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**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF BUSINESS AND ECONOMICS**

**DETERMINANTS OF GROSS DOMESTIC SAVING: AN  
EMPIRICAL EVIDENCE FROM EAST AFRICA**

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**BY**

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*A Project Paper Submitted to the Department of Economics:  
Faculty of Business and Economics, Addis Ababa University in  
Partial Fulfillment of the Requirements for MA in Economic  
Modeling and Forecasting*

*Addis Ababa University*

*Addis Ababa, Ethiopia*

*JUNE, 2016*

## **Project Declaration**

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I agree that this project paper can be made available as reference document for other students in the Department of Economics and/or in the Library of Addis Ababa University.

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## **Abstract**

*The objective of this paper was to investigate the determinants of gross domestic saving in the Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Uganda using annual panel datasets form 1991-2012. In this study, effort has been made to identify the fundamental determinants of domestic saving in the region of East Africa using the Fixed Effects (FE) model. Estimated results revealed that GDP per capita growth (gdpp) and degree of urbanization (urb) are the only significant determinants of gross domestic saving in the region. However, inflation rate, working age group as a percentage of total population (py), age dependency ratio to working age (agedp), money and quasi money as a percentage of GDP (m2), and government expenditure as a percentage of GDP (ggov) are found to be not statistically significant at the conventional levels. It seems fairly imperative to suggest that governments should give amplified concern for GDP per capita growth and degree of urbanization more than other candidates if they are in a position to design policies for the sake of boosting up domestic savings. On the other hand, this in turn, may be boosting up sustainable economic growth through encouraging investment over the region of interest.*

**Key Words:** *Lifecycle/Permanent-income theory; gross domestic saving; panel data, fixed effects; East Africa*

## ACKNOWLEDGMENTS

First and foremost, I am ever grateful to God and his mother St. Marry, for helping me in having done my masters study serenely, and indeed, throughout my life.

Next, I would like to extend my special gratitude to my supervisor, Associate Prof. Dr. Tekie Alemu (PhD). For his support in several matters: constructive critical comments, suggestions, and remarks about my topic, and the guidance in framing the big picture of my research journey, are of greatly appreciated.

Of course, this second step up in my academic journey would have not been possible without the generous financial assistance from the Ministry of Finance and Economic Cooperation (MoFEC). Indeed, I am also grateful to my friends, Hiluf Hagos and Yohannes Abrha for their unreserved assistance, suggestion, and remark about my topic, and on proofreading my manuscript. I would also like to extend my gratitude to my entire friends whom I do not mentioned their names here.

I would also like to extend my gratitude to my families for their courage and commitment to support me in any..... I thank you so much!

My most special gratitude is reserved to my beloved wife, Selamwait Birhane and my lovely sister Tsehaynesh G/Michael for. It is their support and encouragement as well as their patience which made this master's project possible. I thank you indeed!

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## **LIST OF ABBREVIATIONS**

FE Fixed Effects

FDI Foreign Direct Investment

GDS Gross Domestic Saving

GDP Gross Domestic Product

GNS Gross National Saving

IMF International Monetary Fund

International Financial Statistics

KCB Kenyan Central Bank

LDC Least Developed Countries

LSDV Least Square Dummy Variable Regression

NBE National Bank of Ethiopia

OECD Organization for Economic Co-operation and Development (OECD)

OLS Ordinary Least Square

RE Random Effects

SSA sub-Saharan Africa

WB World Bank

WDI World Development Indicators

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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background of the study

The term saving can be regarded as consumption forgone that is not spent for an immediate buying of goods and services. It can also be equally termed as the residual of current disbursements (i.e., excluding capital disbursement) from the total income generated in a given time period. In a manner that, the time reference for manipulating the saving measurement might be even in a monthly or quarterly, and in a semi-annually or annually base, for this regard. But the focus point of this explanation is on how saving can be defined. In addition, saving can be thought of as the difference between cash inflow and cash outflow. It appears therefore that these similar, but not certainly equal definitions will end up with different saving results both at individual level or country level. Hence, at an aggregate-country level saving can be viewed either as gross national saving (GNS), gross saving, and/or gross domestic saving (GDS). The latter one is defined as gross domestic product minus total final consumption expenditure. On the other hand, the former term that is, GNS is almost similar with GDS except that it includes net transfer (Deaton 'n.d'). For the purpose of this paper the latter term that is gross domestic saving is the one which will be used during the course of study.

When we proceed to the point what saving can be used for, literally it is the other side of consumption. And its ultimate goal may be used, in either way, to finance future consumption. In the meantime, however, what is saved for future consumption will be invested in some productive areas, which may ultimately stimulate the economy in general and the wellbeing of the society in particular.

“Few economists would attribute the differences in growth rates between Asia and Africa to the optimal workings of the invisible hand, and most would favor policies that would raise African growth rates” (Deaton n.d.: 33). Even if there are no distortionary policies and even abstract from skepticism that consumers take adequate inter-temporal decisions, growth is considered to be a good thing by almost all governments and policy makers.

In a closed economy these investments can come only from saving, which is mainly through postponing current consumption. In an open economy, on the other hand, saving in abroad would help in filling the gap for a nation's investment which is not financed by domestic savings, but as

a matter of fact, national investment and national saving are assumed to be having very high correlation given that both of them are defined to exclude education (for more details, see Feldstein and Horioka, 1980; Feldstein and Bacchetta, 1991; Levine and Renelt, 1992; Mankiw *et al.* 1992; and Bosworth, 1993). Most interestingly, Feldstein and Bacchetta, (1991: 218) conclude that “an increase in national saving has a substantial effect on the level of investment”. It is, however, clear to any one that a self-sustained economic growth is the common goal of all nations. In line with this purpose, gross domestic savings has got emphasis in reducing the country's dependency ratio on foreign capital (Feldstein, 1983; Ahmad and Marwan, 2003; Khan, 2006; and Culpeper, 2008). As such foreign debt leads to deficit in balance of payment. Thus, regardless of the importance of international flows of capital, the most determinant factor that any country should have to rely on, for a country's investment, is its own savings (Ozcan *et al.* 2003).

In addition, as Feldstein (1983); Khan (2006); and Culpeper (2008) claimed that persistent high growth rates can be only achieved from sustainable high share of domestic saving. It does not mean, however, that external sources are completely useless when domestic resources are not enough to finance investment requirements. Instead we are saying that depending on foreign savings makes countries completely dependent on unforeseen adverse effects like political crisis and economic shocks coming from other countries. To this effect, mobilizing local resources through domestic savings will have a prominent role in reducing vulnerability to exogenous economic shocks and fluctuations.

To elaborate more, savings and investment are emphasized by scholars as a precondition for growth and development of countries. Consequently, there has been increasing awareness that the faster the rate of saving and investment, the greater the rate of capital formation, which ultimately promote growth and development (Thilwal, 1979). And in the process of economic growth of countries, saving takes a lion share to raise investment and productivity whereby stimulus technological advancement and brings new technique of production. In turn, this plays a crucial role in accumulating physical capital due to the fact that investment increases productive capacity and launches new capital goods. Thus, when saving rate is scaled up the rate of accumulation of capital stock will also be dramatically enlarged (Feldstein and Horioka 1980).

The saving rate varies, however, from individual to individual, from country to country, and from region to region around the world. This variation in saving requires an in-depth explanation

as this would result variations in investment and capital formation by which the economic growth may also be ended up with high variation. As regards saving variation, according to Adewuvi *et al.* (2007), over the past three decades, on average, East Asia saves more than 30 percent of gross national disposable income (GNDI), while Sub-Saharan Africa saves less than 15 percent.

The long-debated relationship between savings and the level and growth rate of income provides a strong stimulus in designing policies to promote savings and investment which in turn enhance economic growth through capital formation (Ozcan *et al.* 2003). In doing so, analyzing the determinants of saving more thoroughly is so critical in understanding the nature and behavior of domestic savings. For this general reason, the interest of this paper is to have a look at the empirical factors of domestic savings for east African countries. This intense interest has been motivated by the general worry over deteriorating saving rates in most of developing countries and the growing discrepancy in saving and investment rates among the developing nations.

Most importantly, we all of us want to live with more comfortable and better standard of living than ever before, and having a better welfare through experiencing a sustainably up surge growth in per capita income. Also governments in both developed and developing countries are aiming to eradicate poverty and increase the level of national income. Therefore, to achieve the main target of economic growth, governments may implement various kinds of policies such as encouraging domestic savings, stimulating investment and production in their countries, which is the central theme of this paper.

## **1.2. Statement of the problem**

At individual level, increasing savings contribute to higher investment on assets and lead to the higher per capita income growth. It means that the higher saving rate leads to less consumption of today, which could also result in larger amount of capital investment and finally a higher rate of economic growth in a country wise. But saving in any economy is dependent on a number of interdependent variables.

It appears, therefore, that any explanation that simply relies on domestic savings, stimulating investment and output to achieve economic growth is, at some level incomplete. Rather, there must be other, deeper reasons that will refer as fundamental determinants for domestic savings. It

is these reasons that hinder countries to have low domestic savings and investment which in turn will prevent countries for having higher economic growth.

In other words, investment contributes to growth in aggregate wealth. But the investment cannot increase without increasing in the amount of saving. Thus, savings perform a major role in providing the national capacity for investment and national income, which will also affect the potential of economic growth. In the sense that for economic planning and/or policy-making purposes, it is important that economic planners and/or policy makers have to have a true and fair idea about the quantum of saving and investment, the behavior of people towards saving and investment and the method by which saving can be improved for investment decisions. Economic planners would also need to know about the motives of saving and investment in order to frame appeals accordingly.

Beyond that understanding saving preferences would also help design and implement saving instruments which effectively stimulate saving, which in turn will take its prominent role in improving the wellbeing of the mass population. Given the present weight of the gross domestic saving to boost up investment and the output level in the economy it would require a stepping up of the saving rate in a country-wise. Hence, there is a need to carefully understand the determinants of domestic saving and the saving pattern.

Over the last three decades, the world has witnessed a marked divergence in saving rates and this has been particularly dramatic within the African countries. Saving rates have risen steadily in East Asia, stagnated in Latin America, and have been volatile in Sub-Sahara Africa, North Africa and deteriorating in South Africa and steadily increased in West Africa (Adewuyi *et al.* 2007 and Kudaisi 2013). These regional saving disparities have been closely matched by divergence in growth experience (Schmidt-Hebbel *et al.*, 1989).

In line with the above claim, though there was an increase in the rate of growth, some of the countries in East Africa witnessed low saving rates. For instance, Ethiopia is among the developing East Africa countries that needs fast and sustainable investment growth. However, its domestic saving rate was on the lowest for the past several decades. The average domestic saving rate was only 7.9% of the GDP during the past four decades (1970/71 to 2010/11). Splitting the available data among the three regimes of Ethiopia also shows that the average saving rate was 13.8% of GDP during the period from 1970/71 to 1973/74, 7% from 1974/75 to 1990/91 and 7.3% from 1991/92 to 2010/11 (Ayalew 2013). This classification implies that, though saving

rate was relatively good during the Imperial period, it declined to lower per cents during the Derg and the current regime of Ethiopia (that is, EPRDF). Moreover, available data from the World Bank report (2011) shows that the average saving rate of Ethiopia was very low by any standard. For instance, when compared with the average saving rates of Sub-Saharan Africa countries between the period 1980/81 and 2010/11, average domestic saving rate in Ethiopia was only 8.6% of the GDP. However, during the same period, the average saving rate for Sub-Saharan African countries was 17.2% of GDP. This implies how much the domestic saving rate of Ethiopia was too much low even by Sub-Saharan Africa standards.

