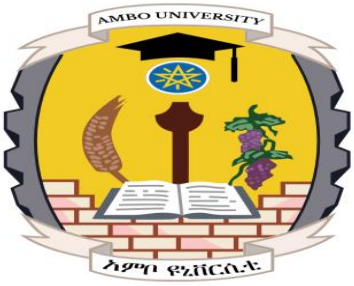

AMBO UNIVERSITY

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Factors Affecting Gross Domestic Saving in Ethiopia: A Vector Error Correction Model Approach

MSc. Thesis

ISRAEL YIGEZU GUTEMA

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July, 2022

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ISRAEL YIGEZU GUTEMA

A Master Thesis Submitted to the School of Graduate Studies of Ambo University in Partial Fulfilment of the Requirements for the Award of Master's Degree of Science in Development Economics

AMBO, ETHIOPIA

July, 2022

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DECLARATION

I the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have dully acknowledged and referred all materials used in this work. I understand that non adherence to the principles of academic honesty and integrity, misrepresentation/fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by university and can also evoke penal action from the sources which have not been properly cited or acknowledged.

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Name of the student Signature Date

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ACRONYMS AND ABBREVIATIONS

ADF Augmented Dickey-Fuller

AIC Akaike Information Criterion

APC Average Propensity to Consume

ARDL Autoregressive Distributed Lag

EPRDF Ethiopian People's Revolutionary Democratic Front

FDI Foreign Direct Investment

GDP Gross Domestic Product

GDS Gross Domestic Saving

GFCE Government Final Consumption Expenditure

GFI Global Financial Integrity

HQIC Hannan–Quinn Information Criterion

IFFs Illicit Financial Flows

IMF International Monetary Fund

IR Inflation Rate

LDCs Least Developed Countries

M2GR Annual Broad Money Growth Rate

MPC Merginal Propensity to Consume

MU Marginal Utility

NBE National Bank of Ethiopia

ODA Official Development Assistance

OECD Organization for Economic Cooperation and Development

OLS Ordinary Least Square

PIH Permanent Income Hypothesis

RIR Real Interest Rate

SBIC Bayesian Information Criterion

SDGs Sustainable Development Goals

UN United Nations

UNCTAD-United Nations Conference on Trade and Development

UNODC United Nations Office on Drugs and Crime

VAR Vector Auto Regression

VECM Vector Error Correction Model

VIF Variance Inflation Factor

WB World Bank

ABSTRACT

The objective of this study is to investigate the short run and long run factors affecting gross domestic saving in Ethiopia using time series data covering the time period of 1985 to 2020. To achieve this desired objective, the study employed Johanson cointegration test to identify the existence of long run relationship between variables after data stationarity has ensured using Augumented Ducky Fuller test. The results reveal that there are up to four cointegrating equationtion in the model. The study also employed Vector Error Correction Model to identify the impacts of factors affecting gross domestic saving in Ethiopia both in short run and lang run. The results reveal that only gross domestic product, real interest rate, annual broad money growth rate and government final consumption expenditure have statistically significant effect on gross domestic saving in Ethiopia in the short run. In long run, Illicit Financial Flows, government final consumption expenditure and annual broad money growth rate have statistically significant negative impact on gross domestic saving while official development assistance, gross domestic product, real interest rate, and inflation rate have statistically significant positive effect on gross domestic saving cetries purbus. The Granger causality test results reveal that there is unidirectional causal relationship between gross domestic saving and illicit financial flows, real interest rate, annual broad money growth rate, official development assistance and inflation rate that runs from these variables to gross domestic saving except for inflation rate that runs from gross domestic saving to inflation rate. Unlike other variables, gross domestic product and government final consumption expenditure have bidirectional causal relationship with gross domestic saving in Ethiopia over the study period.

Keywords: co-integration, Finance, Gross, Growth, Investment, Rate, Saving

1. INTRODUCTION

1.1 Background of the Study

The financing needs to achieve Sustainable Development Goals (SDGs) for developing countries are extremely large. The Addis Ababa Action Agenda (AAAA) stressed the importance of long-term investment, and the need for all financing to be aligned with sustainable development goals. It spells out the potential contributions of public finance, highlighting the growing role of national, international and multilateral development partners (UN, 2015). The necessary financial resources for investment can be obtained either from external sources, i.e. through Official Development Assistance (ODA) and Forign Direct Investments (FDI) or by mobilization of domestic savings.

Inspite of the fact that the the Harrod-Domar model support a positive impact of ODA on domestic saving and growth, its effect is still debatable (Migbaru, 2015). Most ODA are stimulated by political, strategic and economic self interest by the donating countries. It mostly comes with tied conditionalities, stringent and restrictive form. The problem of these conditionalities is that donors forced the recipient government to undertake political and economic policy reforms. On the other hand, foreign borrowing is another option of investment finance but it may cause exchange rate problem in the long run (Todaro and Smith, 2015).

Ethiopia has been facing sustained investment financing gap and failed to raise its domestic savings to the level that meets the required amount of investment for the country (Mulatie, 2019). Therefore, gross domestic saving as a proportion of GDP remains very low for Ethiopia and unlikely to meet investment financing gap. The presence of this resource gap forces the country to rely on an inflow of foreign direct investment to bridge the sustained saving-investment gap. Nevertheless, Ethiopia has recorded low performance in attracting foreign direct investment due to economic and political uncertainty. Besides, the country's reliance on FDI also exposed it to the high risk of external shocks since FDI is highly voletile and attracted towards natural resource

endowment as well as highly responsive to political and macroeconomic stability. (Bienen *et al*., 2013).

Domestic aving is therefore, considered as an important aspect for macroeconomic stabilization and continue to be a priority source of investment financing in order to minimize vulnerability to international economic fluctuations. For this reason, it is one of the important determinants of economic growth since it facilitates financial opportunities for investments in the developing coutries like Ethiopia where there is substantial impediments to capital mobility across international boarders (Getnet, 2017).

According to Addis Ababa Action Agenda, mobilization and effective use of domestic saving is central to the pursuit of sustainable development goals to be meet by 2030. The Action Agenda commits the countries to redouble efforts to substantially reduce Illicit Financial Flows (IFFs) that inhabit domestic saving by 2030. To this end, countries agree to combat tax evasion and corruption (UN, 2015).

In general, it is believed that nations that save more are able to accumulate and mobilize enough domestic resources for huge investment projects and also free from external shocks. Despite this facts, Ethiopia has been persistently registered low domestic saving to date and experienced wide saving-investment gap on the one hand while the country has recently designed a ten years ambitious public investment plans that requires huge amount of financial resources on the other hand. With the given current level of domestic saving, it may be difficult to finance this ambitious 10 years investment plan (Abraham *et al*., 2018). Therefore, it would be vital to look at the factors affecting the level of gross domestic saving in Ethiopia.

1.2 Statements of the Problem

Being an important source of loanable funds that are allocated for financing investment undertakings, gross domestic saving plays vital role in explaining the macroeconomic performance. Therefore, domestic savings have significant impact in building bases for strong and sustainable economic growth and the overall wellbeing of a developing countries (Abraham *et al.*, 2018).

Domestic investments are finaced either by international flows of capital in the country incase there is a possibility of perfect capital mobility or by mobilization of domestic savings especially in the countries where there exists substantial barriers to capital mobility across international borders. But, the first option of investment finance exposes a country to international shocks. Domestic saving is, therefore, found to be the best investment finance option for most developing economies like Ethiopia (Getnet, 2017).

Ethiopia continues to face a potential shortage of domestic resources to finance public and private investments due to its sustained low domestic saving rates for an extended period of time. The gross domestic saving as a share of GDP remains very low and far less than the amount required to meet the needed amount of investment finance. Thus, Ethiopia has been facing sustained investment financing gap and failed to raise its domestic savings to meet the required amount of investment for an extended range of time (Mulatie, 2019). The average GDS for Ethiopia during the imperial era was 11% of GDP, 4% during Durgue regime and 14.5% for the EPDRF regim which indicates that the significant double digit economic growth in recent years didn't resulted in significant growth in GDS (Kidane, 2010).

The low domestic saving performance left the country without option but to make the major development finance to be from external sources. But finacing from external source already exposed the country to external shocks and debt traps. For this reason, domestic saving is remained considered not only as an important sources of investment finance but also an important aspect for macroeconomic stabilization for the country (Getnet, 2017).

Mankiw (2002) argued that saving and investment are important determinants of long run growth of GDP that bring about improved living standards and economists need to understand the functioning of financial market and how events and policies affect these two macroeconomic variables. Therefore, determining these macroeconomic factors that are affecting gross domestic savings are extremely important for a country in order to address those variables that have been hindering the effort to increase GDS. This study is therefore, aims to determine the factors affecting gross domestic savings in Ethiopia over the time period covering 1985-2020.

1.3 Research Questions

This study is proposed to answer the following research questions:

1. What are the macroeconomic factors affecting GDS in Ethiopia?
2. Do the vectors exahibits long run co-integration over the sample period?
3. What is the short run and long run effects of these factors on Gross Domestic Saving in Ethiopia?
4. What is the causual relationship between GDS and macroeconomic factors affecting it in Ethiopia?

1.4 Objective of the Study

The general objective of the study is to investigate factors affecting Gross Domestic Saving (GDS) in Ethiopia both in the short run and long run. To achieve this general objective, the study has the following specific objectives:

1. To identify the macroeconomic factors affecting GDS in Ethiopia;
2. To identify wheather those factors exhibits long run relationship over the sample period of time;
3. To estimate the effects of those macroeconomic factors on Gross Domestic Saving in Ethiopia both in the short and long run; and
4. To determine the causual relationship between GDS and macroeconomic factors affecting it in Ethiopia.

1.5 Significance of the Study

The study intends to address one of the contemporary economic problems in Ethiopia and draw policy recommendation that can help national policy formulators for the efficient and effective use of policy tools to narrow the saving investment gap and to stimulate fast and sustainable economic growth and development in Ethiopia. Besides, the study included IFFs as an explanatory variables which many empirical studies failed to do so. For these reasons, the study is very important to macroeconomists, financial analysts, academicians, policy makers and central bank officials in understanding the responsiveness of GDS to macroeconomic factors affecting it in the country.The study also come up with the relevant policy options to mitigate the low saving problem in the

coutry. Last but not the least, the finding of the study contribute to the knowledge pool and can be one of the empirical sources of information for those who shall conduct similar studies.

1.6 Scope and Limitation of the Study

The conceptual scope of the GDS in this study is limited to the savings of public sector, private corporate sector and household sector in the country. The study limited to macroeconomic variables which includes: Gross Domestic Product (GDP), Government Final Consumption Expenditure (GFCE) as percentage of GDP, Illicit Financial Flows (IFFs), Inflation Rate (IR), Real Interest Rate (RIR), Official Development Assistance (ODA) and Annual Broad Money Growth Rate (M2GR) based on the availability of data. The paper is aimed to employ time series data for 36 years covering the time period from 1985 to 2020 for Ethiopia. The period is selected based on the availability of data for the study variables.

Despite its significance, this study is not free from some shortcomings. The study chooses the above mentioned variables and time series data for the time period of 1985 to 2020 for Ethiopia based on the availability of data. But extending sample period beyond the stated time range and including more variables may produce well fitted model. Furthermore, the research was designed with the due consideration of the resources constraint like time and money needed to complete the study that it has decided to be limited with the current feasible dimensions.

