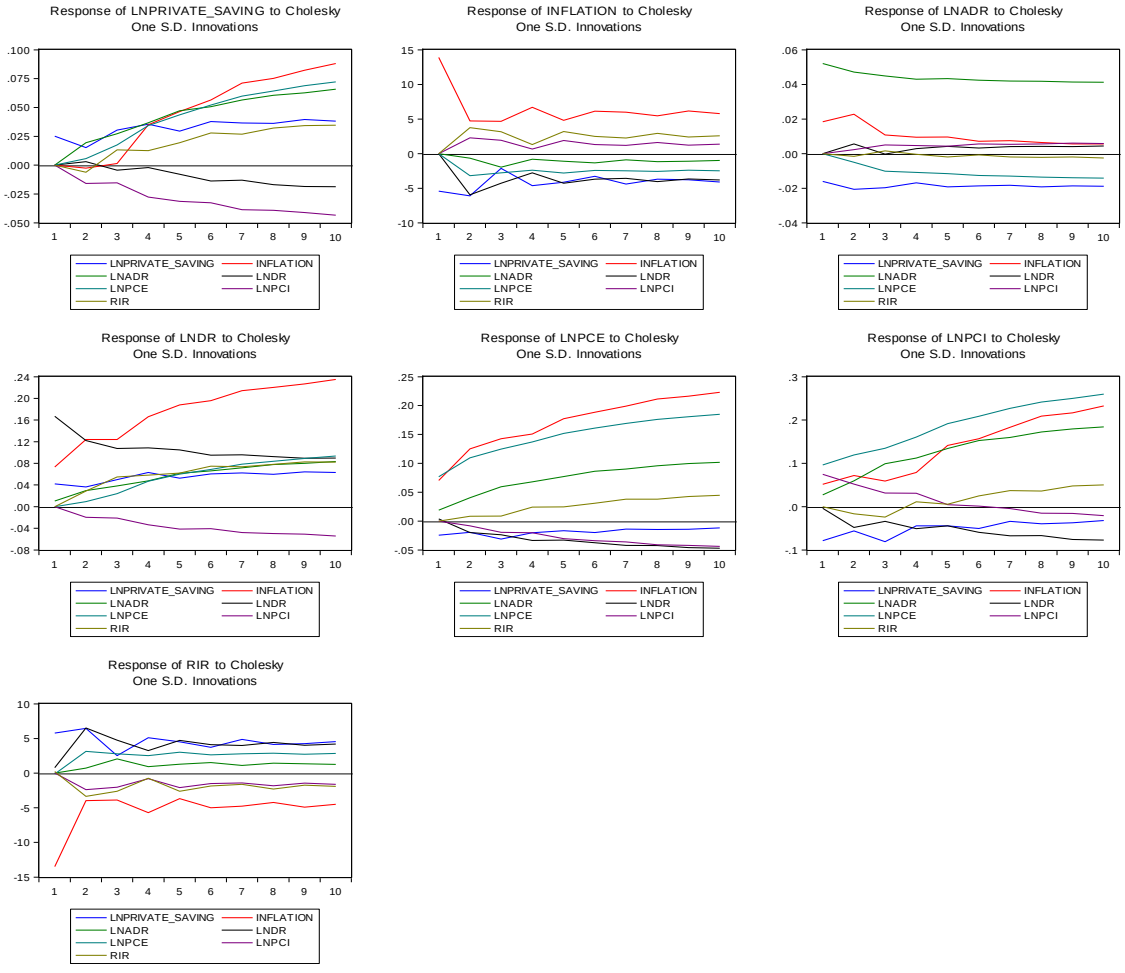
LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
-0.02451	0.070238	0.018769	0.003793	0.076608	0.000000	0.000000
-0.019523	0.124901	0.040371	-0.019737	0.109396	-0.00838	0.008461
-0.031103	0.142555	0.059333	-0.023596	0.124761	-0.019362	0.008688
-0.020387	0.150892	0.067845	-0.033669	0.137187	-0.020203	0.024379
-0.016578	0.177065	0.077115	-0.032749	0.151822	-0.030344	0.024648
-0.019842	0.188363	0.086222	-0.037573	0.160845	-0.033958	0.031030
-0.013707	0.198969	0.090258	-0.042233	0.169022	-0.036024	0.037793
-0.014406	0.211494	0.095713	-0.042477	0.176172	-0.040936	0.038127
-0.014211	0.216286	0.099508	-0.045783	0.180618	-0.041898	0.042550
-0.011724	0.222998	0.101784	-0.047143	0.185000	-0.043811	0.044584

Response of LNPCI:

Period	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	-0.078745	0.051488	0.026944	-0.003807	0.096415	0.074481	0.000000
2	-0.056273	0.071904	0.059445	-0.048228	0.119475	0.051997	-0.016432
3	-0.081102	0.059086	0.098985	-0.034144	0.134828	0.031250	-0.024183
4	-0.044535	0.078762	0.112428	-0.050775	0.160563	0.030674	0.011397
5	-0.044366	0.141228	0.134533	-0.044465	0.191882	0.004596	0.005449
6	-0.050431	0.156949	0.152548	-0.059376	0.208680	0.001450	0.025011
7	-0.033925	0.183114	0.159585	-0.0673	0.226863	-0.004325	0.037064
8	-0.039722	0.209079	0.172402	-0.066923	0.241340	-0.015304	0.036196
9	-0.037105	0.216410	0.179239	-0.0756	0.249988	-0.015492	0.047930
10	-0.031855	0.232638	0.183969	-0.076983	0.259590	-0.020731	0.050256

Response of RIR:

Period	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	5.770686	-13.47995	-0.009577	0.788622	-0.109011	0.032035	0.232480
2	6.458928	-3.957337	0.725528	6.511644	3.151640	-2.382428	-3.341516
3	2.509434	-3.879428	2.057290	4.758671	2.799203	-2.041202	-2.61726
4	5.097950	-5.699755	0.944814	3.258678	2.528850	-0.807411	-0.749636
5	4.526154	-3.688095	1.286559	4.721526	3.015108	-2.080465	-2.630266
6	3.716382	-4.99908	1.537473	4.101259	2.645006	-1.49936	-1.858899
7	4.869588	-4.774805	1.124727	3.992697	2.775480	-1.400582	-1.628848
8	4.141572	-4.232759	1.425771	4.442433	2.867095	-1.834159	-2.281512
9	4.246506	-4.895433	1.359508	4.032110	2.714606	-1.45212	-1.730163
10	4.551093	-4.500476	1.268458	4.197098	2.833740	-1.607542	-1.922889



VEC Residual Normality Tests

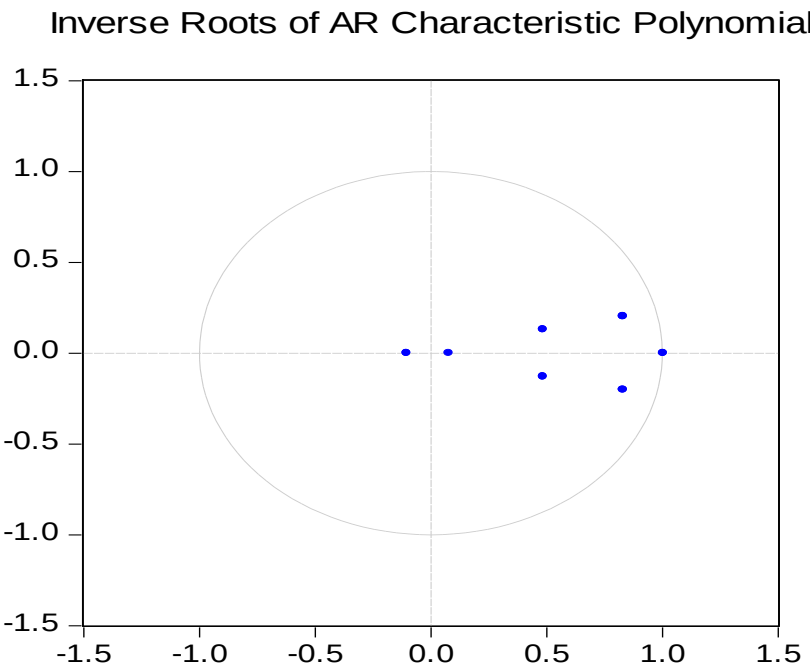
Included observations: 27

Component	Skewness	Chi-sq	df	Prob.
1	-1.073970	5.190350	1	0.0227
2	0.163104	0.119713	1	0.7293
3	-0.189748	0.162019	1	0.6873
4	0.645535	1.875220	1	0.1709
5	-0.120021	0.064823	1	0.7990
6	-0.522335	1.227754	1	0.2678
7	-1.510367	10.26544	1	0.0014
Joint		18.90532	7	0.0085

Component	Kurtosis	Chi-sq	df	Prob.
1	3.577340	0.374986	1	0.5403
2	3.201763	0.045797	1	0.8305
3	2.068914	0.975285	1	0.3234
4	3.068227	0.005237	1	0.9423
5	2.916299	0.007881	1	0.9293
6	2.644465	0.142206	1	0.7061
7	8.619363	35.52440	1	0.0000
Joint		37.07579	7	0.0000