This variation in saving performance across the regions of Africa and over time gives raise a number of questions. Such as: Why do saving rates differ so much across the region? How much do policies (such as total government budget, inflation, financial depth, income level,) and non-policy or demographic (such as age dependency ratio, urban and rural population ratio) variables determine the saving rates in East Africa? Perhaps, from the policy perspective, there are serious questions about the size, sometimes about the sign and the effects of policy variables on saving rates across the countries. What will be the most effective policy in rising domestic saving across East Africa regions?

Hence, this study investigates the determinants of gross domestic savings in six East Africa countries: Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Uganda over the time period of 1991-2012; and it suggests policy measures to adopt, and mobilize domestic savings to support self-sustained economic growth and development in the countries of interest.

The determinants of savings are well-documented in the economic literature. However, the empirical evidence seems to suggest that the impacts of these factors on saving are mixed and inconclusive. Therefore, this study is motivated by the need to fill this particular gap by empirically analyzing the case for the East Africa region.

### **1.3. Objectives of the study**

#### **1.3.1 General Objective**

The main objective of this study was focused on identifying both the macroeconomic and demographic determinant factors of gross domestic savings in East African countries.

### **1.3.2 Specific objectives**

In line with the above general objective, the paper will have the following specific objectives:

1. To examine the trends of domestic savings across different time in East African countries.
2. To point out which parameters are significantly determines domestic saving activities in East Africa.
3. To forward policy implications based on findings.

### **1.4. Significance of the study**

Number of scholar articles have been documented over the topic entitled as determinants of gross domestic savings but most of them have paid much attention either on time-series or cross sectional data during their course of analysis. Besides, the time series studies conducted for country specific outweigh over its counterpart of cross-sectional based studies that have taken in place. Apart from providing finance through a financial institution to the region of Africa, considering the significant contribution of domestic saving for achieving sustainable economic growth, there is little empirical analysis in the academic arena on determinants of domestic saving (Adewuyi *et al.* 2007 and Kudaisi 2013). Moreover, at country level there are number of investigations of gross domestic saving determinants, but there are no hard and fast rules on the determination of how well national and domestic savings should perform in any given year. Thus, in discussions of how well savings are doing in any economy, the standard is usually to compare that economy to other economies of similar size and structure, or to compare the same countries' savings performance over time. In doing so country specific investigations fail to look the nexus between gross domestic savings in longitudinal data sets. This paper mainly give an investigation of the binding constraints of domestic saving explicitly at macro level and on demographic aspects whereby act accordingly to suggest policy interventions and address prioritized problems of the saving part of the economy in the region of East Africa.

### **1.5. Scope of the study**

This paper has had planned to employ panel (longitudinal) data spanning from 1991 to 2012. This period is chosen simply because the variables of interest for the selected entities have almost same data coverage during these time periods (1991 to 2012). Beyond that, the gross

domestic savings could have been determined by number of macro and microeconomic variables, but for the purpose of this paper the variables include, general government final consumption expenditure as a percentage of GDP (*GGOV*), annual percentage GDP growth per capita (*GDPP*), inflation rate as referred as (*INF*), product of inflation rate and GDP per capita growth (*GDPPINF*), money and quasi money as a percentage of GDP (*M2*), age dependency ratio as a percentage of working population (*AGEDP*), population aged 15-64 as a percentage of total population (*PY*), and urban population as a percentage of total population (*URB*).

### **1.6. Limitation of the study**

The study is not free of weakness. The empirical analysis chooses a panel data of six East Africa countries over the period of 1991-2012. But including other countries and extending sampling period may produce a well fitted model; unfortunately inclusion of those countries and extension of the sampling period is constrained due to the reason that data on selected variables were not found in place. Consequently, this paper assumes the given countries and period as proxy measure.

Most importantly, less than three months' time in which the study is constrained by, may not be enough to accomplish a standardized paper.

### **1.7. Organization of the study**

The remainder of the paper is structured as follows: Chapter-Two describes a literature review, including theoretical and empirical works. Chapter Three specifies the methodology of the study. The last two Chapters compile results and discussion; and conclusions and recommendations respectively.

## **CHAPTER TWO**

### **REVIEW OF THEORIES AND EVIDENCES**

#### **2.0. Introduction**

This section presents a review of both theoretical and empirical literatures on gross domestic savings rate, of which the first part deals with reviewing of theoretical literatures, which have either of a direct or indirect relevance on the area of interest (i.e., gross domestic savings in our case), whilst the empirical one, which has been done in both developed and developing countries in general and over the East Africa region in particular is incorporated in the next section, followed by a general overview about the literatures. In the assessment of savings and its determinants, the term saving can be referred to any of the three economic agents such as savings by private and/or households, public and/or governments, and corporate and/or businesses in a given economy. But for the interest of this study the term gross domestic saving equals the part of gross domestic products that is not spent as final consumption expenditure and/or total consumption. In other words, it is a residual of the two large magnitudes such as GDP and consumption, while each of these are measured and calculated with numerous implicit assumptions in which it may expose for different errors. More importantly, saving rates need to be read with care due to institutional differences and differences in data availability, quality, and reliability. This in turn, makes country comparability more difficult.

#### **2.1. Theoretical Literature Review**

Hypothetically, there are many factors that determine the saving performance of a country. And loosely speaking, measuring those factors which could affect the characteristic features of savings of economic agents both at macro and micro bases, is not an easy task as someone can think of. It is simply because of the counterfactual data problems and/or the absence of reliable data on the area. More importantly, if the unit measurement is in a country wise—the exogeneity and simultaneity issues are also at their extreme ones. To be more specifically, if the case is contemplated from the viewpoint of those developing countries the issue will get worse off. But there were various scholarly attempts in determining the key elements in the course of saving behavior of economic agents. Of which the most important factors that have been documented in many studies are those related to income, fiscal policy (i.e., government total final consumption

expenditure), macroeconomic stability (i.e., inflation), the extent of financial sector development (Broad money supply to GDP ratio), and demographic variables among other candidates.

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

### **2.1.1. John Maynard Keynes and the Absolute Income Hypothesis**

In both of the developed world and third world countries, income is found as the most building-block, which has an inevitable role in determining saving rates of both individuals and countries, amongst others. In the 1930s, the argument, by Keynesians, was that consumption and savings are non-decreasing function of absolute and/or current disposable income, as Keynes (1936). In other words, Keynes (1936) had been tried to correlate consumption and savings with income level through the idea of Marginal Propensity to Consume (MPC), though his intuitive model had not been verified by data in both short-run and long-run cases due to the reason that the estimated MPC result is found to be lower than what was found using Ordinary Least Square (OLS). To elaborate more, the short-run estimation result shows that the MPC is below average propensity to consume (APC), whereas in the long run the estimated result of the MPC is found to be the same with the APC. Here the main point is that, under normal condition, consumption is presumed to increase by decreasing rate, while the other side of consumption, that is saving is in a position to increase by an increasing rate whenever disposable income increases. On the other hand, though saving is assumed to be zero or negative when zero level of income is postulated (i.e., that consumption can be funded through dissaving/borrowing), given that some sort of income is perceived, Marginal Propensity of Saving (MPS) is found to be positive but less than unity. This implies that saving has a stable and positive relationship with positive absolute and/or disposable income as claimed by Keynes (1936).

### **2.1.2. Duesenberry's Relative Income Hypothesis (RIH)**

As aforementioned above, the consumption function depends upon the disposable income level of an individual or a household but according to the RIH, which is proposed by James Duesenberry (1949), it is beyond that. In the sense that consumption function is found to be dependent not only upon the given disposable and/or absolute income level of a household but

also on the other household's income level and previous consumption level too; this model had been tried to reconcile the relationship between income and consumption whereby it deals with saving function as well. Consequently, in light of this RIH, the MPS or the saving function can be having special, constant, and positive function of the percentile relative income distribution. Furthermore, this hypothesis does not consider the absolute level of income in determining the amount of income which is saved by a household or an individual, instead it is a function of his/her percentile position in the income distribution as pointed out by Alvarez-Cuadrado and Long (2011), and Alimi (2013). In short, it is to mean that the ratio of aggregate savings is found to be independent of the disposable and/or absolute income level. And from this theory one thing could be generalized that if a given household is in position to have higher income distribution percentile, the MPS of that household would be higher as compared with his counter partner who has lower percentile position of income distribution.

Beyond that, "the RIH suggest that if there is an upward change in income of a household, it would not aspire for a similar upward change in consumption level than the one already achieved implying that its saving rate will increase due to increase in income", as documented by Empaphra (2014: 226). Thus, it's concluded that the marginal propensity of household's consumption is reported to be a positive function to its position of income distribution percentile, while the aggregate saving ratio, on the other hand, is found to be independent of the aggregate income of the given individual (Duesenberry, 1949).

### **2.1.3. Milton Friedman and the Permanent Income Hypothesis**

The inconsistency of Keynes's analysis with data about the consumption function and current income hypothesis paved the way for scholars to look for an in-depth estimation across the course of their relationships (Romer 1996). To this end, in the 1957, Friedman has come with his new thinking of the so-called Permanent Income Hypothesis (PIH). The core point of his theory is that measuring expected long-term income (permanent income) is the main determinant factor for consumption and/or saving behavior of economic agents, instead of simply relying upon the absolute or current income as the case which was argued by Keynes (1936). In this argument, Friedman decomposes current income into two parts—such as permanent income and transitory income. In this perspective, the consumption function, in particular, is independent of the transitory income since it merely fluctuates with past experience that is by permanent income; saving, on the other hand, could simply seem dependent upon both permanent and transitory

income (Tesda, 2013; and Mikesell and Zinser, 1973). And, as pointed out by Arok (2012), this kind of process is, sometimes, known as “consumption smoothing” due to the reason that saving of individuals could be more than their average saving when there is transitory income, and they can also dissave/borrow in times of low current income (i.e., mainly through low transitory income), on the other hand. Besides, in light of this regard, Muradoglu and Taskin (1996) have also recorded as “permanent income takes into account the long-time expectation over a planning period and a steady state and the consumption maintained over a planning period given the individual’s present wealth”.

#### **2.1.4. The Life-Cycle Model**

The other theory that deals with the consumption function is the Life-Cycle Hypothesis (LCH). This hypothesis was mainly adapted into practice by Ando and Franco Modigliani (1963), and it’s more or less similar with the permanent income hypothesis but the only difference they have is that, the LCH assumes the natural variation of income in a definite time horizon, while its counterpart, i.e., the permanent income hypothesis focused on the general variations in income over the indefinite lifetime. According to the life-cycle theory, income growth is postulated to be one of the outstanding determinants of the behavior of domestic savings. This theoretical framework is also in a position to get emphasis through the recent empirical studies. Because it tries to maximize the present value of lifetime utility of individual’s from inter-temporal consumption through taking the lifetime budget constraint of that individual. In a manner that LCH enables to predict a stable consumption and saving decision at any time in point subject to the initial endowment and lifetime labor income of a given household/individual. To this impact, according to the LCH, lifetime of an individual has been grouped into three sub-age horizons: youth time period, working age and/or period, and retirement time period.