1.7 Organization of the Study

This study is organized in such a manner that the first chapter deals with introducing the brief overview of the study. The second chapter deals with literature review with two categories; the theoretical and empirical literature reviews. The third chapter deals with study materials and methodology. Chapter four deeply deals with data analysis and interpretation. The last chapter briefly presents conclusion of the study findings and drawing helpful policy recommendations.

2. LITRATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Operational Definitions of Basic Concepts

Gross Domestic Saving (GDS) can be defined as Gross Domestic Product (GDP) minus total final consumption expenditure. It includes savings of public sector, private corporate sector and household sector in a country is called gross domestic saving (Khan *et al*., 2017). It is a total amount of a nation income minus its aggregate consumption and also illustrates the available funds for local or overseas investment (Khan *et al*., 2018). Domestic Saving plays a remarkable role in the economic growth of a country. It is the main sources of finance for the domestic investments in the countries where there is substantial barriers to international capital mobility across borders. Saving is an important factor which finances investments, creates job opportunities and improves the level of productivity in developing countries. Thus, most economists viewed domestic saving as the major determinants of domestic investment which is the basic requirement for the fast and sustainable economic growth (Getnet, 2017). A strong saving performance is an important prerequisite for achieving sustainable economic growth, macroeconomic balance, and for the financial and price stability. According to these authors, the main reason for the difference in economic performance among countries on the globe is difference in the rate of national saving (Natinael *et al.*, 2018).

Consumption and savings are are two sides of the same coin. Whatever changes in consumption brings about changes saving and vice versa. This is because a decision to consume automatically implies another decision of not saving what is expended (Nagawa *et al*., 2020). The paper presents four main theoretical approaches of consumption and one saving model which is closely related to the scope of the study namely: Keynesian Consumption Theory, Permanent-Income Hypothesis, the Life Cycle Theory, the Random Walk Theory of Consumption and the Two Gap Model.

2.1.2 The Keynesian Theory of Absolute Income Hypothesis

Keynes argued that the relationship between income and consumption was based on the fundamental psychological law. According to him, consumption is a stable function of current disposable income. Based on the law, people dispose to increase their consumption as their income increases but not as much as increment in their income. This means, 0<MPC<1, and MPC<APC. The non-proportional relationship between (MPC < APC) income and consumption exist in the Keynesian absolute income hypothesis. Income that consumers earn but do not spend on consumption will be saved in some form (Weldemariam, 2016). Mathematically;

$$Y = C + S \quad \text{(2.1)}$$

Where; 'Y' is income, 'C' represents consumption and 'S' stands for saving. By rearranging the equation 2.1, the Keynesian consumption function can be written as:

$$C = a + bY \text{ where } a > 0 \text{ and } 0 < b < 1; \quad \text{(2.2)}$$

Where 'C' is real consumption and 'Y' is real disposable income. The intercept 'a' stands for consumption at zero level of income, and the parameter 'b' is Marginal Propensity to Consume (MPC). The ratio of consumption to income is referred to as the Average Propensity to Consume (APC) which declines as income increases.

$$APC = C/Y = a/Y + b \quad \text{(2.3)}$$

This implies that as the income of a given household increases, they consumes smaller fraction of their income and saves larger fraction (1-APC) of it (Alimi, 2013).

$$(APS) = 1 - a/Y - b = -a/Y + (1-b) \quad \text{(2.4)}$$

This indicates that consumers still spend the amount 'a'; at zero level of income and they dis-save 'a'. This means saving will be negative and the income-saving relationship is not proportional. It also indicates that if other things remain constant, rich people saves more portion of their income than poor people do (Bosabose, 2020).

2.1.3 The Permanent Income Hypothesis

The Permanent Income hypothesis (PIH) is a post-Keynesian consumption theory that was developed by Nobel Prize winning Economist, Milton Friedman, in 1957. Unlike the absolute income hypothesis, the Permanent Income Hypothesis holds proportional relationship between consumption and income. According to Friedman, consumption neither depends on absolute income nor on relative income. But it depends on the permanent income based on the expected future income. The PIH assumed the households' marginal propensity to consume is fixed (Weldemariam, 2016). Friedman divided the real income in to two parts: Permanent income (Y_p) and Transitory income (Y_t). Thus, the real income equation will be written as:

$$(Y) = Y_p + Y_t \quad \ldots\ldots (2.5)$$

Permanent income indicates income which is determined by the expected or anticipated income to be received over long period of time while transitory income represents unexpected or a fall or rise in income. In the same manner, Freidman distinguished between permanent consumption (C_p) and transitory consumption (C_t). Transitory consumption is regarded as the unanticipated spending (e.g., expenses incurred for unexpected illness). Thus, real consumption is measured as the sum of permanent and transitory components of consumption (Friedman, 1957). Mathematically,

$$C = C_p + C_t \quad \ldots\ldots (2.6)$$

He argued that permanent consumption depends on permanent income. This means that permanent consumption is proportional to permanent income that exhibits a fairly constant APC. Thus,

$$C = kYp \quad \ldots\ldots (2.7)$$

Where; 'k' is constant and equal to APC and MPC

2.1.4 The life Cycle Theory of Consumption

The Life Cycle Hypothesis was developed by Albert Ando, Richard Brumberg, and Franco Modigliani in 1963. It argued that consumption in any period is not the function of current income of that. It deals with consumption-saving decisions and suggests that economic agents consciously make a great effort to maximize their present value of lifetime utility, by distributing consumption over the lifetime. Thus, in life cycle hypothesis, the individual is assumed to plan a pattern of consumption expenditure based on expected income in their entire lifetime. It is further assumed that individual maintains a more or less constant or slightly increasing level of consumption. However, this level of consumption is limited by his expectation of life time limited income (Browning and Crossley, 2001). An individual in this theory spends on consumption either by borrowing from others or spends the asset given from his parents in his early years of life time. In their main working years of their life time, that individuals save more than they earn and hence make net positive savings. They then invest these saving in productive activities which accumulate wealth that they consume in feature years. They then dis-saves in their lifetime after retirement and consumes more than their income in their later years of their life but is able to maintain or even slightly increase their consumption in the lifetime after retirement (Wijaya *et al.*, 2020).

2.1.5 The Random Walk Theory of Consumption

Robert Hall introduced his famous random walk model of consumption theory in 1978. The theory is tested after accounting for time aggregation bias. The permanent income hypothesis assumes that consumers have certainty about their future income. But practically, consumers are uncertain about future. Hall theory argued that if Milton Friedman's permanent income hypothesis that argues "current income should be viewed as the sum of permanent income and transitory income and that consumption depends primarily on permanent income" is correct and if consumers have rational expectations, then any changes in consumption should be unpredictable, i.e. it follow a random walk (Mankiw& Shapiro, 1985).

Hall argued that consumer chooses to consume in each period, t-1, t, t+1, etc., so that they maximize their lifetime utility with the condition that lifetime utility equals their lifetime resources or income. At any given moment, a consumer selects their consumption based on their current expectations of their lifetime income. Consumers modify their consumption throughout their life because they receive new information that makes them adjust their expectations. Thus, the utility maximization condition is equalizing the marginal utility gained in each time. If consumers are optimally using all available information, then they should be surprised only by events that were completely unpredictable (Bosabose, 2020). Therefore, consumer's changes in consumption should be unpredictable as well. If consumers are certain about their future, the marginal utility in different period can be indicated as:

$$MU\ (C_{t-1}) = MU\ (C_t) = MU\ (C_{t+1}) \ldots\ldots (2.8)$$

Robert Hall applied the rational expectations theory to explain the consumer under uncertainty. According to Hall, consumers are uncertain about future and equalize the marginal utility in period 't' with the expected marginal utility in period 't+1'. So, the rule of utility maximization will be written as:

$$E\ [(C_{t+1})] = (C_t) \ldots\ldots (2.9)$$

However, the expected value of consumption E $[(C_{t+1})]$ is not observable. Thus, Robert Hall applied the theory of rational expectations to the theory of consumption. According to him, the observed consumption behaviour can be written as:

$$C_{t+1} = C_t + \delta \ldots\ldots (2.10)$$

Where δ is expected consumption due to sudden or surprise rise in income. This theory states that there is uncertainty about future income, it may increase or decrease over time. When individuals get an unexpected rise in their income, their consumption also increases, and when income declines, their consumption is also reduced. This kind of change is unpredictable. Hence, the change in consumption in case of uncertainty is random (Mankiw and Shapiro, 1985).

Saving is the portion of today's income that is not spent. Whatever determines consumption directly affects the amount of income saved. Thus, the above four consumption theories are also applicable to saving.

2.1.6 The Two Gap Model

The Two-gap model is an extention of Harrod-Domar growth model. The model is developed by Chenery and Bruno (1962), McKinnon (1964), Chenery and Strout (1966) (Bender *et al.,* 2005). The model argues that development of less developed countries is constrained due to the presence of two gaps. The first one is the gap between domestic savings and investment where domestic savings are inadequate to support the level of investment need required to enhance economic growth while the second one is the gap between export revenues and imports or foreign exchange gap where value of imports plus capital transfers is inadequate to support the level of growth. It claims that the economic growth of a developing country is potentially limited either by their saving gap or by their foreign exchange gap (Usui, 1996). The two-gap model therefore, defines economic growth rate as:

$$G = S/K + F/K \quad \text{.....(2.11)}$$

Where: G = Economic growth rate

S = Savings rate

K = Capital output ratio

F = Foreign capital inflow ratio

The Two-gap model is critized for its failure to take account of relative price since it applied in the medium and long run context. It take no notice of structural changes brought about by foreign aid that may depress the tradable sector through the consequent appreciation of real exchange rate (Bender *et al.,* 2005).

2.2 Empirical Studies

In this section, the study reviews relevant empirical studies conducted on factors affecting gross domestic savings in different developing countries including Ethiopia with different methodologies and explanatory variables.

Khan *et al.* (2018) have investigated determinants of gross domestic saving of eighteen Asian countries by using panel data for the time period covering 1995 to 2016. The researchers employed explanatory variables like: Gross Domestic Product (GDP), Age Dependancy Ratio, Broad Money, Tax Revenue and Inflation Rate applied different statistical techniques such as fixed effect model, descriptive statistics and correlation matrix. They concluded that Gross domestic product, broad money and tax revenue have statistically positive effect on gross domestic saving while age dependency ratio and inflation rate have negative effect on gross domestic saving in the long run in the selected Asian countries.

Alper (2018) empirically studied determinants of domestic savings in Turkey over the period of 1979 to 2017 using annual timeseries data. He used KSS cointegration test to analyze the long-run relationships among variables. Alper concluded that the GDP per capita and bank deposit interest rate have a positive impact on domestic savings in Turkey while inflation and public spending have a negative impact on Turkey's dometic savings. But urbanization rate have statistically insignificant effect on gross domestic savings. El-Seoud (2014) also studied the effect of interest rate, inflation rate and gross domestic product on national saving in Bahrain and clocluded that these three variables have statistically significant positive impact on national saving in the country.

Woldemariam (2017) empirically investigated determinants of gross domestic saving in East African countries (Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Uganda) using annual panel data for the period covering 1991 to 2012. He employed the Fixed Effects (FE) model and concludeded that GDP per capita growth and degree of urbanization have statistically positive effect on gross domestic saving in East Africa while inflation rate, age dependency ratio to working age, money and quasi money as a

percentage of GDP and government expenditure as a percentage of GDP are statistically insignificant effect on GDS in these selected East African countries.