Component	Jarque-Bera	df	Prob.
1	5.565336	2	0.0619
2	0.165510	2	0.9206
3	1.137304	2	0.5663
4	1.880457	2	0.3905
5	0.072705	2	0.9643
6	1.369960	2	0.5041
7	45.78984	2	0.0000
Joint	55.98111	14	0.0000

Model stability test



Variance Decomposition for independent variables

Variance Decomposition of INFLATION:

Period	S.E.	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	14.92124	13.25992	86.74008	0.000000	0.000000	0.000000	0.000000	0.000000
2	18.64401	19.20645	61.97006	0.131442	10.21917	2.947620	1.499117	4.026129
3	20.43069	17.07062	56.81617	1.034009	12.90609	4.293773	2.146294	5.733043
4	22.35906	18.53437	56.39214	0.998179	12.33581	4.727763	1.877939	5.133791
5	24.10306	18.86775	52.48417	1.066264	13.74612	5.432821	2.226696	6.176173
6	25.65791	18.28002	52.00414	1.209822	14.20624	5.678389	2.227685	6.393710
7	27.20108	18.89481	51.10372	1.185029	14.37280	5.896835	2.171389	6.375411
8	28.61635	18.74838	49.81908	1.237673	14.98135	6.134249	2.277311	6.801951
9	29.97508	18.68231	49.61084	1.261735	15.13551	6.230242	2.242434	6.836931
10	31.28978	18.85699	48.95578	1.258088	15.37253	6.354133	2.247713	6.954769

Variance Decomposition of LNADR:

Period	S.E.	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	0.057475	7.814257	10.21453	81.97121	0.000000	0.000000	0.000000	0.000000
2	0.080822	10.50066	13.11918	75.38792	0.487900	0.382290	0.080814	0.041241
3	0.095829	11.70014	10.59587	75.55714	0.347726	1.405714	0.335118	0.058282
4	0.107517	11.75144	9.196088	76.05341	0.348678	2.147358	0.455110	0.047922
5	0.118646	12.28466	8.197264	75.81010	0.409073	2.725619	0.506541	0.066745
6	0.128371	12.59937	7.310174	75.68817	0.411828	3.303567	0.625886	0.061010
7	0.137273	12.80450	6.684988	75.51449	0.445648	3.779730	0.698279	0.072365
8	0.145761	13.10316	6.120846	75.22972	0.476326	4.218302	0.765806	0.085836
9	0.153584	13.28355	5.644428	75.01263	0.496943	4.626397	0.843313	0.092741
10	0.161058	13.46148	5.255090	74.76956	0.527771	4.979142	0.898438	0.108519

Variance Decomposition of LNDR:

Period	S.E.	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	0.187282	5.029587	15.23787	0.300277	79.43227	0.000000	0.000000	0.000000
2	0.262419	4.494863	30.06434	1.442125	62.09948	0.127947	0.564929	1.206316
3	0.322085	5.369187	34.79017	2.363540	52.35441	0.637955	0.802918	3.681824
4	0.395052	6.111953	40.78929	3.025512	42.37506	1.824083	1.255886	4.618217
5	0.466984	5.642724	45.41219	3.898092	35.34904	2.949866	1.684632	5.063449
6	0.534318	5.593179	48.13414	4.502231	30.16165	3.912961	1.871007	5.824834
7	0.602941	5.459775	50.42232	4.957096	26.21754	4.771117	2.103146	6.069008
8	0.667646	5.248023	51.99531	5.397127	23.29998	5.469777	2.271063	6.318723
9	0.730056	5.162011	53.13217	5.710124	20.98963	6.060106	2.385952	6.560009
10	0.790918	5.036673	54.08557	5.977586	19.17040	6.558632	2.503852	6.667281

Variance Decomposition of LNPCE:

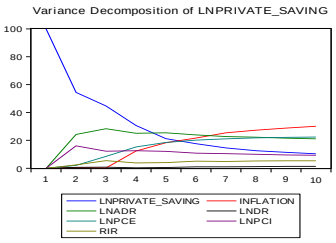
Period	S.E.	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	0.108488	5.104377	41.91605	2.993241	0.122257	49.86408	0.000000	0.000000
2	0.204645	2.344583	49.03005	4.732876	0.964524	42.58935	0.167688	0.170921
3	0.288551	2.341146	49.06873	6.608772	1.153820	40.11629	0.534615	0.176627
4	0.363325	1.791542	48.19805	7.655411	1.586539	39.56040	0.646414	0.561638
5	0.441847	1.352130	48.64839	8.222245	1.622113	38.55550	0.908695	0.690934
6	0.517626	1.132150	48.68926	8.765692	1.708817	37.74878	1.092496	0.862805
7	0.590710	0.923178	48.73217	9.065532	1.823301	37.17318	1.210791	1.071846
8	0.662576	0.781048	48.92288	9.292372	1.860227	36.61631	1.344089	1.183069
9	0.730873	0.679704	48.96414	9.490517	1.921206	36.19995	1.433247	1.311230
10	0.796715	0.593656	49.03973	9.618826	1.966906	35.85575	1.508528	1.416603