In accordance, the working or middle age lifetime is assumed to be a period for accumulating an amplified high saving, while the other two age groups, especially of those who retired are positioned into dissaving and/or borrowing periods, and this borrowing motivates for higher interest rates as documented by Branson (1979) and Arok (2012). The higher interest rate that emanates from higher demand, however, leads to increase the opportunity cost of current consumption as compared with future consumption, which in turn discourages current consumption. This implies that those who were in a position to finance their consumption through borrowing will be enforced to quit and stimuli for saving Modigliani (1967). In general,

the LCH, which is proposed by Modigliani and his colleagues (1967), focuses on the point where the aggregate saving and income growth have an increasing function. This means that higher income growth will lead to increase aggregate income of working age groups. This in turn, results for higher lifetime resources of individual's, and thus consumption and saving depends mainly through. To this effect, aggregate saving will get rise following the annotation of income growth. This analysis works, however, if the future income is not predictable, as argued by Tobin (1967), which is cited in Ozcan *et al.*, (2003); unless and otherwise this conclusion will not be established as a matter of fact since forward looking individuals will anticipate future higher income and they are demanding more current consumption. If this is the case, saving rate will go downturn simply because of the fact that it's negatively correlated with consumption level. This implies that, other things remain constant; the higher portion of income growth is outweighed through.

### **2.1.5. Saving and Economic Growth**

Standard macroeconomic theories have little to say about the impact of domestic saving on growth. But the area has got its initial annotation in early times by the 'father of classical economics', called Adam Smith (1776) through his implicit postulation about the "division of labor", which can be sourced from saving and capital accumulation as it is cited in Rasmidatta (2011). And its thorough emphasis both in theoretical and empirical levels, on the other hand, went to the Harrod-Domar growth model where it states how domestic savings has a prominent contribution on the economic growth through the assumption that the ratio of saving rate and capital-output is equal with the natural growth rate of the economy or growth rate of labor force of the economy (Begovic and Ciftcioglu, 2010). In addition, the Solow and AK growth models were emphasizing on capital accumulation to bring economic growth; whereby showing us as higher saving is a prerequisite to fostering growth by the reason that higher savings would imply higher economic growth. In fact, according the Solow's model, savings has no permanent impact 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 effect on income per person: it causes a period of rapid growth, but eventually that growth slows as the new steady state is reached. Thus, although a high saving rate yields a high steady-state level of output, saving by itself cannot generate persistent economic growth. Despite of that, it is however, positively affecting the living standards permanently and this may

end up with higher steady state amount of capital stock per worker, which in turn might also have a decisive positive impact on output per worker in the long run.

To the contrary, according to Aghion and Howitt (2005: 1), “more recent models emphasizing innovation as the main engine of growth (Romer, 1990; and Aghion and Howitt, 1992), either ignore capital accumulation, in which case there is no role for saving even in a closed economy, or they emphasize on the complementarities between capital accumulation and innovation (Howitt and Aghion, 1998), in which case the equilibrium growth rate depends positively upon domestic saving”.

In any case, savings play an important role in the economies of many countries. As noted by Kodom (2013), available research points to a positive relationship between savings and economic growth. In a manner that higher income has been shown to precede economic growth to this effect savings mobilization or the savings rate in a country is an important indicator of growth in a given economy.

#### **2.1.6. Savings and Interest Rate**

Theoretically, the effect of interest rates on savings tends to be unclear-cut issue being subject to potentially offsetting negative substitution and positive income effects—the latter reflecting the fact that the private sector is a net creditor in financial assets. Actually, human wealth (that is, discounted future labor income) is much larger than financial wealth for a typical individual and that human wealth varies inversely with the rate of interest—suggesting that the negative substitution effect should outweigh. However, consumers may not plan their lifetime consumption but instead respond primarily to current income. The saving behavior of pension plans enhances the empirical importance of the income effect on private saving. For defined benefit plans, higher interest rates increase the income available to pay pensions, allowing lower contributions (Bernheim and Shoven 1988). Empirical research has reported mixed results, paralleling the theoretical ambiguity. For instance, using data on saving for industrial countries, Bosworth (1993) finds 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) concludes that in most cases the real interest rate elasticity is zero, while Schmidt-Hebbel *et.al* (1992) also find no clear effects on saving. But Ogaki *et.al* (1995) on the other hand, find positive interest rate effects that vary with income but are still small.

Given that financial liberalization may have changed the interest rate effects, it is not too surprising that results are not robust. The effect of liberalization on saving behavior can operate through at least two channels. First, financial development may provide outlets 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 generally affects the form that saving takes and also the efficiency of investment, it need not raise the level of saving (De Gregorio and Guidotti 1994). The second aspect involves the liberalization of consumer access to bank credit, as occurred in a number of industrial countries in the 1980s. Regulatory changes have allowed banks to lend more freely to individuals, for instance for purchase of a house or for consumption, and this may lead, at least initially, to a significant decline in saving. Empirical evidence supports this effect in countries that have liberalized access to consumer credit (Jappelli and Pagano 1989, Bayoumi 1993, Lehmussaari 1990, and Ostry and Levy 1995). Financial liberalization may involve one or another of these aspects, each of which will tend to increase the sensitivity of saving to interest rates. Financial liberalization in a given country may also expand the international diversification possibilities of other countries, making their saving more responsive to foreign interest rates.

## **2.2 Empirical Evidence**

In line with the potential determinants of saving behaviors, there are numbers of empirical works which have been done in both developed and developing countries. And as a matter of fact those empirical studies have been deployed different methodological approaches. Most studies used techniques like co-integration and error correction models, which allow for heterogeneity in parameters and dynamics across countries, to determine the long-run determinants of saving rates, while some others have been used panel data estimation procedures in order for getting rid of the problem of omitted variables bias and losing degree of freedom in one hand, and such type of estimation 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 arena of savings behaviors, many of the revealed studies have mainly focused on looking up into the association amongst savings and demographic variables such as dependency ratio and life expectancy, while majority of others have paid much attention on the macroeconomic variables including, income, real interest rate,

money supply, terms of trade and current account balance. And not few studies have also been come through looking at both of the macroeconomic and demographic variables in determining the factual behaviors of savings. In one way or another, to the best of the researcher's knowledge, this study shall review those empirical works which are at most relevant factors in determining gross domestic savings of developed, developing and group of the two countries.

Aric (2015) studies the determinants of saving in the Asia-Pacific Economic Cooperation (APEC) countries during the period of 2000-2013. The findings of the estimated saving rate model suggest that income, age dependency ratio, young population, rural population and urban population are found to have positive effect upon gross domestic savings. Financial depth which is approximated by broad money supply to GDP ratio, on the other hand, is estimated to have a negative effect on saving rates, while the other explanatory factors such as inflation and old population are found to have no any significant effect on the dependent variable.

Another study has also been conducted by Kudaisi (2013) on the determinants of gross domestic savings in the region of West Africa over the time spanned from 1980-2006. In accordance, the results somehow seem on the contrary to Aric's findings; in a sense that gross domestic saving rate is negatively affected by the size of dependency ratio and interest rate, while growth of GDP has a positive impact on; but as a matter of fact, all of these variables are revealing to be statistically insignificant for this regard. However, 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 the real interest rate and terms of trade concerned, it's reported as there is no plausible impact in determining the saving rate over the West African countries. Most importantly, Aric (2015) examined the determinants of savings in the Middle-East countries during the period of 2000-2013. The findings of the estimated saving rate model suggest that income, money supply, and government expenditures have negative impact on savings, whereas young population and inflation rate are found to affect savings positively. But, rural population and urban population, and old population are found to have no significant effect on the dependent variable.

Beyond that, Elbadawi and Mwega (2000) have done their study for Sub-Saharan Africa, Latin America, East Asia and Caribbean. Accordingly, their finding reveals that gross private domestic income, the growth of gross private domestic income per capita and the growth in the term of

trade have positive impact in determining the rate of savings in the countries of interest. In the same way but somehow differently, a paper conducted by Edwards (1996) suggested that per capita income growth is the most important determinant of private and public savings. Moreover, Dayal-Ghulati and Thimann (1997) analyze the determinants of private savings for a sample of economies in Southeast Asia and Latin America during the period of 1975-1995. In light with their findings, it is revealed that fiscal policy is the core policy gadget that impacts savings among other variables in consideration over the Asian region.

In an attempt to analyze the determinants of private saving in India, Athukorala and Sen (2004) estimated a saving rate function using the life-cycle model. The results indicate that the spread of banking facilities, the growth level of per capita income, the rate of inflation and the real interest rate have positive and significant impact on domestic saving in India. However, terms of trade and remittances from abroad have a negative and significant impact on the saving rate. The study noted that public saving is different from private saving in India.

Masson *et al.* (1998) have examined the determinants of private savings using large sample size of both industrialized and developing countries. During the course of their estimation they used a panel data technique, and the findings for those industrialized countries revealed that private savings was outweighed through changes emanating from public savings. In developing countries, on the other hand, demographics and GDP growth were found to have significant effects in determining of private saving rates. In another study, Metin\_Özcan and Özcan (2005) have conducted their study to look upon the relationship between private savings and different macroeconomic factors in 15 Middle East and North African countries during the period of 1981-1994. The results suggest that income growth and per capita income have a significantly positive impact on private savings, which implies that the more advanced countries tend to save a higher percentage of their GDP, the higher the real capita growth rate relative to saving which support the vicious cycle hypothesis that increase in growth rate of real capita income increases saving to even higher growth. In light with the crowding out effect of public saving on private savings, it is found to have partial effect, instead of truly holding the Ricardian Equivalence proposition.

Besides, it was reported that those countries which have deeper financial sector development seem to coincide with higher private savings. In other words, it's to mean that financial sector development and private saving are found to be positively interrelated. But in Nigeria,

Nwachukwu and Egwaikhide (2007) analyzed the determinants of private saving model for the period 1970-2005 using an Error-Correction Model. And it was noted that the degree of financial depth had negative but insignificant impact on private saving. Most importantly, the paper of Metin\_Özcan and Özcan (2005) write up that macroeconomic stability which is manifest by lower inflation rate has resulted for amplifying of savings. This implies that inflation will hinder the growth of private savings other things remained constant.

On the other hand, Hondroyiannis (2006) performed a panel co-integration using the sample of 13 EU countries. According to his results, inflation tends to influence private savings in a positive way, which is a bit antagonistically with the findings of Metin\_Özcan and Özcan (2005) as it was reported that inflation impacts private savings negatively. With regard of the other variables such as changes in the dependency rate and the dependency rate of the elderly, budget limitation of the government, increase in real disposable income, and real interest rates it is reported that to influence private savings in a positive way, while liquidity constraint has a negative impact on savings.

Özcan, *et al.* (2003) also investigate the determinants of private savings for Turkey during the period 1968-1994. The study reveals that income level has a positive effect on the private savings, though the growth rate of income is not statistically significant. The results also suggest that the rate of life expectancy tends to have a negative impact on savings. Similarly, a study by Doshi (1994) on the role of life expectancy as a determinant of saving performance, demonstrates that life expectancy is a statistically significant and important factor affecting savings levels in Least Developed Countries. With regard to inflation which captures the degree of macroeconomic uncertainty, the findings of Özcan, *et al.* (2003) suggest that inflation has a positive effect on private savings. These results are also similar to Olusoji (2003)'s findings of the study on determinants of private savings in Nigeria. In the same study, it was pointed out that savings in Nigeria are being influenced by income; this also seems to claim in an opposite position with the points forwarded by Özcan, *et al.* (2003).