Basabose (2020) studied the behaviour of domestic saving in Ruwanda for the time period covering 1988 to 2018 using the Johansen co-integration test and Vector Error Correction Model (VECM). The study colcluded that gross domestic product, exports, and foreign direct investment and gross domestic product have statistically significant positive effect on gross domestic saving in Ruwanda while final expenditure and the population growth has statistically insignificant effect on domestic savings in Ruanda.

Nagawa *et al.* (2020) examined the short-run and long-run determinants of gross domestic savings in Uganda using an Autoregressive Distributed Lag (ARDL) approach to cointegration for the time period covering 1980 to 2017. The authors concluded that in the long run, gross domestic product growth rate, foreign domestic investments and broad money have statistically significant efects on GDS while current account balance and gross national expenditure have ststisticaly negative impacts on savings. In the short run, current account balance has a ststistically positive signifcant impact on GDS while gross domestic product and deposit interest rate have statistically signifcant negative impact on GDS in Uganda.

Arok (2014) studied dterminants of gross domestic saving in Kenya using the Johanson co-integration and Vector Error Correction Model (VECM) for the time period covering 1971to 2012. The study colcluded that real per capita income has statistically positive impact on gross domestic saving in Kenya while the current account deficit, public savings, rate of interest on deposits and broad money have statistically negative impact on domestic savings in Kenya in the long run. The study also added that there is unidirectional causual relationship between GDP and GDS that runs from GDP to GDS.

Mulugeta (2020) conducted comparative analysis between gross national savings and economic growth in ethiopia for the period covering 1980 - 2018. The author employed Johanson co-integration approach to predict the long-run and short run relationships between the two variables. He concluded that economic growth rate and gross national saving have statistically significant two directional effect on one another. The Vector

Error correction model cuasual relationship test result also revealed that there is bi-directional causal relationship between gross national savings and real GDP.

Zeleke (2019) studied the causual relationship between saving and investment in Ethiopia using annual time series data covering the time period 1980 to 2016. The study employed the Johanson Co-integration test and it revealed that there exists a long run relationship between saving and investment. The Granger causality test result also suggests that bidirectional causality exist between saving and investment that runns from saving to investment in Ethiopia over the sample period.

Abraham *et al*. (2018) has conducted a time series analysis on the short run and long run predictors of national saving in Ethiopia for the period ranging from 1970/71 to 2016/17 using the the Johnson's cointegration test and Error Correction Model. The authors colcluded that inflation rate, foreign aid, national income, financial development and deposit interest rate variables were found to be important predictors of national saving in the long run while only inflation and national income variables were estimated to have significant impact in favor of national saving in Ethiopia in the short run.

Getnet (2017) examined the the short and long run determinants of gross domestic savings rate (GDS) in Ethiopia using secondary annual data for the time period covering 1980-2014 using co-integration and error correction model. The study colcluded that foreign aid and age dependacy ratio have statistically significant negative effect in long run. It also added that financial depth of the country has positive effect on GDS both in the short and long run while bank interest rate has statistically negative impact on GDS in the short run but its effect is insignificant in the long run.

Hassen (2017) also studied factors affecting GDP in Ethiopia using the Johanson Co-integration test and Vector Error Correction Model for the time period covering 1965-2013. He colcluded that GDP growth in Ethiopia is significantly determined by domestic savings, money supply, and foreign capital inflow while foreign capital in-flow in the form of foreign aid and terms of trade have statistically positive impact on GDS. The study also summarized that gross domestic savings in Ethiopia are affected by age

dependency ratio, real exchange rate, real interest rate, real gross domestic product, foreign capital inflow and money supply both in the short and long run.

Migbaru (2015) examined the impact of foreign aid on Ethiopian domestic saving over the period covering 1981 to 2011 using the Johanson cointegration approach. The results revealed that both bilateral and multilateral aid determined domestic saving in Ethiopia where multilateral aid have statistically positive impact on gross domestic saving in longrun but bilaterail aid have negative impact on gross domestic saving in Ethiopia.

Haile (2013) studied the long and short run determinants of domestic saving in Ethiopia for the time period of 1969/70-2010/11 using Johnson co-integration test and Vector error correction model. The study revealed that growth rate of GDP, government consumption and foreign aid are statistically significant long run determinants of domestic saving in Ethiopia while deposit interest rate, dependency ratio, and financial depth are found to be statistically insignificant effect on domestic saving. The study also added that all the explanatory variables employed by the study have statistically insignificant effect on domestic saving in Ethiopia in the short run.

According to GFI (2019), the low level of Gross Domestic saving in Ethiopia is further exarbeted by Illict Financial Flows (IFFs) that derains the already limited local resouces. The stdudy also revealed that Ethiopia is one of the top ten African countries that are losing a significant amount of domestic financial resources through illicit financial flows. Ethiopia has lost an estimated 84 billion USD through IFFs between 1980 and 2018 in just 38 years. The country has lost an estimated 2.1, 2.4 and 2 billion USD through trade mis-invoicing only in the years: 2014, 2015 and 2019 respectively.

Slany *et al.* (2020) analyzed the relationship between gross capital formation and IFFs in African countries between 2000 and 2015. The authors concluded that IFFs have ststistically significant negative effect on capital formation. Signe *et al.* (2020) also revealed that IFFs have strong negative effect on investment in developing countries and hence it inhibits saving rates in Africa where savings and investments are strongly correlated and traditional sources of investment provide limited funding for local investments. They also referred IFFs as “dissaving”. Le (2020) also added that IFFs are

presently inhabiting Africa's saving rate and decreasing the degree of IFFs leads to increase in savings that can be invested to improve human capital development which can even increase further saving. Ndikumana & Boyce (2008) indicated that IFFs is same as transferring part of domestic private savings abroad and hence it is one of the causes of low domestic savings in African countries. As reviewed in this section, all the study conducted on the determinants of gross domestic savings didn't included the effect of illicit financial flows. Besides, most of the related studies conducted in Ethiopia are not up to date. Thus, this paper addresses the effects of IFFs on GDS in Ethiopia and come up with an up to date result on factors affecting GDS in Ethiopia.

2.3 Conceptual Framework

The empirical literature reviews in the preeding section indicated that the major factors affecting Gross Domestic Saving (GDS) in Ethiopia are: Gross Domestic Product, Age Dependancy Ratio, Broad Money Growth, Inflation Rate, Interest Rate, government final consumption expenditure, Official Development Assistance, and Illicit Financial Flows (IFFs). This study also uses some of these variables for which manageable data is available in order to syetematically analyse factors affecting gross domestic saving in Ethiopia. However, the age dependacy ratio variable has been excluded from the study due to the nature of the data which failed to synchronize with other variables in meeting statinairity nature of the time series variable.

Therefore, this study is designed to scientifically analyse factors affecting Gross Domestic Savings in Ethiopia with due consideration of the above mentioned explanatory variables using time serious econometric analysis; i.e. multivariate VECM. Based on the reviewed theoretical and empirical studies, the conceptual framework of the study is schematically presented by the following figure.

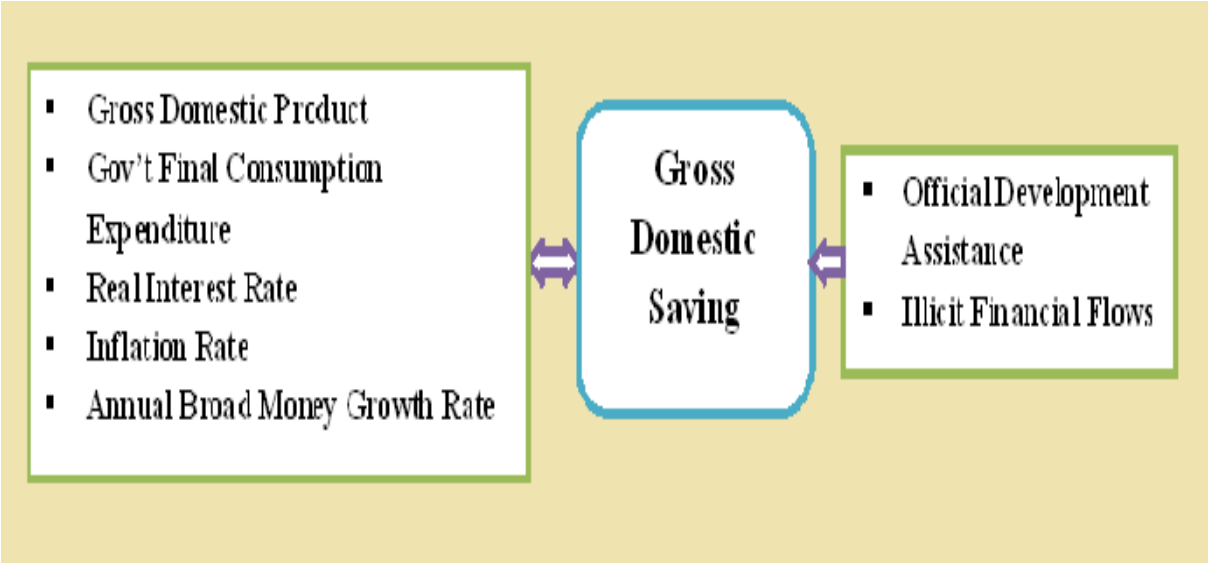


Figure 1: Conceptual Framework

3. RESEARCH METHODOLOGY

3.1 Description of the Study Area

Ethiopia is located in the horn of Africa and the second most populous country in the continent with the population of 112 million of which 60% per cent was under the age of 25 (Deren and Motamed, 2020). The current country's population growth rate is estimated to be 2.32% per year. Ethiopia is a land locked country with an area of 1.1 million km^2 (WB, 2020).

The Ethiopian People's Revolutionary Democratic Front (EPRDF) has overthrown the Dergue military Junta in 1991 and established Ethiopia's ethnic federal system by decentralizing power to regional states and granting ethnic groups the right to self-governance under the constitution (Deren and Motamed, 2020). Since then, Ethiopia has been recorded remarkable economic growth until 2017. It becomes one of the fastest growing landlocked economies in the world. According to IMF (2020), the country has increased its per capita income by 200 per cent and reduced its infant mortality rate by half since 1990.

According to Deren and Motamed (2020), the Ethiopia's total GDP was 96 billion USD with 9 per cent growth rate in 2019. However, the rapid economic growth rate in Ethiopia has only delivered relatively small reductions in poverty. Every one per cent rise in per capita GDP corresponded to a 0.19 percentage point reduction in the poverty rate. Accordingly, the country ranks 173rd out of 189 countries in Human Development Index in the year 2019.

In 2016, protests and unrest sparked in the country and the government imposed state of emergency which resulted in the resignation of Prime Minister Hailemariam Desalegn in 1918 followed by the election of Abiy Ahmed as an executive committee member as chairman of EPRDF and became the next Prime Minister of Ethiopia. Prime Minister Abiy Ahmed has announced a Home grown Economic Reform Plan, consisting of a mix of macroeconomic, structural and sectorial policies that aimed to address vulnerabilities and tackle structural bottlenecks that inhibiting private sector activities. The

macroeconomic and structural reforms announced by the authorities are expected to lead to a reduction in public debt, lower external vulnerabilities, and stronger growth, investment and exports for the country (IMF, 2020).