Variance Decomposition of LNPCI:

Period	S.E.	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	0.156319	25.37636	10.84885	2.970983	0.059321	38.04219	22.70230	0.000000
2	0.236389	16.76367	13.99626	7.622919	4.188388	42.17979	14.76578	0.483185
3	0.310890	16.49733	11.70409	14.54453	3.627696	43.19465	9.547288	0.884406
4	0.383287	12.20379	11.92292	18.17292	4.141575	45.96684	6.921682	0.670269
5	0.475151	8.812937	16.59278	19.84196	3.570666	46.21903	4.513332	0.449297
6	0.569136	6.927760	19.16988	21.01402	3.577126	45.65852	3.146423	0.506272
7	0.664420	5.343947	21.66138	21.18799	3.650713	45.16037	2.312922	0.682670
8	0.762060	4.333959	23.99355	21.22437	3.546334	44.35872	1.798530	0.744541
9	0.855464	3.627352	25.43966	21.23259	3.595179	43.74045	1.460021	0.904747
10	0.947136	3.072278	26.78646	21.09415	3.593558	43.19494	1.238980	1.019628

Variance Decomposition of RIR

Period	S.E.	LNPRIVATE_SAVING	INFLATION	LNADR	LNDR	LNPCE	LNPCI	RIR
1	14.68669	15.43857	84.24201	4.25E-05	0.288331	0.005509	0.000476	0.025057
2	18.51430	21.88537	57.57915	0.153592	12.55134	2.901200	1.656164	3.273177
3	20.24490	19.84009	51.82781	1.161121	16.02230	4.338169	2.401695	4.408823
4	22.07834	22.01338	50.24210	1.159414	15.65020	4.959521	2.153112	3.822273
5	23.78711	22.58483	45.68690	1.291355	17.42232	5.879222	2.619838	4.515532
6	25.22921	22.24660	44.53948	1.519318	18.13011	6.325445	2.682087	4.556953
7	26.69362	23.20056	42.98626	1.534725	18.43271	6.731544	2.671178	4.443025
8	28.03883	23.20957	41.23944	1.649566	19.21674	7.146722	2.848930	4.689032
9	29.30446	23.34795	40.54489	1.725383	19.48588	7.400849	2.853708	4.641332
10	30.54921	23.70343	39.47842	1.760049	19.81784	7.670466	2.902793	4.667002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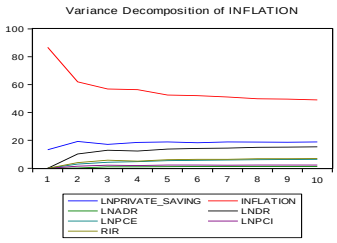
RIR


Variance Decomposition of INFLATION
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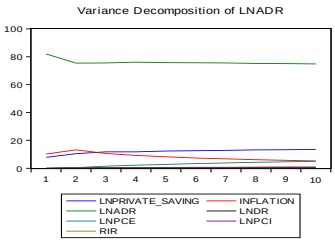
RIR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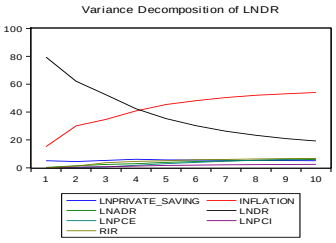
LNPCI
RIR


Variance Decomposition of LNDR
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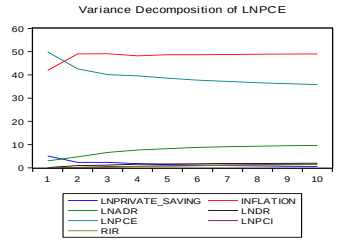
LNPCE
LNPCI
RIR


Variance Decomposition of LNPCE
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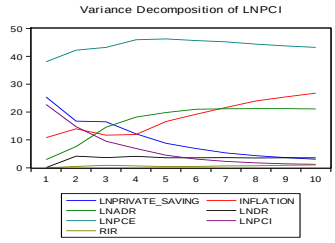
LNDR
LNPCE
LNPCI
RIR


Variance Decomposition of LNPCI
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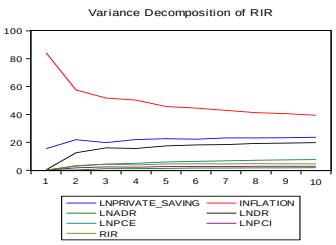
LNDR
LNPCE
LNPCI
RIR


Variance Decomposition of RIR
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INFLATION
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LNPCE
LNPCI
RIR