Yohannes (2014) examined time series analysis of the determinants of gross national saving in Ethiopia using autoregressive distributed lag and error correction econometric modeling, and employ data for the period 1971-2011. He revealed that financial development and Current account deficit are significant determinants of gross national saving in Ethiopia in the long run, while the rest of the explanatory variables such as gross national disposable income, dependency

ratio, budget deficit, and inflation, approximated by consumer price index, were reported as they are statistically insignificant determinants of gross national saving in Ethiopia over the long run. He also showed that variables such as gross national disposable income, financial development, current account deficit, and budget deficit were statistically significant in determining gross national saving in the short run, while consumer price index and dependency ratio are not.

Tiriongo (2005) analyzed the determinants of aggregate domestic private savings using OLS estimation technique in Kenya. He used demographic variables such as young and old age dependency ratios, real per capita income, indicators of financial sector development, deposit rate used at central bank, current account deficit, spread of interest rate, terms of trade, inflation rate and income tax. The findings indicated that aggregate private savings in Kenya are significantly determined by the ratio of M2 money to GDP, real gross per capita income growth, current account deficit, deposit rate and the old age dependency ratio.

Over all, it can be concluded from the overview of empirical literature that determinants of savings rates are several. Some empirical studies revealed that variables such as GDP growth rate and GDP per capita growth rate represent the most important determinants of gross domestic savings (Mahmoud 2008; Kidane 2010; Emmanuel and Ahmad 2001). Also, budget deficit and current account deficit had negative impact on saving rate. While lagged gross domestic saving rate, interest rate, broad money and inflation rate appeared to have an ambiguous impact on saving levels and thus the significance of these variables was mixed between studies (Athukorala and Sen 2004; Mahmoud 2008; Nwachukwu and Egwaikhide 2007; Ahmed 2011; Kidane 2010; Ahmad and Marwan 2003).

Nevertheless, factors which have successfully explained determinants of domestic savings rates in one region would not be certainly appropriate or successful in another region, indeed in countries too due to differences in economic, social, and demographic conditions among regions and/or countries. Some of these factors may be significant in one case, but not in others, and thus they should be carefully examined taking into consideration the characteristics of each case. Thus, this study tries to determine factors that explain gross domestic savings rate in East African countries, which the author is hoping to contribute this study, will help for policy makers to formulate policies that enhance domestic saving rates.

## CHAPTER THREE

### 3.0. RESEARCH METHODOLOGY

This study combines the theoretical expectations and empirical observations that enable to extract the expected variables that influence gross domestic savings rate. In doing so descriptive statistics and econometric analyses have been applied and Stata software was deployed to examine the findings.

#### 3.1. Conceptual Framework: Life Cycle-Permanent Income Hypothesis

The conceptual framework for this paper is derived from Life-Cycle model. This model incorporates the issue of time in explaining the saving behavior. However, the general life-cycle framework cannot include every variable affecting consumption and savings decisions. Therefore, the theoretical framework adopted in this paper is rooted in the life-cycle/permanent-income hypothesis developed by Hall (1978). This theory, also known as the random-walk hypothesis, combines the lifecycle/permanent income variables.

The theory assumes that an individual is rational and aiming at maximizing the present value of lifetime utility subject to the budget constraint. The budget constraint equals the current income plus the present value of expected income in life time. Given that income fluctuates over the course of life of an individual, each stage in the life cycle is an important determinant of saving behavior (Kudaisi 2013). The basic idea of the lifecycle/permanent-income hypothesis is that saving is a future consumption, and therefore, anything that affect consumption will similarly determine saving. This theoretical model is modified to capture a number of variables that determine savings in the Region of East Africa. It is assumed that any variable that affect consumption and both current and future income will have an impact on saving function.

In order to capture the saving behavior under uncertainty, Hall (1978) start the simple equation with the Keynesian consumption function that an individual's saving in period  $t$  is the difference between income and consumption (saving) in period  $t$ .

$$Y_t = C_t + S_t \text{(3.1)}$$

On the other hand, let us consider an individual, who lives for  $T$  periods whose lifetime utility is:

$$U = \sum_{t=1}^T u(C_t), u'(\bullet) > 0, u''(\bullet) < 0, \text{(3.2)}$$

Where  $u(\bullet)$  refers to the instantaneous utility function,  $C_t$  simply shows consumption at time  $t$ . Besides, it is assumed as the individual has an initial endowment of wealth, say  $A_0$  and has also a labor income of  $Y_1, Y_2, \dots, Y_T$  over his or her lifetime period,  $T$ . In this hypothetical example, it is assumed as the individual could borrow or save at an exogenous rate of interest whenever feels he/she is in shortage and/or in a surplus of, respectively. Furthermore, unpaid debt should be repaid at the end of the lifetime of the presumed individual. Thus, the budget constraint could be generalized in the following equation:

$$\sum_{t=1}^T C_t \leq A_0 + \sum_{t=1}^T Y_t \quad (3.3)$$

Given that the marginal utility of consumption is always positive ( $u'(\bullet) > 0$ ), individual consumption expenditure corresponds to his or her budget constraint.

Therefore the individual's optimization problem can be written as follows;

$$L = \sum_{t=1}^T u(C_t) + \lambda(A_0 + \sum_{t=1}^T Y_t - \sum_{t=1}^T C_t) \quad (3.4)$$

The first-order condition for utility maximization can be written as below;

$$u'(C_t) = \lambda \quad (3.5)$$

If equation 3.5 holds in lifetime period, the marginal utility of consumption is constant overtime. Since marginal utility is determined by the level of consumption, therefore consumption is also constant over time. Factoring this idea into the budget constraint leads into equation 3.6:

$$C_t = \frac{1}{T}(A_0 + \sum_{t=1}^T Y_t), \text{ For all } t. \quad (3.6)$$

The individual's total lifetime resource (which is made up of initial wealth and lifetime labor income) is presented in the terms in the parenthesis in the above equation. It shows that in each period of his or her lifetime the individual has an equal amount of resources for consumption. Equation 5 implies that the individual's consumption in any particular period is not only a function of his or her current income but also income over his or her lifetime. This is what Friedman (1957) termed —permanent income, while the difference between this permanent income and current income is called —transitory income (Romer, 2005) as clearly articulated in chapter two. Saving can be represented from the relationship between income and consumption that is;

$$S_t = Y_t - C_t \quad (3.7)$$

Substituting consumption equation 3.6 into 3.7 yields a saving equation expressed as follows;

$$= Y_t - \frac{1}{T}(\sum_{t=1}^T Y_t) - \frac{1}{T}A_0 \quad (3.8)$$

Equation 3.8 indicates that saving is high when current income is high relative to its average (when transitory income is high). Conversely, saving becomes negative when permanent income exceeds current income. According to Romer (2005), this is the basic idea of permanent-income hypothesis of Modigliani and Brumberg (1954) and Friedman (1957). In the permanent-income hypothesis, saving is regarded as future consumption. Therefore opportunity cost of postponing current consumption (saving) for a high level of future consumption is the interest rate. Based on this idea, the individual's budget constraint in equation 3.3 can be modified as follows (assuming a constant interest rate and a lifetime of T periods);

$$\sum_{t=1}^T \frac{1}{(1+r)^t} C_t \leq A_0 + \sum_{t=1}^T \frac{1}{(1+r)^t} Y_t \quad (3.9)$$

This implies that the present value of lifetime consumption corresponds to the sum of initial wealth and the present value of lifetime labor income. Incorporating this into the saving equation 3.7 above, gives

$$S = \left\{ \left( \frac{Y_t}{1+r} \right) - \frac{1}{T} \sum_{t=1}^T \frac{Y_t}{(1+r)^t} \right\} - \frac{1}{T} A_0 \quad (3.10^1)$$

This implies that saving is high when the present value of current income is high relative to its average—that is when transitory income gets high as it is also revealed in section two. And eventually, the LCH was developed from the permanent income theory (see section two of this study).

## 3.2. Data Sources

Data for this investigation purpose came from different sources. Various variables are used to explicitly figure out determinant factors. Data from World Bank (WB): world development indicators (WDI) and International Monetary Fund (IMF): International Financial Statistics (IFS) and other complementary sources supported this investigation, including a central bank report of individual countries and other specific country sources are employed to address the given discourse.

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<sup>1</sup>All the formulas (equations from 3.1-3.10), and even their explanation have been adopted from Adewuyi *et.al* (n.d)

### 3.2.1. Types of Data and Description of Variables of Interest

This paper is employed a secondary annually panel data on the dependent variable called gross domestic savings as a percentage of GDP ( $S$ ). Whereas the independent variables include, general government total final consumption expenditure as a percentage of GDP (GGOV), annual percentage GDP growth per capita ( $GDPP$ ), rate of inflation as referred to as ( $INF$ ), product of  $GDPP$  and  $INF$  ( $GDPPINF$ ), money and quasi money as a percentage of GDP ( $M2$ ), age dependency ratio as a percentage of working population ( $AGEDP$ ), population aged 15-64 as a percentage of total population ( $PY$ ), population aged 65 and above as a percentage of total population ( $PO$ ), and urban population as a percentage of total population ( $URB$ ) for the period of 1991 to 2012 over six East African countries such as Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Uganda. Detail of both of the dependent variable and of the regressors is discussed as below.

#### 3.2.1.1. Dependent Variable

##### *a) Ratio of Gross Domestic Savings to Gross Domestic Products ( $S$ )*

As aforementioned in the introductory section of chapter two,  $S$  is a residual of the two large magnitudes such as GDP and consumption. In other words, it is calculated as a residual by subtracting the total final consumption expenditure from the gross domestic products, and then simply divided by GDP.

#### 3.2.1.2. Explanatory Variables

##### *a) General Government Final Consumption Expenditure as a Percentage of GDP (GGOV)*

This variable has been incorporated all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation.

##### *b) GDP Growth Per Capita ( $GDPP$ )*

This variable represents the income level. Modigliani (1966: 167) in his life cycle hypothesis suggests that if aggregate income increases progressively in a time period, it will affect saving rates positively. Thus, differences in per capita income could be one of the factors that explain the wide range of saving rates in developing countries. At subsistence levels, the potential for

significant saving is small. A rise in per capita income may therefore lead to higher saving rates. However, the size of this effect is likely to decline as per capita income rises and may even become negative for rich countries where investment opportunities and growth are relatively lower. In any case, it seems to be a stylized fact that the process of development involves initially low saving rates, a period of high growth accompanied by high saving rates.

**c) Inflation Rate(*INF*)**

The other explanatory variable is inflation rate. This variable is used as proxy for macroeconomic instability where country inability to control macro environment. While stable and predictable price stimulates informative content of price system, allowing favorable allocation of resources creates suitable system in the economy. But high and unpredictable inflation alters the information system of the relative prices and attached with high riskiness of the projects. Thus, leaves negative impact on the long term investment prospects. Inflation considered in the savings model in the following dimension. That is inflation as macroeconomic instability; the existence of high Inflation causes for the deterioration of purchasing power of money, less space to save money in the bank and thus it affects savings negatively.

**d) Money and Quasi Money as a Percentage of GDP (*M2*)**

The other relevant financial variable that would influence savings is financial depth which could be measured by the degree of monetization of the economy captured by the broad money (*M2*) as percentage of GDP (Ozcan et al., 2003). Financial depth or financial market development shows the range and availability of financial assets, accessibility to banking facilities, and extent of credit opportunity. The range and availability of different financial assets that suit savers interest, expansion of bank branches and improvement in the accessibility to banking facilities motivates individuals to save. This implies that its effect on domestic savings is positive. However, saving can be discouraged by the availability of more credit as availability of more credit relaxes domestic liquidity constraints, particularly credit given for consumption (Loayz et al., 2000). Besides, according to the LCM cited in (Masson et.al 1998), financial development stimulates for consumption and this in turn can discourages savings and through this reason it can have a negative impact on savings.