3.2 Data Type, Sources and Collection

In order to analyse factors affecting gross domestic saving in Ethiopia, the researcher employed time series quantitative data. The annual time series secondary data for the time period covering 1985 to 2020 is collected from World Bank (WB), Global Financial Integrity (GFI) and International Monetary Fund (IMF) websites. Besides, Data from National Bank of Ethiopia is also used for this study. The data collection mechanism is made through document review.

3.3 Method of Data Analysis

The study combined the theoretical expectations and empirical observations which enable to extract the expected variables that influence gross domestic savings in Ethiopia in short and long run. In doing so, the study has employed time series econometric data analysis using STATA software version 13. The study employs Vector Error Correction Model (VECM) for developing estimates of the model parameters β_0, $\beta 1$, $\beta 2$, $\beta 3$ $\beta 4$, $\beta 5$, $\beta 6$, and $\beta 7$.

3.3.1 Descriptive and Inferential Statistics

Descriptive statistics like: mean, maximum, minimum tabulation, and graphs are used to show the trend, the nature of the time series data for the variables. Besides, the study also employs inferential statistics like: t-test, Augmented Dickey Fuller (ADF) test, Lagrange multiplier test, normality and causality test to infer the different statistical tests to be used for data analysis.

3.4 Variable Definitions and Working Hypothesis

3.4.1 Dependant Variable

3.4.1.1 Gross Domestic Saving (GDS)

Saving is the residual of the two large magnitudes of GDP and consumption. Thus, gross domestic saving can be defined as GDP less total final consumption expenditure. It is a total amount of a nation's income minus its aggregate consumption and also illustrates the available funds for local or overseas investment. GDS is measured as a percentage of GDP (Basabose, 2020). The data source for Gross Domestic Saving for the study is National Banak of Ethiopia (NBE) and the notation "GDS" is used to indicate it in the study. It is positioned as dependant variable in the Vector Error Correction Model. The study used GDS in the form of logarithm to the base ten.

3.4.2 Independant Variables

3.4.2.1 Gross Domestic Product

Gross Domestic Product is defined as the market value of all final goods and services produced within a country in a given period of time. It is the sum of all gross value added by all residents in the economy plus any product taxes minus any subsidies (Mankiw, 2002). The notation "GDP" is used to represent Gross Domestic Saving and the data source for the study is The World Bank. GDP is measured in millions of USD and used in the form of logarithm to the base 10 for this study. It expected to have positive effect on GDS. Weldemariam (2016) has studied the relation between GDP and Gross Domestic Saving using panel data from six East African Countries and concluded that GDP is one of the important determinants of Gross Domestic Saving in East Africa.

3.4.2.2 Official Development Assistance (ODA)

Official Development Assistance is the net disbursements of grants or loans made on concessional terms by official agencies majorly by high income member countries of the Organization for Economic Cooperation and Development (OECD). It includes multilateral and bilateral grants, concessional loans, and technical assistances. Official

Development Assistance is reprented by a notation of "ODA" in this study and the ODA data used in this study if obtained from the World Bank. ODA is measured in millions of USD and used in the form of logarithm to the base 10 for this specific study. ODA is positioned as independent variable and expected to have positive effect on GDS. Empirical evidence indicated that multilateral aid has a significant positive impact on domestic saving in the long run (Migbaru, 2013).

3.4.2.3 Illicit Financial Flows (IFFs)

IFFs represent money that is illegally earned, transferred across international borders by violating currency control rules and illegally utilized which includes exchange of values. If it breaks laws in its origin, movement, or use, it is called IFFs. The flows that cross a boarder include assets that cross borders and assets where the ownership changes from a resident of a country to a non-resident even if the assets remain in the same dominion (UN, 2020). IFFs ranges from individual transfer of funds in his/her account abroad without paying taxes on the funds to highly complex money laundering schemes that involves criminal network setting up multi layered multi-jurisdictional structures to hide ownership and transfer stolen funds (Ritter, 2015). IFFs are measured in millions of USD and used in the form of logarithm to the base 10 for this specific study. The notation "IFFs" is used to represent Illicit Financial Flows and the data used in this study for IFFs is obtained from Global Financial Integrity. It is postioned as independent variable in the model and expected to have negative effect on GDS. Signe *et al.* (2020) indicated that IFFs affects domestic saving and investments negatively.

3.4.2.4 Real Interest Rate (RIR)

Interest rate is the amount a lender charges for the use of assets expressed as a percentage of the principal. It is the market price at which resources are transferred between the present and the future i.e. the return to saving and the cost of borrowing and the rate of interest that investors pay to borrow money. The real interest rate is the nominal interest rate corrected for the effects of inflation. The interest rate is typically noted on an annual basis known as the annual percentage rate. An increase in real interest rate makes saving more attractive and hence increases national saving. (Mankiw, 2016). The notation "RIR"

is used for this specific study to represent Real Interest Rate. RIR is postioned as independent variable in the model and expected to have positive impact on GDS. The data source for this specific variable is obtained from National Bank of Ethiopia. It is measured in percentage and used in level form for this particular study since it has both negative and positive values.

3.4.2.5 Annual Broad Money Growth Rate (M2GR)

Broad money includes notes and coins but also saving accounts and deposits in a savings account. Broad money can also include treasury bills and gold. These financial securities are seen as 'near money' because they are more illiquid than cash and instant saving accounts (Mankiw, 2002). Annual Broad Money Growth Rate is symbolized as “M2GR” and the data source for the variable is National Bank of Ethiopia. The annual broad money growth rate is the rate of growth of money and hence measured in terms of percentage and used in logarithmic form for this study. It is positioned as an independent variable in the model and expected to have either positive or positive impact on GDS.

3.4.2.6 Inflation Rate (IR)

Inflation rate which is symbolized as “IR” in this study is defined as the percentage change in the price level from the previous period. It measures how fast prices are rising (Mankiw, 2016). Haile (2013) indicated that inflation have adverse effects on gross domestic saving in Ethiopia both in the short run and long run. The IR data is obtained from IMF for this particular study. Inflation rate is measured in percentage and used in level form for this particular study since it has both negative and positive values. It is expected to have negative impact on GDS.

3.4.2.7 Government Final Consumption Expenditure

Government Final Consumption Expenditure which is symbolized as “GFCE” is an aggregate transaction amount on a country's national income accounts representing government expenditure on goods and services that are used for the direct satisfaction of individual needs, consumption or collective needs of members of the community. It

represents government purchases of goods and services including road and infrastructure repairs, national defence, schools, healthcare, and government workers' salaries.

Table1: The Summary of study variables

S/N	Variable	Notation	Description	Expected Sign	Source
1	Gross Domestic Saving	GDS	The total amount of a nation's income minus its aggregate consumption		NBE
2	Gross Domestic Product	GDP	The market value of all final goods and services produced within a country in a given period of time.	Positive	WB
3	Official Development Assistance	ODA	The net disbursements of grants or loans made on concessional terms by official agencies.	Positive	WB
4	Illicit Financial Flows	IFFs	Money that is illegally earned transferred across international borders and illegally utilized.	Negative	GFI
5	Real Interest Rate	RIR	The amount a lender charges for the use of assets expressed as a percentage of the principal.	positive	NBE
6	Annual Broad Money Growth Rate	M2GR	The annual growth rate of notes, coins, saving and deposits accounts.	Negative or Positive	NBE
7	Inflation Rate	IR	The percentage change in the price level from the previous period.	Negative	IMF
8	Government Final Consumption Expenditure	GFCE	The general government final consumption expenditure expressed as a percentage of GDP	Negative	NBE

Source: the author

The Government Final Consumption Expenditure excludes cash payments to households, such as the state pension and child benefit. It also excludes interest on the national debt,

investment grants, subsidies to companies and the self-employed, and our contributions to membership.GFCE data is obtained from National bank of Ethiopia for this study. It is measured in millions of USD and used in the form of logarithm to the base 10. It is expected to have negative impact on GDS.

3.5 Econometric Model Specification

The study built the econometric model for analysis based on the Cobb-Dougla production function given as follows:

$Y_{jt} = A_{jt} L^{\alpha}_{jt} K^{\beta}_{jt}$……(3.1)

Where, Y_{jt} is the aggregate output of a country 'j' at time 't', A represents total factor productivity or technology, L stands for labor whereas K represent the physical capital stock, α and β stand for output elasticity's of labor and capital respectively.

The study employs the following functional relationship to analyse the factors affecting Gross Domestic Savings (GDS) in Ethiopia with reference to: Mankiw, 2002, Haile, 2013, Migbaru, 2013, Ndikumana, 2014, Getnet, 2017, Natinael, 2018 and Signe *et al*., 2020.

GDS= f (IFFs, IR, GDP, RIR, M_2GR, ODA, GFCE)…….…….. (3.2)

Based on the above functional relationship, the following multiple linear econometric models can be specified to measure the average impacts of each explanatory variable on the explained one.

$\log GDS_t = \beta_0 + \beta_1 \log IFFs_t + \beta_2 IR_t + \beta_3 \log GDP_t + \beta_4 RIR_t + \beta_5 \log M2GR_t + \beta_6 \log ODA_t + \beta_7 \log GFCE_t + \varepsilon_t$……...……. (3.3)

Where: logIFFs stands for logarithm of Illicit financial Flows, IR stands for Inflation Rate, logGDP represent logarithm of Gross Domestic Product, RIR for Real Interest Rate, logM2GR for logarithm of Annual Broad Money Growth Rate, logODA represents logarithm of Official Development Assistance, and logGFCE stands for logarithm of Government Final Consumption Expenditure. β_0 is the intercept that stands as a constant term and β_1, β_2, β_3 β_4, β_5, β_6, and β_7, are the coefficients of each independent variable

that measures the change in the mean value of gross domestic saving per unit change in a given variable while holding other endogenous variables constant and ε_t is the error term at time "t".

3.5.1 Estimation Techniques

The study employs Vector Error Correction Model (VECM) for developing estimates of the model parameters β_0, β_1, β_2, β_3 β_4, β_5, β_6, and β_7. At the beginning, the study proposed to use Ordinary List Square (OLS) method of estimation. But it is only appropriate method for the time series variables that are stationary at their level form. But most macroeconomic time series data exhibits non stationary status in their level forms but becomes stationary at first difference where the convectional regression estimators are not appropriate for estimation. If such data have the behaviour of co-integration in long run, Vector Error Correction Model (VECM) is the appropriate model for estimation (Loves *et al*., 2021). The variables employed by this study become stationary at first differencing that the study employed VECM model to analyse factors afffecting GDS in Ethiopia.

The goal of the study is therefore, to identify whether the vectors exhibits long run co-integration or not and also to identify the long run effects of other endogenous variables on the variable of interest. The identification of the integration of vectors in the long run determines the type of VAR model employed, i.e., the unrestricted VAR or the restricted VAR (VECM). Thus, if endogenous variables are integrated of order one or I(1) but do not co-integrated in long run, the unrestricted VAR is the suitable model of estimation (Shrestha, and Bhatta, 2018). But, all the variables employed for this study becomes stationary after I (1). Thus, the data type guided the study to switch to Vector Error Correction Model (VECM) that is appropriate for those series data which becomes stationary after first differencing. The VAR model can be developed from Cobb. Douglas types of production given under equation 3.1 above.

$$Y_t = \alpha_j + \sum_{j=1}^{n} \beta_j Y_{t-j} + \varepsilon_t \quad \text{.....} \quad (3.4)$$

Where: Y_t = ($logGDS_t$, $logIFFs_t$, IR_t, $logGDP_t$, RIR_t, $logM2GR_t$, $logODA_t$, $logGFCE_t$)

This is a [8x1] vector of non-stationary variable while αj is vector of constant, n is number of lags, and B_j is [8x8] matrix of parameters to be estimated and ε_t is a [8x1]

vector of error terms, and j is the number of co-integrated equations included in the VECM.