**e) Age Dependency Ratio as a Percentage of Working Population (*AGEDP*)**

AGEDP is one of the demographic variables that are widely used to determine on savings. This variable is defined as the ratio of dependent people, who are younger than 15 or older than 64, to

the working population those aged 15-64. In this aspect, Agenor and Aisenman (2004) find positive relationship between age dependency and savings, while Kibet et al. (2009), Loayza et al. (2000), and Das and Ray (2012) find negative associations between dependency ratio and savings rate. On the other hand, Kelley and Schmidt (1996: 366) indicate that there is no definite relationship between dependency ratio and savings.

**f) Population Aged 15-64 as a Percentage of Total Population (PY)**

The second variable considered to have an impact upon savings under the demographic variables framework is PY. As pointed out in the Modigliani's assertion on the LCH (M) individuals who are in the age limit of 15-64 are supposed to save more thus PY is expected to positively associate with gross domestic savings.

**g) Product of GDP per capita and rate of inflation(GDPPINF)**

GDPPINF has also been included over the general savings model to the reason that this variable would have its own impact on savings rate simply to look at the effect of inflation rate.

**h) Urban Population as a Percentage of Total Population (URB)**

Last but in no sense least, URB is another independent variable that the model involves to capture how the growth of urbanization and financial sector development could influence savings rate domestically. And according (Wan et al., 2003), it can be said that urban regions provide sufficient financial instruments and government protection for individuals. By this reason urbanization can affect the savings rate positively.

### **3.3. Methods of Specification**

Key variables under consideration are taken from theoretical setups and empirical evidences in different countries. The study and econometric output depend upon the data from the aforementioned sources. Looking at their trends and identifying of main constraints of domestic savings activities in the region underscores in this paper. Of course, the econometric method of data analysis is deployed panel datasets to determine factors which affect gross domestic savings. For this regard, below is clearly defined what panel data is, and what advantages and disadvantages does have during the course of its application.

### 3.3.1 Panel Data Models

Panel data or longitudinal data typically refer to data containing time series observations of a number of individuals—and observations in panel data involve at least two dimensions; a cross-sectional dimension, indicated by subscript  $i$ , and a time series dimension, indicated by subscript  $t$ . These days, the usage of panel data models during estimation period becomes most common simply because of its data availability, capability to model more complexity of human behavior than a given cross-sectional or time series models, and its challenging methodology. Panel data, by blending the inter-individual differences and intra-individual dynamics, have several advantages over time-series or cross-sectional data (Chris 2008). For instance, panel data has the ability to increase efficiency of econometric estimates since it usually contains more degree of freedom and more sample variability than time-series or cross-sectional data thus it gives more accurate inference of model parameters.

Besides, it can provide greater capacity for capturing the complexity of human behavior over time-series or cross-sectional data. Simply because panel data treat samples either consecutively to know what their former and recent behavior looks like or through introducing sort of treatment group and control group to overcome the issue of selection bias and contagion bias. Furthermore, panel data mitigates the problem of impact of omitted variables due to the reason that it envisages information on both inter-temporal dynamics and individuality of entities, which this may allow one to control the fixed effect of unobserved variables. Beyond that, panel data enables one to simply compute statistical inference which seems normally difficult to do so in time-series perspective. If, for instance, time-series data are found to be non-stationary, the distribution of least-square or maximum likelihood ratio estimation will no longer normally distributed because it fails for the large sample approximation distribution but in the case of panel data, given that data are available and they are cross sectional independent it is possible to make estimation since the central limit theorem holds true. For these reasons, though numbers of literatures are available on the subject matter—and most of them are used either time-series or cross-sectional kind of analysis, this study considers panel data whereby cross sectional with time variation natures of the data can be applied to get the estimated variables of interest. When looking variation of gross domestic saving rates in the region, it is affected by different observable and unobservable characteristics; time varying and invariant factors across in the investigation period.

Despite of the above advantages, it is however, argued in literatures that model specification and statistical tests in panel datasets are not as such easy unlike time-series and cross-section data analysis. To this effect, it is advised as researchers should consider a multifaceted analysis, such as the objective of their research question at hand and level of compromise that someone is willing to accept between consistency and efficiency of our estimates (cf. Wooldridge 2002; Clarke *et al.* 2010; and Clark and Linzer 2012). This implies that though panel data has various value additions as compared with time-series and cross-sectional datasets it has its own limitation too.

In any case, an attempt has been made to model the determinants of gross domestic savings in the East African countries. And the empirical model for this study can be specified thus:

$$S = f(GGOV, GDPP, INF, M2, AGEDP, PY, GDPPINF, URB, )$$

Therefore, the model can have the following fully-fledged functional form:

$$S_{it} = \beta_0 + \beta_1 GGOV_{it} + \beta_2 GDPP_{it} + \beta_3 INF_{it} + \beta_4 M2_{it} + \beta_5 AGEDP_{it} + \beta_6 PY_{it} + \beta_7 GDPPINF_{it} + \beta_8 URB_{it} + u_{it} \textbf{(3.11)}$$

Where  $i$  symbolizes country,  $t$  symbolizes time;  $i = 1-6$  countries and  $t = 1991-2012$  (22 years).

As literature reveals that the simplest way in panel data models is may be to use pooled estimation in one equation as shown above, but most panel data models are estimated under either the fixed effects or the random effects assumption. In the sense that empirical estimation using fixed effect and random effect models estimation can be applied depending on the assumption of the nature of unobserved factors relation with predictor variables; and policy intervention using this kind of estimation is becoming common for controlling unobserved regional variations as explained by Wooldridge (2012).

In light of this, applying the FE model is common to get rid of ‘time *invariant*’ factors. Hence, this ‘time *invariant*’ factors that affect gross domestic saving rates in the region includes geographical features of country locations and historical factors are effectively captured by the unobserved effect (cf. Wooldridge 2012). For this reason, this investigation has paid attention on both macroeconomic and demographic variables as aforementioned in section 3.1.1, and during the course of estimation both of the candidate models have been taken into account that is the fixed and random effects models.

### 3.2.1.1. Fixed Effects Model

One of the (two) most important potential sources of bias in cross-sectional econometrics is the so called heterogeneity bias arising from unobserved heterogeneity related to both  $y$  and  $x$ . If we assume that the unobservable element correlated with  $x$  does not change over time, we can get rid of this source of bias by running the fixed effect model (FEM). The fixed effects model is useful in a wide variety of situations, and it can be applied to panel data with any number of individual, cross sectional observation. Unbalanced panels, where  $T$  differs over individuals, are no problem for the FE-estimator. Also, time-constant unobserved heterogeneity is no problem for the FE-estimator. FE as well allow for serial autocorrelation individual specific constant, which will capture all time-constant (unobserved) characteristics. The base specification of fixed effect is of the form:

$$Y_{it} = (\alpha + \alpha_i) + X'_{it}\beta + \varepsilon_{it}, \varepsilon_{it} \text{IID} (0, \sigma^2_\varepsilon), \quad (3.12)$$

In this case, it is assumed that the error terms,  $\varepsilon_{it}$ , have no any correlation with all of the explanatory variables,  $X_{it}$  and the intercept terms are also assumed to vary with the entities,  $i$  (i.e., countries in our case).

And, we can write this in the usual regression framework by including a dummy variable for each unit  $i$  in the model. That is,

$$Y_{it} = \sum_{j=1}^n \alpha_j D_{ij} + X'_{it}\beta + \varepsilon_{it} \quad (3.13)$$

Here  $D_{ij} = 1$  iff  $i=j$ , otherwise it is zero (0). And the implied estimator  $\beta$  is assumed through the Least Square Dummy Variable (LSDV).

Where the subscript  $i$  refer to entities or countries,  $t$  refers to time and  $X_{it}$  refers to independent variables.  $Y_{it}$  is the vector of saving rates,  $D_{ij}$  is the vector of country dummy variables,  $X_{kit}$  is the matrix of independent variables, and  $\varepsilon_{it}$  is the vector or errors, which are assumed to satisfy the assumption of the white noise axiom. This basic model incorporates fixed country-specific effects in the intercept term. However, the assumption that will be made for this study will be that, the slope coefficients are constant across time and space and the cross term captures differences over time and individual. This approach is to disregard the space and time dimension of the pooled data and just estimate the usual OLS regression. Therefore, given the small number of countries included here and the differences in their economic features, the fixed effect

estimator seems to be suitable for the analysis of this study as it allows for serial autoregressive to its minimum level.

We are mainly interested in the determinants of gross domestic saving rates within the countries and therefore start off by using the within estimator. The within estimator is the OLS estimator from regression of  $E(y_{it})$  on an intercept and  $E(x_{it})$  for country  $i$  and time  $t$ . This estimator exclusively focuses on the variance within countries. In other words, it provides information whether countries with e.g. a high income level, have higher saving rates or not. It is therefore straightforward to use the within estimator to analyse the differences in saving rates in countries. In addition, this estimator averages over the observed period. Consequently, it has the benefit to measure the impact of long-term differences in saving behavior within the country.

### 3.2.1.2. Random Effects Model

An alternative approach assumes that the intercepts of the individuals are different but that they can be treated through drawings from a distribution with mean  $\mu$  and variance  $\sigma^2_\alpha$ . The basic assumption here is that these drawings are supposed to be independent of the explanatory variables,  $X_{it}$ . In this condition, the premises will take us into the Random Effects (RE) Model, which is sometimes also known as the error components model. As with fixed effects, the random effects approach proposes different intercept terms for each entity and again these intercepts are constant over time, with the relationships between the explanatory and explained variables assumed to be the same both cross-sectionally and temporally (Verbeek 2004).

Their difference is, however, relies that under the REM, the intercepts for each cross-sectional unit are assumed to arise from a common intercept  $\alpha$  (which is the same for all cross-sectional units and over time), plus a random variable  $i$  that varies cross-sectionally but it is constant over time.  $i$  measures the random deviation of each entity's intercept term from the 'global' intercept term  $\alpha$ . We can write the RE panel model as the following:

$$Y_{it} = \mu + x'_{it}\beta + (\alpha_i + \varepsilon_{it}) \quad (3.14)$$

Where  $\mu$  refers to the intercept

### 3.3 Hausman Specification Test

To make sure that the study was used an appropriate model, this study has been employed Hausman (1978) test specification in order for deciding whether FE or RE model is fitting with

the given data and helps to find out the parameters to be estimated in the model. The axiom of the tests for the assertion is gone through the following tests.

Theoretically, under the null hypothesis, the Hausman (1978) test states that the explanatory variables,  $X_{it}$ , are uncorrelated with the randomly drawn intercept,  $\alpha_i$ , in which, of course it compares estimators of the two tests. Meaning one (i.e., FE estimator) is supposed to be consistent under both of the null hypothesis and alternative hypothesis, while the other (i.e., the RE) estimator is regarded to be consistent and efficient merely in the null hypothesis. But if it is observed any significance difference in these two results, it is assumed as the null hypothesis fails to do so.

Given that  $E [X_{it}, \varepsilon_{it}] = \mathbf{0}$  for all  $i, t$ , which states that  $\beta_{FE}$  is consistent whether the explanatory variables,  $X_{it}$ , are uncorrelated with the intercept,  $\alpha_i$  or not, whereas the RE estimator that is  $\beta_{RE}$  will be consistent and efficient if and only if there is no correlation between the error term and explanatory variables (Verbeek 2004).

### **3.4. Diagnostic Tests**

Last but in no sense least, diagnostic tests were used to establish whether the model was consistent or not. These tests involved test for normality, serial autocorrelation, multi-collinearity, and heteroskedasticity tests. Having this methodological setup into consideration, the researcher is proceeding onto the analysis section, which is the main work of him for this matter.

## **CHAPTER FOUR**

### **4.0 EMPIRICAL DATA ANALYSIS, DISCUSSIONS AND INTERPRETATION**

#### **4.1 Introduction**

As it is clearly documented in chapter three, this chapter presents and discusses the empirical data analysis and findings of the panel datasets model. First it examines about the average trend of gross domestic savings over the sampled countries, and it also figures out the results of the descriptive statistics and then followed by econometric analyses.

#### **4.2. Trend Performances of Average Gross Domestic Savings Rate**

##### **4.2. 1. Savings Trends in Africa: Some Stylized Facts**

There are no hard and fast rules on the determination of how well domestic savings should perform in any given year. Thus, in discussions of how well savings are doing in any economy, the standard is usually to compare that economy to other economies of similar size and structure, or to compare the same countries' savings performance over time, or even to compare actual performance to planned performance. In this section we shall focus our discussion by looking at the saving in East Africa in relation to other regions in Africa.

Generally speaking, in the region of East Africa the annual average gross domestic saving performance tends to be low as compared to that of the other regions of the continent. For example, in the Middle, North, South, and West Africa the annual average gross domestic saving rate during 2000-2006 were 28.3, 19.2, 17.9, and 9.2 percent, respectively; while in the East Africa it was merely 2.8 percent, which is by far very small. Besides, it was gradually moving downward when we simply look at its trend even. Practically, the average gross domestic saving during 1990-1994 was 5.6 percent, by then it permanently declined to the percentage point of 4.8 and 2.8 during the years of 1995-1999 and 2000-2006, respectively. But it is worth noting that the average saving rate of South Africa region was showing up a sharp decline that is from 10.9 percent in 1990-1994 to 4.1 percent during the 1995-2000 time horizons. This could be lined mainly due to the political crisis that was happened during the year of 1997.

*Table.4.1: Annual Averages of gross domestic saving of African regions as a percentage of GDP (1990-2006)*

<b>Region</b>	<b>1990-1994</b>	<b>1995-1999</b>	<b>2000-2006</b>
<b>East Africa</b>	5.6	4.8	2.8
<b>South Africa</b>	10.9	4.1	17.9
<b>Middle Africa</b>	11.9	15.2	28.3
<b>North Africa</b>	13.8	14.3	19.2
<b>West Africa</b>	8.0	7.7	9.7
<b>TOTAL</b>	9.44	9.22	15.58

*Source: Author's computation from the World Bank data*

#### **4.2.2. Savings Performance within the sampled East African Countries**

Despite the economic reforms that many African countries attempted in the last decade, there is little evidence of having a major impact on savings and investments in countries (World Bank 1994). And taking this report into consideration, it seems important to emphasize on the East Africa region since the focus of this study is on this particular region.

As can be shown in table (4.2) it presents some stylized facts on the activity of gross domestic saving to GDP ratio in six East African countries such as Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Uganda, and used as the preliminary evidence for performing some analytical investigation on the activity of savings situation in the region.

Thus, in these countries gross domestic saving is found to take a lower share of GDP, in overall it is below 10 per cent. Not only had that but also Mozambique and Rwanda experienced a negative domestic savings during 1991-2000, while the other four countries have had a positive domestic savings over the same period. Beyond that it is revealed that the gross domestic savings shown high variation that is from positive 9.27 percent in Ethiopia to negative (10.55) percent in Mozambique during the period of 1991-2000. In general, this insufficient domestic saving may therefore hinder investment and dampen economic growth. On the other hand, the disparity in gross domestic saving rates may also suggest that some countries rely more on foreign savings to

finance domestic investments, which is making these countries more vulnerable to external shocks. Above all, investment in these countries may even be depressed due to the lack of finance.

To the contrary, as it is depicted from the table, the savings rate of all the countries, excluding Ethiopian case has shown up an improvement between 2001 and 2012. Though these figures show that the East African countries' domestic savings is very low by any standard, it might have created a positive pathway for better achievements in the process of economic growth of these countries. In a matter that higher domestic savings affects domestic investment to be enlarged, which in turn will affect economic growth positively.

*Table 4.2: Average Value of Gross Domestic Savings as a percentage of GDP in six East African countries*

Average Gross domestic savings		
Country	Time periods	
	1991-2000	2001-2012
Ethiopia	9.27	9.20
Kenya	3.62	3.95
Mozambique	(10.55)	4.64
Rwanda	(5.32)	4.81
Tanzania	1.51	6.34
Uganda	4.69	5.95

Source: Own Computation's

### 4.2.3. Macroeconomic Indicators of East African Countries during the Period of 2000-2012

Following SAPs in which an improving macroeconomic environment through deregulation and privatization process and elimination of trade barriers in the 1980s and early in the 1990s allowed the economies of these developing countries to become more market oriented, and able to reduce budget deficits and induce the growth of economies. After all, what are the associated factors in the performance of gross domestic saving activity in the region and what makes one distinct from the other; thus, table (A1) shows a descriptive overview of the six East African countries economic performance and associated factors from the period of 2000-2012.

Thus, table (A1) explicitly shows there is preliminary evidence on macroeconomic performance of East African countries as first glance to further investigate what determines gross domestic saving ratio in this region. Finally, taking the outlined indicators as main explanatory variables and further accounts in the FE models and figure out what truly explains the variability of domestic saving in the region and its validities. Subsequently, precautions should be taken in the sense of intensity of macroeconomic adjustment program; the occurrence of economic crises and the performance outcomes of these countries vary accordingly.

Table A1 presents the macroeconomic performances of Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Uganda over the period of 2000-2012 (see Table A1 from the appendix).

The salient features of East African countries economic growth process as can be shown in the macroeconomic indicators in the last decade revealed that there are significant differences in the real GDP growth and per capital growth across countries. A clear picture can be gained from the following discussions.

**Ethiopia's economic performance during 2000-2012:** the country has different economic growth in response of macroeconomic policies whereby the real GDP grew on average of 7.68% in 2000-2007 and increased to 10.40% in 2008-2012. This robust and inclusive growth of Ethiopia places the country among the top performing African countries as the NBE (2012) noticed that for these achievements many factors are associated with the stated economic growth, conducive policy and the environment for best productivity; For these reasons the agriculture sector grew remarkably using improved variety and favorable environmental condition; Also central bank noticed the government statement of Ethiopia which claims industry sector has become enhanced by more than 15.0% during the 2010 fiscal year onwards and this is supported

by investment in basic infrastructures and the construction sector along with service becomes stimulated.

In the same vein, per capita GDP growth increased from on average 4.68 to 7.55 % and average per-capita GNI<sup>2</sup> in US Dollar increased from 593.75 in the year 2000-2007 to 1100 in the year 2008-2012 moved from lower-income to lower-middle income. Inflation rate increased on average from 7.20 to 23.40, i.e., from single to double digit inflationary pressure. This was attributed by the high price of food items and other commodities, mainly fuel prices in the international markets and further constraint was faced by the domestic supply side and high growth rates of reserve money which aggravated the existence of high inflationary pressure. Average gross domestic saving as a percentage of GDP became stagnant and didn't show any significant variation. The current account balance shows there is a deficit, which accounts on average 4.92 % of GDP from the year 2008 to 2012.

Terms of trade index show a decline from 2000-2004 which is negative value later it shows an improvements and it became on average 125.64 from the year 2008-2012 where its index values is (2000=100). The experience of decline movements in the terms of trade reflects as export items are depends on the primary commodity and as its prices deteriorate which leaves a substantial impact on the terms of trade. The occurrence of debt service as percentage of export and external debt stock as a % of GNI shows deterioration (8.64 to 4.67, and 56.95 to 20.68, respectively) but still its presence might affect the activity of private investment by diverting the available resources to overcome the existing external debts.

Data obtained from World Bank, GNI is equivalent to the sum of value added by producers of all resident and plus any product taxes (less subsidies) that is not incorporated in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Estimated low income countries are (\$1,045 and less); lower- middle income countries are (\$1,046 and \$4, 125).

**Kenya in the period of 2000-2012:** Kenya experienced GDP growth rates of 4.02% from the period of 2000- 2007 and 3.81% later on, for this result there are different assertions that lead to perform such economic growth. Among the stated factors are an increment of fuel prices, unfavorable weather conditions in the agriculture sector, which contribute a higher share to the country's GDP (i.e. more than 20%) and high costs of inputs that resulted from higher fuel prices added up together leaves undesirable effect on the economy of Kenya (CBK2012). Furthermore,

after Kenya's election in the 2007, the growth rates of the economy experienced different obstacles where the post-election violence in the 2008 and 2009 and unfavorable climate conditions especially drought incident caused the economy to grow only 1.53 and 2.74 % respectively. In addition, in 2011 and 2012, severe climate condition and an unstable macroeconomic environment put another undesirable effect on the growth of the economy.

However, the growth rate of the economy shows relatively robust where 4.42 and 4.55 % respectively.

Moreover, on average inflation was accelerated from 9.21% in 2000-2007 to 12.57% in 2008-2012, this is attributed to high food and oil prices, which led to an incidence of high inflationary pressure, a deteriorated exchange rate and a rapid increment of interest rates especially in the period of 2011/2012 worsen the situation. In the same vein, GDP per capita decline from 1.28 to 1.06, gross domestic saving deteriorated from 9.14 to 5.25 % of GDP, it leaves undesirable effect on investment activity where unable to mobilize domestic resources and since saving rate declines couldn't finance investment activities.

In doing all this, Kenya during the period 2000-2012 remain grouped in lower-middle income countries since the average per capita GNI in US Dollar on average are 1602.5 and 2042, respectively from the period of 2000-2007 and after 2007. In addition to this, as there is an existence of current account deficit, which is 8.21 % of GDP, there are factors that could leave an undesirable effect on macroeconomic environments. Terms of trade show negative value taking 2000 as the base year, thus it has less export capacity in the relation to the import of goods and services.

**Mozambique in the period of 2000-2012:** SAPs launched in Mozambique in 1987 and various macroeconomic performances has been realized. The Structural Adjustment Facility (SAF) till 1990 assisted the program and support macroeconomic environments. This program sustained to a second phase until the period of 1995 with an enhanced SAF until the middle of 1999 (IMF 1999). This policy with approved government's targeted areas and economic reforms supported by the World Bank facilitates and the lending program allows creating a favorable environment for the investment climates.

Moreover, during the year 2011 and onwards Mozambique's economy was mainly stimulated by the production of coal mining projects which became functional in 2011 and makes the economy experiences new dimensional growth and export performance rises from this coal mining project,

and creates a suitable macroeconomic environment and strong fiscal performance via providing strong export performance from natural resources.

In addition to this, financial sector development, transport and communication service and construction development supported the economic growth rate of Mozambique. High records FDI inflows and growth of the agricultural sector supports the robust economy growth of Mozambique. Furthermore, a recent high infrastructure investment which stimulates other sectors of the economy and has also created a favorable environment for the high inflow of FDI into the economy (AfDB *et al.* 2012). Despite in doing all this, Mozambique as shown in the per capita GNI in US Dollar which is below \$1,045 and categorized under in the LICs group. State led system in the economy and huge infrastructure investments of government exacerbates the presence of fiscal deficits. Thus, the presence of fiscal challenges in the governments of Mozambique is solved by different scenarios, one side, creating a positive environment for the private sector and reducing the fiscal deficit and other side while expanding infrastructure and allied activities should target on priority projects and appropriate pro-poor policies.