The VEC model is a modified VAR model that restricts the long run behaviour of endogenous variables to converge to their co-integrating relationship while adjusting for short-run dynamics. VECM considers all the variables in the regression are potentially endogenous and relates each variable to its own and other variables' lagged values (Baum, 2013). The VEC model with co-integrating rank (r) can be formulated as follows.

$$Y_t = \alpha_j + \mu\beta Y_{t-1} + \sum_{j=1}^{n-1} \pi_j \Delta Y_{t-j} + \varepsilon_t \quad \text{(3.5)}$$

Where, α is vector of constant, μ is the error correction coefficient, β represent (nxr) matrices of co-integrating vectors. The coefficients of variables in equation 3.5 represent a VECM model estimated in this study, and constitute two main important parts. The first part is '$\mu\beta Y_{t-1}$' which is the Error Correction term that represents the long-run causal relationship between co-integrated variables of the estimated model. Hence, the error correction term determines long-run causality. If the coefficient μ is significant, then it means that there is a long run causal relationship between the estimated variables. The second part of the equation 3.5 constitutes the coefficients of the lagged explanatory variables $\sum_{j=1}^{n-1} \pi_j \Delta Y_{t-j}$ which represent the short-run causal relationship among endogenous variables included in the model.

Most time series research assumes that the underlying time series data are stationary. But time series data can only be stationary if and only if it's mean and variances do not vary over time. In other words, a no stationary time series will have a time varying mean or a time varying variance or both. But in order to avoid the drawback of wrong implications from the non-stationary regressions, the time series data should be stationary i.e. the data should not have unit root. Besides, time serious research can be associated with many other problems like autocorrelation and model instability that it needs to test the specified model against these conditions (Gujarati, 2009). Therefore, the study employs different statistical testing mechanisms like Johansen co-integration test, Lagrange multiplier test, Causality test, normality and model stability tests of the series data in use in order to identify whether the series data fulfil the standard regression assumptions and the direction of causality between dependant and independent variables under consideration.

3.5.1.1 Stationarity Test

The standard classical methods of estimation are based on the assumption that all variables are stationary. However; most economic variables are not stationary in some time series researches. A model containing non stationary variables will often lead to a problem of spurious regression, whereby the results obtained suggest that there are statistically significant relationships between the variables in the regression model when in fact all that is obtained is evidence of parallel correlations rather than meaningful causal relations. In addition to this, inferences based on the standard statistical tests will not be valid (Wooldridge, 2013). Thus, it is necessary to test the stationarity nature of time series variables before conducting any regression analysis. There are a number of stationarity testing mechanisms namely: Dickey-Fuller (DF), the Augmented Dickey-Fuller (ADF) test, and Phillips-Peron test from which this study employs Augmented Dickey-Fuller (ADF) test to identify whether the time series data are stationary or not. The ADF tests the unit root for the y_t series as:

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{i=1}^{k} \boldsymbol{\beta} \Delta Y_{t-i} + \varepsilon t \quad \text{.....(3.3)}$$

Where: δ = coefficient of y_{t-1}

ΔYt = First difference of y_t i.e. $y_t - y_{t-1}$

The null hypothesis of ADF is $\delta=0$ against the alternative hypothesis of $\delta<0$ and we accept the null hypothesis if the series is stationary and vice versa.

3.5.2.2 Maximum Lag-Order Selection

In econometric analysis, the dependence of the dependant variable 'Y' on the explanatory variable 'X' is rarely instantaneous. In most cases, Y responds to X with the lapse of time due to psychological, technological and institutional reasons (Shrestha and Bhatta, 2018). Such laps of time is called lag. Most time series econometrics analysis uses distributed lag models for economic data analysis where lag plays highly useful role. Thus, it needs to identify the maximum lag length in the econometric model where lag factors are considered (Gujarati, 2009).

This study uses the most common lag length selection criteria namely, Akaike's information criteria (AIC), Schwarz's Bayesian information criteria (SBIC), FPE and Hannan-Quinn Information Criterion (HQIC).

3.5.1.3 Johansen Co-integration Test

Two or more variables that have long term relationship are usually expressed in terms of equilibrium. Such relationship in econometrics is called co-integration and the regression analysis that involve co-integrating variables is called co-integrating regression. Johansen and Juselius (1990) have developed an improved co-integration test models. Johansen co-integration method is based on the relationship between the rank of matrix and its characteristics roots with 'n' variable vectors (Baum, 2013). Thus, the study employs Johansen co-integration test to avoid spurious regression situation and the existence of long run relationship between variables.

3.5.1.4 Lagrange-multiplier test

Auto correlation is a characteristic of data which shows the degree of similarity between the values of the same variables over successive time intervals. Autocorrelation refers to the degree of correlation between the values of the same variables across different observations in time series data. Autocorrelation can cause problems in co-integrating regression analysis that assume independence of observations (Baum and Schaffer, 2013).The study employs Lagrange-multiplier test to identify whether the specified model variance experiences autocorrelation or not.

3.5.1.5 Model Stability Test for VECM

The Vector Error Correction Model (VECM) is efficient for the estimation of parameters if and only if the model is stable but biased otherwise. For a K-variable model with r co-integrating relationships, the companion matrix will have K−r unit Eigenvalues. For keeping the stability of the model, the moduli of the remaining r Eigenvalues should be strictly less than unity (Baum, 2013).

3.5.1.6 Granger Causality for VECM

When co-integration relation exists between X and Y variables, the two variables have the probability to have three relationship, i.e.; 1) X affects Y (have unidirectional relationship). 2) Y affects X (have unidirectional relationship) and X and Y affect each other i.e. X and Y have bidirectional relationship. On the other hand, if two variables not co-integrated, it means that they are independent to one another. If current and lagged values of X improve the prediction of the future value of Y, then it is said that X 'Granger causes' Y (Shrestha and Bhatta, 2018). The simple model of Granger causality is as follows:

$$\Delta Y_t = \sum_{i=1}^{n} \Delta Y_{t-1}\alpha_i + \sum_{i=1}^{n} \Delta X_{t-j} + u_{1t} \quad \text{.....(3.4)}$$

$$\Delta X_t = \sum_{i=1}^{n} \lambda_i \Delta X_{t-i} + \sum_{j=1}^{n} \delta_j \Delta Y_{t-j} + u_{2t} \quad \text{.....(3.5)}$$

The last equation shows that the current value of ΔY is related to the past value of itself and the past value of ΔY and same is true for X. The study also used Granger causality test to identify the direction of causality between the endogenous variables and the variable of interest for the study in order to identify which variable causes (come first) another variable.

4. FINDINGS AND DATA ANALYSIS

This chapter presents, statistical test results for timeseries data, descriptive statistics, infrantial statistics, the final results and discussion of empirical analysis as per the econometric frameworks presented in the prior chapter. In order to conduct the econometric analysis using the Vector Error Correction Model (VECM), the proposed econometric model is tasted against the assumptions of standard regression model.

4.1 Stationarity Test

The standard classical methods of estimation are based on the assumption that all variables are free from unit root. The existence of a unit roots in time series data implies that the mean, variance, and covariance of the variables are time variant. This often leads to the problem of spurious regression which usually creates statistically significant relationships between the variables that arise from concomitant correlations rather than meaningful causal relations (Gujarati, 2009).

The study employed the Augmented Dickey Fuller (ADF) test in order to identify the stationarity nature of time series data before conducting the proposed economic model analysis. The ADF test is conducted with the following assumptions;

1. The Null Hypothesis; (H_o): The time series is non-stationary.
2. Alternate Hypothesis; (H_a): The time series is stationary or series has no unit root with the decision criteria of rejecting 'H_o' if the absolute values of the test statistic is greater than McKinnon's critical values or p-value at 1%, and 10% level of significance and accept otherwise. Based on the above assumptions, Augmented Dickey Fuller (ADF) test result is summarized as follows.

Decision: The null hypothesis (Ho) is accepted for all the variables in level forms or I(0) while it is rejected for all the variables after first order differencing or I(1) as given in the table 2 as follows at 5% level of significance.

Table 2: ADF test result for unit root

S/N	Variable	In Level Form			After Differencing				
		Test Statistic	Critical Value at 5%	Status	Order	Test Statistic	Critical Value at 5%	MacKinnon p-value	Status
1	logIFFs	-0.319	-2.978	Non stationary	I(1)	-4.75	-2.978	0.0001*	Stationary
2	IR	-2.074	-2.978	Non stationary	I(1)	-5.063	-2.978	0.000*	Stationary
3	logGDP	0.832	-2.978	NonStationary	I(1)	-3.015	-2.978	0.0336**	Stationary
4	logGDS	-1.215	-2.978	Non stationary	I(1)	-3.951	-2.978	0.0017*	Stationary
5	RIR	-1.246	-2.978	Non stationary	I(1)	-4.645	-2.978	0.0001*	Stationary
6	logM2GR	-2.416	-2.978	Non stationary	I(1)	-3.352	-2.978	0.0127**	Stationary
7	logODA	-0.709	-2.978	Non stationary	I(1)	-4.827	-2.978	0.0000*	Stationary
8	logGFCE	0.123	-2.978	Non stationary	I(1)	-3.488	-2.978	0.0083*	Stationary

**Shows significance at 1% level while ** shows significance at 5% level.*

Source: Author's own calculation based on the collected data

4.2 Optimum Lag Length Selection

The Johansen co-integration test result is very sensitive to the number of lags included for the endogenous variables in the estimation of the vector error correction. This necessitates the determination of an optimal lag order prior to the test of co-integration (Loves *et al*., 2021). The optimal lag order is determined with the sequential modified Likelihood Ratio test statistics (LR), the Final Prediction Error (FPE), the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SIC), and the Hannan-Quinn Information Criterion (HQIC). As shown in table 3 below, LR, HQIC and SIC suggested an optimal lag of four at a 5% level of significance while AIC and FPE suggested 3 hence the optimal lag length for this study decided by the author to be three.

Table 3: Maximum lag order selection criteria

lag	LL	LR	df	P	FPE	AIC	HQIC	SIC
0	-134.15				.007699	8.88431	9.00578	9.25075
1	-4.6578	258.98	64	0.000	.012097	4.79111	5.88428	8.08902
2	108.246	225.81	64	0.000	.000063	1.73464	3.7995	7.96402
3	794.981	1373.5	64	0.000	.00017*	-37.1863*	-34.1498	-28.0255
4	7613.11	13636 *	64	0.000	.	-459.819	-455.933*	-448.093*

Source: Author's own calculation based on the collected data

4.3 The Johansen Cointegration Test

The stationary test result reveals that all the variables employed by this specific study are non-stationary in their level form. However, the Granger representation theorem states that it is possible for non-stationary variables to produce a stationary relationship if they are co-integrated (Baum, 2013). This would imply that there is a meaningful long run relationship among the variables. Thus, the presence and the number of such co-integrating relationships are checked using the trace and the maximum Eigen value methods. The study employed Johansen co-integration test with the following hypothesis:

1. The Null Hypothesis; (Ho): There is no co-integration equation at 5% level of significance.
2. The Alternative Hypothesis; (Ha): There are co-integrating equations with the decision criteria to reject 'Ho' if the trace statistics is higher than its corresponding critical values.

Decision: As it is clearly indicated in the table 4, the Johanson co-integration test result reveals that there are at most four co-integrating equations so that "Ho" is rejected.

Table 4: Johansen Co-integration Test Result

Trend: Constant No. of observation 34 Sample: 1987-2020

Maximum rank	Parms	LL	Eigenvalue	Trace Statistics	5% Critical Value**
None 0*	72	-40.364		278.7905	156
At most 1*	87	5.47515	0.93255	187.1123	124.24
At most 2*	100	36.3227	0.83709	125.4172	94.15
At most 3*	111	63.986	0.80353	70.0905	68.52
At most 4	120	78.1049	0.56418	41.8527*	47.21
At most 5	127	88.101	0.44457	21.8605	29.68
At most 6	132	95.1465	0.33929	7.7695	15.41
At most 7	135	99.0262	0.20404	0.0102	3.76
At Most 8	136	99.0313	0.003	.	.

Note: the symbol '*' in the maximum rank column indicates rejection of the null hypothesis at 5% level of confidence interval while ** MacKinnon-Haug-Michelis (1999) p-values.

Source: Author's own calculation based on the collected time series data

4.4 Descriptive Analysis

4.4.1 Summary of Descriptive Statistics

From table 5 below, the descriptive statistics shows that the mean value of the GDS for the study period is 12.79% of GDP with minimum value of 4.95% and maximum value of 22.36% while the mean value for IFFs is 1.86 billion USD per year with the minimum value of 123.03 million USD recorded in 1995 and maximum value of 6.026 billion USD recorded in 2018. The mean value of inflation rate for the study duration is 7.97% with the minimum value of -9.81% and maximum value of 44.39%. The average GDP for the country over the study period is 28 billion USD whith minimum value of 7.143 billion USD in 1993 and maximum value of 107.6 billion USD recorded in 2020. The average RIR over the study period is -0.46% with the minimum and maximum value of -13.12% and 12.91 respectively. The average money growth is 19.52% with minimum value of 3.96% and maximum value of 36.21% while ODA has 2.1 billion USD average value with 100 Million USD minimum value and 4.9 billion USD maximum value. The mean

value of government expenditure is 2.9 billion USD with the minimum value of 708 million USD and maximum value of 9 billion USD recorded in the year 2020.

Table 5: Summary of descriptive statistics

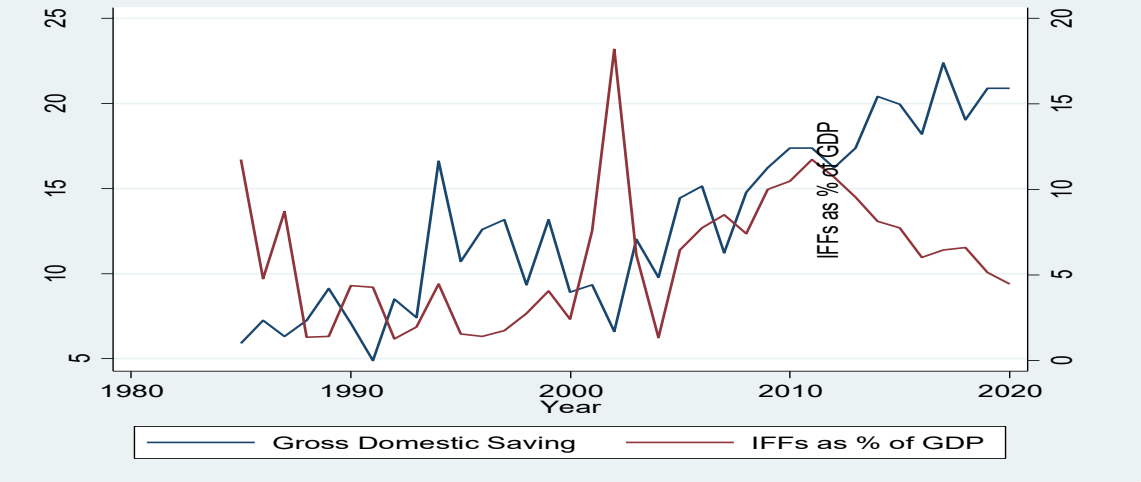
Variable	Obs.	Mean	Std. Dev.	Min	Max
IFFs (in millions $)	36	1,857.16	1,941.08	123.03	6,025.60
IR (%)	36	7.97	9.55	-9.81	44.39
GDP (in millions of $)	36	27,974.97	28,726.68	7,143	107,600
GDS (%)	36	12.79	5.18	4.95	22.36
RIR (%)	36	-0.46	6.61	-13.12	12.91
M2GR (%)	36	19.52	9.54	3.96	36.21
ODA (millions of $)	36	2,102.94	1,495.56	100	4,941
GFCE (%)	36	2,896.65	2,509.58	707.95	9,080

Source: Author's own calculation based on the collected data

4.4.2 The Trends of IFFs in Ethiopia Compared with GDS

The trend of Gross Domestic saving as a percentage of GDP under the study period is not stable and it has recorded a numbers of fluctuations as it has shown by fig. 2 below. GDS has also expreinced a number of fluctuations and have gradually increased over the study time period.

Fig. 2: The trends of IFFs in Ethiopia compared with GDS



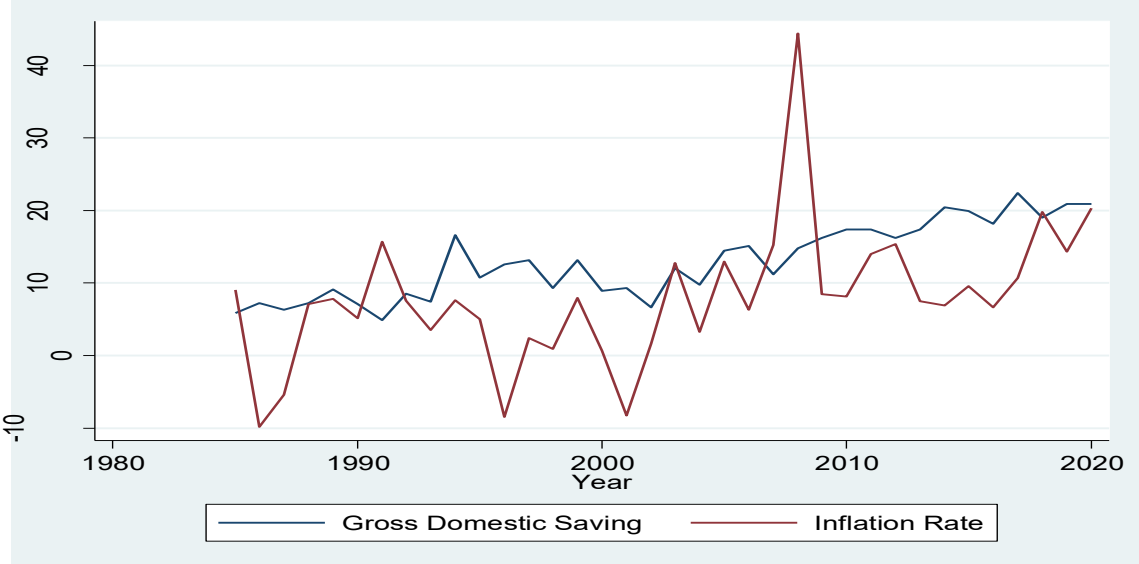
Source: the author based on the collected data

It is also clear from the figure 2 above that IFFs has relatively experienced lower ups and down and increased in amount over the study time period. Thus, both IFFs and GDS have expreinced fluctuations and increased over duration of the study. Accordingly, the GDS has increased from 5.89% in 1985 and reached in the region of 22.39% of GDP in 2017 from where it has shown slight decline to 20.89% in 2020. IFFs on the other hand have increased from 977 million USD in 1985 to 6.026 billion USD in 2018.

4.4.3 The Trends of IR in Ethiopia Compared with GDS

From figure 3 given below, the GDS in Ethiopia has recorded slow growth over the study time period with its common fluctuations. It has gradually grown over time from 5.89% of GDP in 1985 to 20.89% in 2020 despite its fluctuations. On the other hand, the country has experienced slow inflation rate in the first two decades of the study period with the average inflation rate of 4.4% until 2007. But it has increased as high as 44.39% in 2008 after which the economy has experienced the average double digit inflation rate until the end of the study period. As it is clear from the figugre 3, the inflation rate is below the level of growth domestic saving in Ethiopia for most of the study time period except in some occastions as represented on the following figure.

Fig. 3: The trends of Inflation Rate in Ethiopia compared with GDS

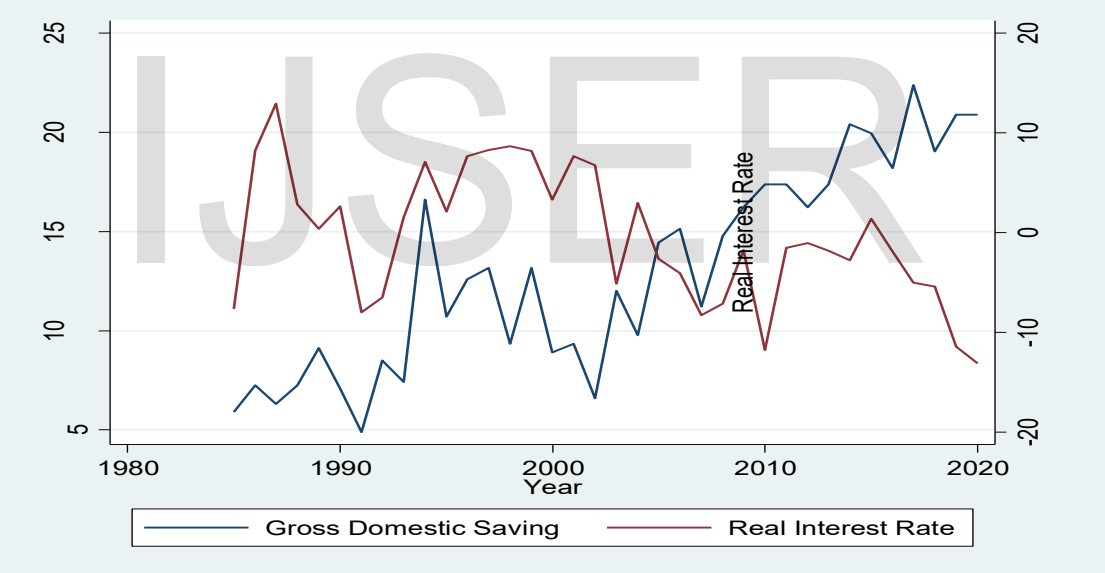


Source: Author's own interpretation from the collected data

4.4.4 The Trends of RIR in Ethiopia Compared with GDS

As it is mentioned in the previous section, Ethiopia has recorded very low GDS over the study time period with significant fluctuations. In similar fashion, real interest rate in Ethiopia has also expreinced a number of ups and downs but declined on average over the study time period. In 1985, RIR in Ethiopia was -7.67 and reached climax in 1987 with 12.91% value as it is shown in fig. 4 below. Then it remains with both negative and positive single digit values with the average value of 1.2% until 2009. In 2010, it becomes -11.78%, perhaps due to the policy response of the high inflation rate recorded in 2008. In general speaking, RIR has been delined on average over the study time period with some fluctuations.