**Rwanda in the period of 2000-2012:** In the Rwandan economy, despite the growth of agricultural production and a low growth rate of broad money in the economy, inflationary pressure accelerated in the economy and in the year 2007 annual average has reached 9.08% and 15.44% in the year 2008. For this acceleration of inflation in the economy, high price of international fuel and food price are mentioned as the cause to this instability in the economy (National Bank of Rwanda 2008). The economy growth rate relatively shows robust and sustained and 8.01% and 7.69% real GDP growth rate during 2000-2007 and 2008-2012 respectively. Similarly, total debt service and external debt stock percentage of GNI shows decline but there exist still high public debt. As per capita GNI in US dollar increased from 793.75 to 1248 US dollar and moved from low-income to lower middle income countries category. Domestic saving that enables to finance investment activities domestically shows an improvement.

**Tanzania in the period of 2000-2012:** Tanzania experiences robust economic growth from the period of 2000 to 2012. This growth is supported by prudent fiscal policy resulting from an improvement in domestic revenue, and domestic saving increased from 14.08% to 18.72 % of GDP. Tanzanian economy mainly depends on agriculture which accounts for more than 25% of GDP, offers 85% of exports, and 80% of the work force is also engaged in this sector of the

economy. With the existence of this reality economic growth rate is supported by investments in infrastructure activity and recording robust economic growth indifferent time reflected by improvement in the communication and service sector and the growth of the financial sector by reforming the financial sector stimulating the growth of credit to the private sector of the economy (Bank of Tanzania 2009).

Moreover, there is an improvement in the per capita GNI from 1030 to 1504 US dollars, but remain grouped in the category of lower-middle income countries. The growth of GDP is influenced by global financial and economic catastrophes through trade channels and capital inflows into the economy of Tanzania (Bank of Tanzania 2009). In doing all this, the economy experiences GDP growth in 2009 shows a relative decline i.e. 6.02% from 7.44 % in the year 2008. Average performance was 6.76% and 6.78% from the year 2000-2007 and 2008-2012, respectively as shown from table (A1).

**Uganda in the period of 2000-2012:** Uganda experiences different growth performance where from the period of 2000 to 2007 GDP growth rate was 6.98% and later it became on average 6.37% growth, which leads to deteriorating GDP per capita growth on average from 3.46 to 2.86 %. This reduction in the economic performance is linked with different assertions. As Sender and Erik (2009) pointed out global financial crises leaves an undesirable effect on the price of export items (coffee and cotton and flowers) after the year 2007 and worsen the balance of payments through a decline in export revenue which was related to the price of items, not on the volume of export items.

Moreover, fluctuation of international commodity prices affects the domestic economy. In the export of items in the economy almost 20% of revenue is from coffee exports and where the destiny to international markets mainly in Europe (financial crises occurred next to US) affects the economy undesirably (Evarist *et al.* 2010). Domestic saving shows an improvement from 8.40 to 10.62 % of GDP, which is believed to finance investment projects domestically. Progress shows in the per capita GNI and on average from 843.75 to 1244 US dollar and moved from low-income to lower-middle income. Terms of trade index show an improvement on average from 95.98 from the year 2000-2007 to 110.43 after the year 2007 while taking (2000 =100) as the base year. Total debt service as a percentage of export declines and external debt stock declines as well, but still there exists a high external public debt. Thus, the Ugandan economy experiences

home grown problems, and externally interlinked factors on the performances of the macroeconomic environment.

### 4.3. Econometrics Results

In chapter three it was articulated as panel data will be used for the purpose of making precise analysis and for doing so, data has been taken from both the world development indicators of the World Bank and international financial statistics of the International Monetary Fund datasets and the descriptive and regression results are analyzed in this section. The econometric method of data analysis is utilized to examine the systematic association between the macro-economic and demographic explanatory variables and gross domestic saving rates using panel dataset from the study area.

#### 4.3.1. Descriptive Statistics

Both saving rates and many of the explanatory variables are persistent over time, but large standard deviation exists both within country and across countries. Table 4.3: reports some descriptive statistics on the selected variables. The table also makes distinction between the variance across countries and within countries over time. Note that gross of the total variation in annual domestic gross saving rates in the panel originates from differences within countries and not between countries over time. 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 countries.

**Dependent variable and its fundamental determinants:** The dependent variable, gross domestic saving, which is measured as percentage of GDP, has an average value of 3.365809, while the average values for the explanatory variables such as the government expenditure as percentage of GDP, GDP per capita growth, inflation rate, money and quasi-money (M2) as percentage of GDP, age dependency (both groups below 15, and 65 and above years old) as a percentage of working age group, working age as a percentage of total population, the elderly age dependency ( 65 and above) as percentage of total population, and urban population as a percentage of total population which proxies for degree of urbanization are 18.89655, 5.457857, 12.4734, 10.70392, 94.45833, 43.13966, 17.28931, and 19.9475, respectively.

*Table.4.3: Results of the Descriptive Statistics*

Variables	Mean	Std. Dev.			Min	Max	Number of Observations		
		Overall	Between	Within			Total	n	T
s	3.563798	6.131072	3.619609	5.157103	-31.9162	14.74008	132	6	22
ggov	21.67259	16.39007	17.6177	2.858836	0.5894	55.11824	132	6	22
gdpp	5.457857	7.88572	4.96825	6.43981	-47.7225	37.12759	132	6	22
inf	12.19421	12.85227	3.435396	12.46103	-9.18761	91.22635	132	6	22
gdppinf	63.55532	12.5954	1.991348	12.46261	2.159958	105.3992	132	6	22
m2	19.14654	7.907432	6.939526	4.702764	0.1234	41.98877	132	6	22
agedp	94.45833	18.22569	19.86678	0.984035	79.09515	108.7126	132	6	22
py	43.13966	32.3814	35.19732	2.993249	2.660146	55.83624	132	6	22
urb	19.9475	6.527402	6.061346	3.431659	5.490997	31.934	132	6	22

*Source: Own computation from stata*

### **4.3.2. Empirical Regression Results**

Once data are cleaned up and evaluated in a way that enables us to make precise analysis, the next step is then proceed to report with estimations' results aligning with prior expectations and theory setups. In a sense that we checked up all the necessary tests in panel datasets such as estimating coefficients using of pooled OLS, fixed effects, and random effects models and scrutinizing these findings with both empirical and theoretical aspects. As it might be clear to all of us, the first test that should be performed is the F-test in order to decide the estimation technique which will be used. That is either of the Pooled OLS or fixed effect. In this study, such a process has been done through the rule of thumb where the fixed effects are tested by the F-test. For example, if the null hypothesis is failed to reject, we are to mean in favor of pooled OLS regression, otherwise we tends to prefer the fixed effects model. In this regard, we performed our pre-test. In accordance, the null hypothesis is failed to accept the premises. As a result, the researcher is enforced to choose fixed effects estimation.

In fact, we also checked up the Hausman test, which is the pertinent statistical test for choosing fixed effects or random effects. And the test seems to suggest for the application of fixed effects against its counterpart of the random effects panel data model. The reason to do so is that it has a robust advantage on eliminating the issues of serial auto-correlation and multi-co-linearity.

To elaborate more, here below are described what were done in a detailed manner, in line with the objective of the researcher's and statistical tests consulted. The researcher was mainly interested in the determinants of differences in gross domestic saving rates between countries and therefore start off by using the "between estimator". The between estimator is the OLS estimator from regression of  $y_{it}$  on an intercept and  $x_{it}$  for country  $i$  and time  $t$ . This estimator exclusively focuses on the variance between countries. In other words, it provides information whether countries with e.g. a high income level, have higher saving rates or not. It is thus straightforward to use the between estimator to analyze the differences in saving rates between countries. In addition, this estimator averages over the observed period. Consequently, it has the benefit to measure the impact of long-term differences in saving behavior.

However, though the ultimate goal of the paper was to see the variation of gross domestic saving ratio amongst the countries of interest, the statistical tests performed tends to go against that. For this clear reason, focusing on the between estimator seems useless. And, without even taking the statistical tests into consideration, there are two important drawbacks of the between estimator, which disapproved for its usage in this specific analyses. Firstly, it may be biased as it relies on the assumption that the country-specific effects are independent of the other covariates in the model. A second drawback is that we lose information by averaging over the period. Indeed, the between estimator only takes into account the cross sectional variation in the panel. Our panel contains 6 countries, the number of observations in this case. Therefore we can only include a limited number of explanatory variables in the regression.

In the remainder of this section we present several alternative models. They address these drawbacks. In addition, they also result from several econometric tests that guide us in the choice of a final model. First, we compare results from the between estimator with results from pooled OLS, an estimator that exploits all panel data information. In the pooled OLS model, we regress  $y_{it}$  on an intercept and  $x_{it}$  for country  $i$  and time  $t$ . The pooled OLS estimator exploits both the within and between variation in our data. The benefit of the pooled OLS estimator is to enlarge the number of observations which allows studying the impact of other potential explanatory variables on the dependent variable of interest that is gross domestic savings.

We estimate a reduced form linear specification in order to include the broad range of saving determinants which were outlined in the previous section. Both our benchmark and the alternative pooled OLS specification, however, rely on important assumptions which are tested.

Several statistical checks were performed to test the underlying model assumptions. We check for multi-co-linearity problems which may break down OLS estimation. First, we did a visual analysis of the data. To this end, we used matrix graphs plotting each of the relevant variables against each other. These graphs can be found in the appendix (see Figure A1). Only working age (i.e., 15-64) as a percentage of total population, old age dependency (65 and above) as a percentage of total population and to some extent also the GDP per capita growth and government expenditure, show linear relationship with some other variables. But, statistical tests (like VIF) did not indicate any issues of severe multi-co-linearity. Therefore, we proceed with this group of variables.

Beyond that, the author performs several additional statistical tests to check the assumptions underlying the OLS model. That is first, we checked the homoscedasticity condition of the error term. Due to the characteristics of our panel in which we pooled different countries, it is highly likely that the standard errors are not constant across the panel rather clustered at the country level. But the homoscedasticity assumption is indeed failed to rejected by the Breusch-Pagan test (P-value=1.00) (see Table A3). Therefore, Table 4.4 reports cluster robust standard errors which does not allows for within country correlation. In other words, we assured as there is no any degree of serial correlation of the error term at the country level too.

Next, we investigate whether these country-specific effects are correlated with the regressors' as this would raise endogeneity issues. To this end we first examine the presence of time and country fixed effects. A simple F-test on the coefficients of time dummies could reject the assumption of a common time intercept (p-value = 0.00). However, a similar test indicates that the pooled OLS model is misspecified as it does not include country-specific effects, which appear to be present.

Afterwards, we investigate whether the country-specific effects are likely to be correlated with the regressors. For example, measurement error of government expenditure is likely to be correlated with the level of GDP per capita growth as mentioned earlier. Therefore, we report the regression results of the random and fixed effects estimator, respectively. The second and third column of Table 4.4 and test whether the regressors are indeed correlated with the country-specific effects. If this is the case, the random effects estimator breaks down. If there is no correlation present, the fixed effect estimator is consistent, but inefficient. In this case, the random effects estimator should be preferred. The Hausman test also suggests that the country-

specific effects may not be considered random (p-value = 0.00) (insert Table A2 around here). Therefore, the regression results of the fixed effects estimator are preferred above those of the other panel estimators which are likely to suffer from endogeneity bias.