Fig. 4: The Trends of Real Interest Rate in Ethiopia compared with GDS



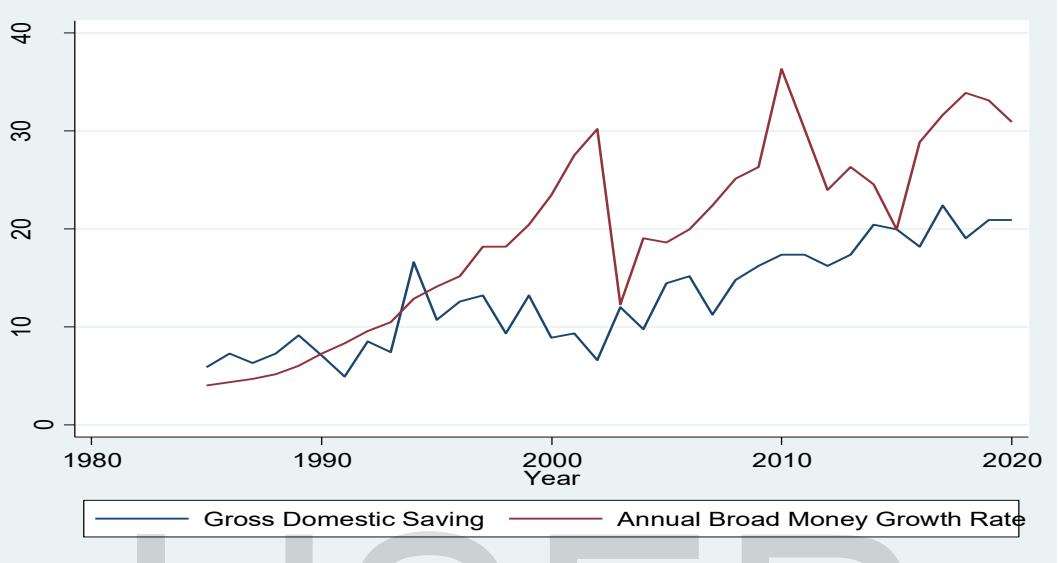
Source: Author's own interpretation from the collected data

4.4.5 The Trends of M2GR in Ethiopia Compared with GDS

From the figure 5 below, the trend of annual broad money growth rate indicates that it has been below the gross domestic saving for the frist five years of the study period, i.e. until 1989. However, it remains above the GDS for the entire time period of the stuy after the year 1989 with the average value of 22%. In the entire study period time, the annual

broad money growth rate has an average of 19.52% with the minimum value of 3.96% and maximum value of 36.21%.

Fig. 5: The trends of M2GR in Ethiopia compared with GDS.



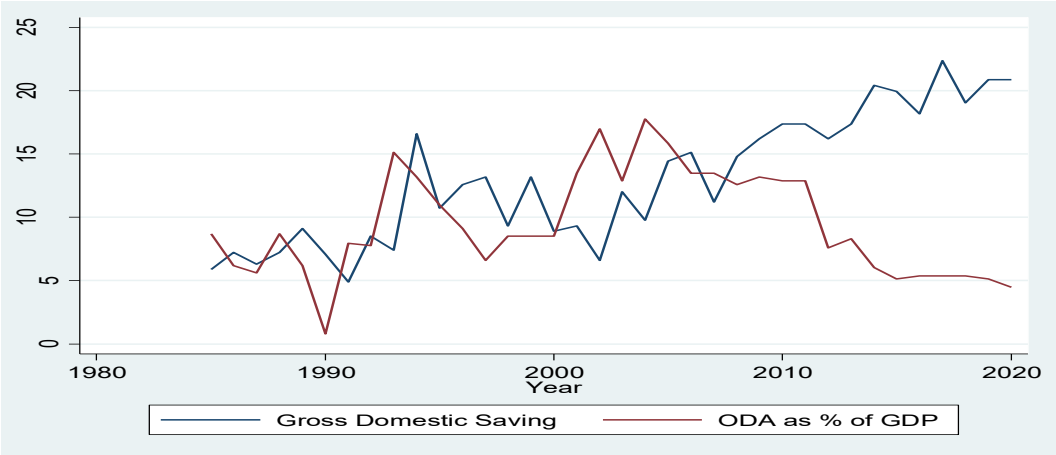
Source: Author's own interpretation from the collected data

4.4.6 The Trends of ODA in Ethiopia Compared with GDS

ODA as a percenatage of GDP is increased during the first ten years of the study period until 1990 and continuously increased for the next five years until 1995 as it is shown on figure 6 below. Then, it declined in the next two years and increased until 2011 where it persistently declined as a share of GDP until the end of study period but it increased in volume over time. Accordingly, ODA as a percenatage of GDP remains below GDS as a share of GDP since 2008.

From table 5 above and figure 6 given below, the average value of ODA as a percenatage of GDP for the entire study period is 9.46% while it is 13% for GDS. GDS as a percentage of GDP is increased from 5.89% in 1985 to 20.89% in 2020 while ODA has decreased from 8.71% in 1985 to 4.47% in 2020.

Fig 6: The trends of ODA in Ethiopia compared with GDS

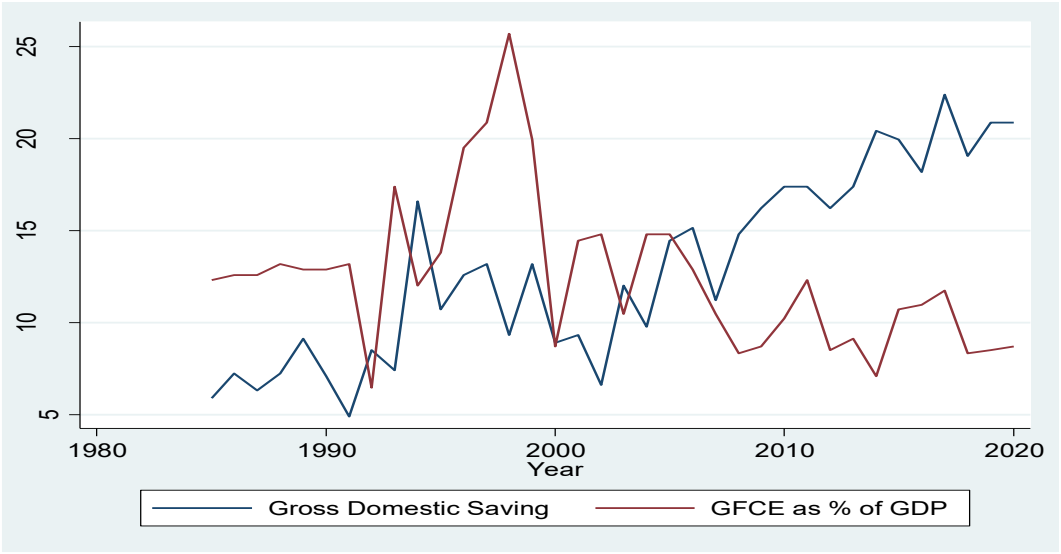


Source: Author's own interpretation from the collected data

4.4.7 The Trends of GFCE in Ethiopia Compared with GDS

The average GDS as a share of GDP is 13% while it is 12.5% for GFCE as a share of GDP as shown in table 5. GFCE is declined through the study time period but it increased from 2.9 billion USD in 1985 to 9 billion USD in 2020 by volume. The trend of these two variables over the study time duration is illustrated in figure 7 as follows.

Fig. 7: The trends of GFCE in Ethiopia compared with GDS



Source: Author's own interpretation from the collected data

As one can understand from the fig. 7 above, GFCE is relatively stable over the study time period despite its unusuall increase between the year 1996 to 1999.

4.5 The Vector Error Correction Model (VECM)

In this section, the study estimated the average effects of explanatory variables employed by the model on the variable positioned as dependant, i.e. GDS and interprets the obtained results. The model regress GDS on seven explanatory variables namely: Illicit Financial Flows (IFFs), Inflation Rate (IR), Gross Domestic Product (GDP), Real Interest Rate (RIR), Annual Broad Money Growth Rate (M2GR), Official Development Assistance (ODA) and Government Final Consumption Expenditure (GFCE) using the Vector Error Correction Model (VECM). All the variables are used in logarithm form to the base ten for analysis except inflation rate and interest rate which have negative values to be used in their logarithmic form.

4.5.1 Short Run Effects of Factors Affeecting GDS in Ethiopia

The Johansen co-integration test result reveals that there are up to four co-integrating vectors in the model specified for this special study. This means that there is high long run association between the variables and hence the VECM model can be applied for further analysis of the impact of explanatory variables (Shrestha and Bhatta, 2018). Thus, the unrestricted VECM model is used to analyse the short run effect of the above listed explanatory variables on GDS in Ethiopia.

From the table 6 given below, the adjustment term (-0.5566) is negative and statistically significant at 1%, suggesting that the previous year's errors or the deviation from the long run equilibrium are corrected with in the current year at the convergence speed of 55.66%. The negative figure of adjustment term also shows that there are long run causal relationship between GDS and other endogenous variables. Thus, the system converges toward equilibrium with the convergence rate of 55.66% per year. This means it takes two years for GDS to return back to equilibrium in response to shock.

Table 6: Vector Error Correction Model (VCEM) Short Run Relationship

Sample: 1985 - 2020 AIC = -63.876 Log likelihood = 1237.017
HQIC = -60.61178 Number of obs. = 32 SBIC = -54.02817

Variable	Coefficient	Standard Error	Z	Probability
Cel L1.	-0.5566	0.2058	-2.70	0.007
logGDS				
LD.	-.8326257	.1885912	-4.41	0.000
L2D.	-.4427756	.2182489	-2.03	0.042
logIFFs				
LD.	.2540917	.1226352	2.07	0.138
L2D.	.1076286	.0860716	1.25	0.211
IR				
LD.	-.0059055	.0031874	-1.85	0.064
L2D.	-.0039175	.0028214	-1.39	0.165
logGDP				
LD.	-1.047648	.2895534	-3.62	0.000
L2D.	-.1234933	.2402634	-0.51	0.607
RIR				
LD.	-.0130864	.0056112	-2.33	0.020
L2D.	-.004758	.0047846	-0.99	0.320
logM2GR				
LD.	-.5171896	.2181469	-2.37	0.018
L2D.	-.190082	.2032991	-0.93	0.350
logODA				
LD.	-.2691044	.2070137	-1.30	0.194
L2D.	-.0896822	.1307054	-0.69	0.493
logGFCE				
LD.	-.0160704	.1880407	-0.09	0.932
L2D.	.3230414	.1580591	2.04	0.041
Constant	.0595971	.0230067	2.59	0.010

Source: Author's own calculation based on the collected data

From table 6 above, the first and the second lag values of GDS have statistically significant short run effect on itself at 5% level of significance. The first lag value of GDP, RIR, M2GR and GFCE have also statistically significant short run effect on GDS at 5% level of significance. This finding is similar with the findings of (Natinael *et al*., 2018). Based on the unrestricted short run VECM result, we can drive the following econometric equations for the first lag of each endogenous variable by positioning GDS as dependant variable.

$$\Delta logGDS_t = 0.06 - 0.83\Delta logGDS_{t-1} + 0.25\Delta IFFs_{t-1} - 0.006\Delta IR_{t-1} - 1.05\Delta logGDP_{t-1} - 0.01\Delta RIR_{t-1} - 0.52\Delta logM2GR_{t-1} - 0.27logODA_{t-1} - 0.02logGFCE_{t-1} - 0.56ECT_{t-1} \quad \ldots\ldots(4.1)$$

4.5.2 Long Run Effects of Factors Affecting GDS in Ethiopia

The Johansen co-integration test results of the model reveal that there are up to four co-integrating equations in the long run. Therefore, the restricted Vector Auto Regressive -

Table 7: Vector Error Correction Model (VCEM) Long Run Relationship

Variable	Coefficient	Standard Error	Z	Probability
logGDS-LD.	1			
logIFFs-LD.	0.6194	0.01691	36.63	0.000***
IR-LD.	-0.0177	0.0008	-23.24	0.000***
logGDP-LD.	-0.9885	0.0416	-23.75	0.000***
RIR-LD.	-0.0420	0.0011	-38.69	0.000***
logM2GR-LD.	0.4106	0.0191	21.55	0.000***
logODA-LD.	-1.3929	0.0258	-53.90	0.000***
logGFCE -LD.	0.5998	0.0366	16.37	0.000***
Constant	3.3567	Johansen normalization restriction imposed		

The symbol '***'shows significance at 1% level,

Source: Author's own calculation based on the collected data

(VAR) which is also called Vector Error Correction Model (VECM) can be applied to further analyse the long run relationship between variables and its result is summarized in the table 7 above.

The Johansen normalized Vector Error Correction Model (VECM) model results reveal that all the explanatory variables employed by the study have statistically significant effect on the GDS at 1% level of significance in the long run as presented in table 7. Thus, keeping other things remain constrant, a one per cent increase in the IFFs resulted in 0.62% decrease in GDS while a sigle percent increase in IR resulted in 0.02% increase in GDS. Similarly, a 1% increase in GDP resulted in 0.99% increase in GDS while a single percentage increase in RIR increases GDS by 0.04% . A single percentage increase in M2GR decreases GDS by 0.41%. A 1% increase in ODA increases GDS by 1.39% while 1% increases in the GFCE expenditure resulted in 0.6% decrease in GDS in Ethiopia. This finding is consistent with other empirical studies such as: (Seoud, 2014; Nagawa et al., 2020; Mulugeta, 2020; Abraham et al., 2018; GFI, 2019; Le, 2020; Slany *et al*., 2020; and Hassen, 2017) but against the findings of Getnet, 2017 and Haile, 2013.

4.5.3 Diagnostic Check for VECM

4.5.3.1 Lagrange Multiplier for Autocorrelation Test

The study applied the Lagrange multiplier test to identify whether the residuals of the specified model experiences autocorrelation or not with the following hypothesis:

1. The null hypothesis; (Ho): = First order autocorrelation does not exist.
2. The alternative hypothesis; (Ha): = First order autocorrelation exists.

Table 8: Lagrange multiplier test

lag	chi2	df	Prob > chi2
1	79.9045	64	0.08666
2	67.5375	64	0.35726
	Ho: no autocorrelation at lag order		

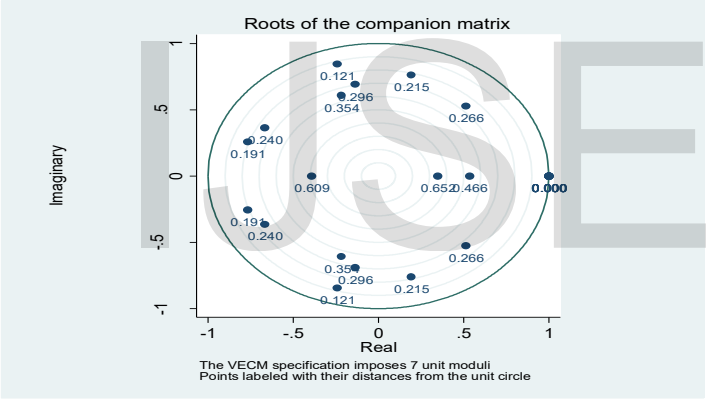
Source:Author's own calculation from the collected data

As per the result presented in table 8, we cannot reject the null hypothesis that there is no autocorrelation in the residuals for any of the orders tested at 5% level of significance. Accordingly, this test finds no evidence of model misspecification.

4.5.3.2. Model Stability Test

The VECM stability test checks whether there is stationarity of the co-integrating relations or wether the co-integrating rank of the VECM is correctly specified. The study employed Eigenvalue stability test of Vector Error Correction Model to identify weather the model is stable or not. The decision criteria is based on the fact that the VECM is stable if the number of unit moduli is equal to the number of endogenous variables which is same as the number of co-integrating vectors; i.e., all roots are inside the unit cycle.

Fig.8 Roots of the companion matrix



The VECM specification imposes 7 unit moduli and the model satisfies stability condition since all the eigenvalues lie inside the unit circle.

4.5.3.3 Granger Causality Test

In the preceding section of the study, it has already proved that variables in this model are co-integrated and hence there is a long run causal relationship among them. Economic theory guarantees that there is always Granger Causality in at least one direction in the model where variables have long run co-integrations (Basabose, 2020). Thus, this study employed Granger causality test for this specific study with the hypothesis of:

1. The null hypothesis; ($H_{O)}$: The lagged value of Y_t doesn't "Granger cause" for X_t
2. The alternative hypothesis; (Ha): Lagged value of Y_t does "Granger cause" for X_t with the decision criteria to reject the null hypothesis if the probability value is less than 5%, and does not reject otherwise.

Table 9: Short Run Granger Causality Test

The Null hypothesis	chi2	Probability	Decision
The lag value of logIFFs doesn't Granger cause for logGDS	19.493	0.000	Reject Ho
The lag value of logIFFs doesn't Granger cause for logGDS	3.800	0.284	Accept Ho
The lag value of IR doesn't Granger cause for logGDS	4.910	0.179	Accept Ho
The lag value of logGDS doesn't Granger cause for IR	8.219	0.042	Reject Ho
The lag value of logGDP doesn't Granger cause for logGDS	13.201	0.004	Reject Ho
The lag value of logGDS doesn't Granger cause for logGDP	11.961	0.008	Reject Ho
The lag value of RIR doesn't Granger cause for logGDS	15.518	0.001	Reject Ho
The lag value of logGDS doesn't Granger cause for RIR	7.664	0.053	Accept Ho
The lag value of LogM2GR doesn't Granger cause for logGDS	13.537	0.004	Reject Ho
The lag value of logGDS doesn't Granger cause for LogM2GR	5.429	0.143	Accept Ho
The lag value of logODA doesn't Granger cause for logGDS	32.800	0.000	Reject Ho
The lag value of logGDS doesn't Granger cause for logODA	9.696	0.163	Accept Ho
The lag value of logGFCE doesn't Granger cause for logGDS	19.909	0.000	Reject Ho
The lag value of logGDS doesn't Granger cause for logGFCE	19.263	0.000	Reject Ho

Source: Author's own calculation based on the collected data

From the table above, the lag value of logIFFs has unidirectional granger causality relation with logGDS that runs from logIFFs to logGDS. IR has also unidirectional causality relation with logGDS that runs from logGDS to IR while logGDP, and logGFCE have bidirectional causal relationship with logGDS. RIR, LogM2GR and logODA have unidirectional causal relationship with logGDS that runs from these variables to logGDS.

5. CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Conclusions

The main objective of this study was to investigate macroeconomic factors affecting Gross Domestic Saving (GDS) in Ethiopia both in the short run and long run. After confirming stationarity using ADF and the existence of long run relationships among the variables using the Johnson cointegration approach, Vector Error Correction Model (VECM) is applied to capture both the short and long run dynamics. All of the diagnosis as well as model validity tests were examined and allowed the estimation of the model specified. The VECM analysis results indicate that only GDP, RIR, M2GR and GFCE have statistically significant effect on GDS in Ethiopia in the short run at 5% level while all the variables included in the model have statistically significant effect on GDS in the long run at 1% significance level. Accordingly, ODA and GDP respectively have been found to be the dominant factors that favour GDS while IFFs and GFCE have been found to be the dominant factors that negatively affect GDS in Ethiopia in the long run.

The granger causality test results reveal that there is unidirectional causal relationship between GDS and IFFs, RIR, M2GR, ODA and IR that runs from these variables to GDS except IR that runs from GDS to IR. Unlike other variables, GDP and GFCE have bidirectional causal relationship with GDS in Ethiopia over the study period.

5.2 Policy Implications

The study reveals that all the variables deployed by the study have statistically significant effects on GDS in Ethiopia. The strong negative effect of IFFs on GDS in Ethiopia implies that if the flown amount of money would have remained in the country and reinvested, it would significantly contribute to job creation efforts, provision of social services, infrastructure development that enhance productivity and saving rate in the country. Thus, policy makers in Ethiopia are need to design a well-coordinated policy response aimed to mitigate IFFs from Ethiopia.

The positive effects of GDP on GDS in the long run implies that when the economy expands sustainably in volume, it creates more jobs and affords to pay higher salaries and wedges which in turn increase per capita income over time. This result is same as the lifecycle and permanent income hypothesis that states income growth is a strong positive determinant of domestic saving. Thus, policy makers are advised to take measures necessary to boost production and economic growth in Ethiopia. The weak positive effect of RIR on GDS might be due to the low level or negative real interest rate adopted in Ethiopia to enhance investment. Its positive effect implies that an increase in interest rate will make saving more attractive and policy makers are recommended to restore positive real intrest rate to attract people to save.

Annual broad money growth rate has statistically negative effect on saving in Ethiopia. It implies that money supply dicaurages saving and hence policy makers needs to reduces it and adopt proper monetary policy to boost saving, investment and economic growth rate in Ethiopia. The strong positive effect effect of ODA on GDS in Ethiopia implies financial capital is very scarce in Ethiopia and its marginal productivity is very high. Thus, policy maker are advised to adopt necessary measures that increase official development toward Ethiopia in order to boost economic growth. The negative effects of GFCE on GDS implies public investment undermines saving rate in Ethiopia. Thus, Ethiopian economic policy makers are advised to encourage private sector investment and need to finance infrastructural investment through public private partnership fincing mechanism.

5.3 Areas for Further Research

The results of empirical studies implies that factors affecting GDS in Ethiopia is still inconclusive and there is no agreement on the issues of which variables favours GDS and which ones affect it negatively in Ethiopia. Besides, this study is limited to only seven explanatory variables due to time and resource constraints as well as data unavailability. But vriables like: the amount of remittances, current account balance, age dependency ratio, tax revenue and others may also most likely affect GDS in Ethiopian context. Thus, the author recommends futher studies on similar area that includes these remaining variables.

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APENDICES

A.1 Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	7	16202.41	0.0000

A.2 VECM Model Stability Test Result

Eigenvalue stability condition

Eigenvalue	Modulus
1	1
1	1
1	1
1	1
1	1
1	1
1	1
-.2410792 +.8449077i	.878629
-.2410792 - .8449077i	.878629
-.767276 +.2567357i	.809089
-.767276 -.2567357i	.809089
.1928551 +.7609262i	.784985
.1928551 -.7609262i	.784985
-.6665082 +.3650076i	.75991
-.6665082 -.3650076i	.75991
.511604 +.5256325i	.733504
.511604 -.5256325i	.733504
-.1359374 +.6908663i	.704113
-.1359374 -.6908663i	.704113
-.2173849 +.6082099i	.645891
-.2173849 -.6082099i	.645891
.534155	.534155
-.3907431	.390743
.3475406	.347541

The VECM specification imposes 7 unit moduli and it satisfies stability condition