Lastly, we see that the explanatory power of the latter model decreases. In other words, the explanatory variables do a poorer job in explaining the within country variation over time. This indicates that gross domestic saving rates are persistent over time and are expected to adapt only slowly to changes in underlying economic determinants. Nonetheless, the fixed effects estimation broadly confirms the results of the other specifications.

The estimation results of our panel analysis are reported in Table 4.4. In all regressions, the dependent variable is the gross domestic saving rate as defined in Section 2 and 3. The different explanatory variables that were used in the analysis are reported in the first column. The following columns show the estimation results of the panel estimators described above and which will be discussed below.

*Table 4.4: Results of panel data analysis (dependent variable: gross domestic saving ratio)*

VARIABLES	(1)	(2)	(3)	(4)
	Between Estimator	Pooled OLS	Random Effects	Fixed Effects
Ggov	-0.04	0.04	-0.04**	-0.05
	(0.05)	(0.07)	(0.04)	(0.04)
Gdpp	0.27***	0.24***	0.28***	0.29***
	(0.05)	(0.07)	(0.03)	(0.03)
Inf	--	-0.08**	-0.08**	0.02
	(0.03)	(0.04)	(0.32)	(0.03)
M2	0.01	0.22***	-0.24	-0.02
	(0.04)	0.04)	(0.05)	(0.05)
Agedp	0.52***	0.09	0.12*	-0.46***

	(0.11)	(0.07)	(0.29)	(2.91)
Py	-0.25	-0.22	3.75***	8.49
	(0.22)	(0.20)	(0.76)	(10.38)
Gdppinf	-0.01	-0.01	-1.29***	-0.03
	(0.11)	(0.11)	(0.26)	(2.93)
Urb	0.99***	0.17**	1.06**	1.13***
	(0.17)	0.08)	(0.25)	(0.29)
Cons	-53.13	8.04	-317.02***	-639.047*
	(16.24)	(15.28)	(60.43)	(235.30)
Obs	120	132	126	132
number of countries	6	6	6	6
<b>R-squared</b>	<b>0.74</b>	<b>0.34</b>	<b>0.99</b>	<b>0.42</b>
<b>Robust Standard errors in parentheses</b>				
<b>*** p&lt;0.01, ** p&lt;0.05, * p&lt;0.1</b>				

Source: Author's Computations

As it can be referred from the above table 4.4, the first specification in the second column reports the estimation results of the between estimator. This estimator only takes into account the cross sectional variation in the panel. Our cross section contains 6 countries and therefore we can only include a limited number of explanatory variables in this regression. The estimated model contains the key explanatory variables which were identified in previous literature and also had explanatory power in our case. These are GDP per capita growth as income variable, inflation, money and quasi-money, age dependency (i.e., the ratio below 15, and 65 and above to the working age group i.e., 15-64, a ratio of 65 and above total population), and the independency ratio (15-64 as a percentage of total population), urban population to total population ratio, and the government expenditure.

Besides the between estimator, we report three other sets of regressions using different models. The next specifications are the random and the fixed effects estimators as previously mentioned. In all specifications, robust standard errors are shown between brackets.

The results of the fixed effects estimator should be preferred above other specifications. We have shown above that country fixed effects appear to be present. Moreover, the Hausman test indicated these fixed effects are correlated with our explanatory variables. Therefore, only the fixed effects estimator is consistent and the other estimates suffer from endogeneity bias. The results of specification (1) to specification (4) should be interpreted with caution though. The results of the panel estimations indicate the following:

### **1) Income and wealth**

Differences in per capita income could be one of the factors that explain the wide range of saving rates in developing countries. At subsistence levels, however, the potential for significant saving is small. A rise in per capita income may therefore lead to higher saving rates. The size of this effect is likely to decline as per capita income rises and may even become negative for rich countries where investment opportunities and growth are relatively lower. As an addition, the simple permanent-income theory predicts that higher growth (that is, higher future income) reduces current saving. But in the life cycle model, growth has an ambiguous effect on saving, depending on which agent benefit most from income growth.

According to the estimation's result of the fixed effects, however, the growth of GDP per capita, which is a proxy's for income exhibits a positive and statistically significant at the 1% level of significance. In the region, as the growth rate of real GDP per capita increases across time by 1%, the gross domestic saving as a percentage of GDP will increase by 1 unit. This implies that those poorer economies save lesser amount than those of richer countries. This result is consistent with empirical findings of Loayza, Schmidt-Hebbel and Serven (2000) for developing countries.

In any case, numerous reasons may explain this finding. First, this might be empirical evidence for the income effect that seems to explain much more of the differences in saving rates across than within countries. Second, the income growth is most likely to be correlated with the fixed effect capturing unobserved differences like differences in institutions and other data issues. Third, the coefficient may also capture any reverse causality as higher saving may lead to higher

investment, an important source of economic growth and income. Similar findings were reported by Athukorala and Sen (2004) and Metin\_Özcan and Özcan (2005).

## **2) Demography**

According to this investigation, the ratio of age dependency (below 15, and 65 and above) to the total population is found to have a negative association with gross domestic savings and statistically significant at 1%. The same finding was concluded by Aric (2015). But the other coefficients of the explanatory variables except age dependency ratio (agedp) are found to have insignificant impact on the aggregate domestic saving. This could be mainly due to the fact that demography variables only evolve slowly over time. But the period under analysis may be too short to show the impact of population ageing on gross domestic saving. As it can be depicted from table 4.2 above, variances in working age as a percentage of total population are much larger between countries than within countries over time. And this is the main issue of fixed effect for this regard. Not only that but also the data on hand seems to go parallel with theory. In line with the magnitude and sign of the regressors, the ratio of working age (15-64) to the total population was presumed to be positively correlated with gross domestic saving ratio. This presumption has been made based on the theoretical postulation of Franco Modigliani (1963). According to him the working age and/or middle age group is the one who saves an amplified portion of his/her incomes taking the elderly age's consumption through dissaving into account. So that the sign of this variable is found in light with the prior expectation that is positive (8.49) and its magnitude also sounds wonderful as augmented in the explanation.

On the other hand, increasing urban population as percentage of total population is found to be positively and statistically linked with saving rates. This seems justifiable due to the reason that banks are agglomerated in urban areas than in rural. In turn, individuals will stimuli to save what is left in their hands once consumption outlays are disbursed. On the other way, urban dwellers are assumed to have a better understanding about saving and its significance than their counterparts who live in rural areas. This is simply because those who live in rural areas may not be aware of about formal saving and due to cultural and other traditions too. The urban dwellers would have access to education and awareness. And they are also required to live with a better life for tomorrow like having of houses and other basic necessities. To do so, however, the mechanism may become through saving some fraction of their income continuously likewise what Ethiopians are currently doing through the 10/90, 20/80, and 40/60 housing schemes.

### **3) Uncertainty**

Higher anticipated inflation in developed and developing countries could reduce savings. In those countries inflation serves as a measure of the authority's commitment to macroeconomic stability. Higher and variable inflation therefore may lower the credibility of the authorities and as a result discourages savings. Besides, if people are consumption oriented, there will be less saving in the country. The consumption function shifts upward, while saving function shifts downward. Under this investigation, the inflation rate as macroeconomic instability exhibits negative and statistically insignificant at the conventional levels of significant. In the region, as inflation increases across time by one rate, gross domestic saving as percentage of GDP lowers by 0.02percent. This result is consistent with the empirical findings of (Green and Villanueva 1991; Oshikoya 1994; Harupara 1998). Hence, inflation as a proxy for macro instability alters the information system of the relative prices and attached with high riskiness of projects. The negative effect of inflation on gross domestic savings model either leads to an unexpected increase in the aggregate demand for durable assets. And/or causes for the deterioration of purchasing power of money, less space to save money in the bank. Thus, due to the stated factors as inflation directs towards economic uncertainty and has negative impact on the rate of savings in the region.

### **4) Fiscal policy**

In line with fiscal policy variables, government finances and/or expenditures are considered and it is assumed to have a mixed effect on gross domestic saving. With respect to the Ricardian equivalence hypothesis, under normal condition, government deficits increase saving ratio. However, higher public debt levels appear to be associated with lower domestic saving. For precautionary reasons we would expect households to save more in case of heavily indebted governments. But in this case, our findings show that there is a negative association between government expenditure and saving rates.

Therefore, this outweighs to be in a position against the hypothesis of the Ricardian equivalence. Not only that but also it is found to be statistically insignificant. So whether the government expenditure is large or small it does not matter as it has not statistically significant effect upon savings.

### **5) Financial market development and access to finance**

The money and quasi-money (M2) as a percentage of GDP is used as a proxy for financial development and financial depth in the economy has been estimated to have a look at the systematic association with gross domestic saving ratio in the area of interest. Accordingly, it was found as it has a negative (-0.02) and insignificant impact on gross domestic savings under the fixed effects estimator. The same results were also reported by Keho (2011) and Haile (2012) regarding that gross domestic savings is not influenced by financial development. These results do provide evidence that the availability of liquidity in the economy may stimulate borrowing and therefore decrease aggregate domestic saving. A study made by Aric (2015) on the Middle East countries also revealed the same analysis with respect to their relationships, though the effect was reported as to have a statistically significant effect unlike to the case we find out in our case.

Financial systems in East Africa can be described as underdeveloped. Financial sectors in region suffer from various unfavorable characteristics such as limited financial products and financial innovation, wide interest rate spreads, weak legal systems, and pronounced market fragmentation (Ncube, 2007). The level of financial depth and efficiency in East Africa is rather low, also in comparison to other developing world regions. The reason why it is not statistically significant could be mainly emanated from the infancy behavior of the financial development in least developing countries. Besides, the real interest rate in developing countries is not fully determined through the market rather by the government. And most often central banks in those developing countries are characterized by their non-independence at which the government can manipulate things to its self-interest like keeping real interest rate at its lower point. The reason for doing so is that to encourage investment but those savers may not be willing to put their money in banks as return is not as such attractive. Instead, they want to maximize their utility through consumption of both durable and durable goods.

Consequently, the nonexistence of financial development and its infancy stage could not be in a position to have a significant effect upon gross domestic savings. Almost the same result has been suggested by Gries *et al.* (2009).

In sum, the ultimate goal of this study was to analyze the determinants of savings in the East African countries. As illustrated from the result, gross domestic saving is significantly affected by different parameters in the investigation period. That is gross domestic savings is affected by different macroeconomic parameters such as output/ per capita growth, uncertainty, monetary

and urbanization amongst demographic variables in the economy. Evidence from econometric output confirmed that gross domestic saving as percentage of GDP is positively and significantly associated with real GDP per capita growth rates. And this seems consistent with theoretical and empirical based expectations. In addition urbanization has a positive effect upon gross domestic savings in the region during the course of 1991-2012.

On the contrary, the ratio of age dependency (i.e.  $< 15$  and  $\geq 65$ ) to the total population is found statistically significant at 1% level of significance. And their relationship is also negative as it is expected from theoretical suggestion and empirical findings. On the other hand, the remaining explanatory variables are found to be non-statistically significant in all the conventional levels of significance.

## CHAPTER FIVE

### 5.0 CONCLUSIONS AND POLICY IMPLICATIONS

This paper has tried to address issues whereby gross domestic savings is affected by different macroeconomic variables such as GDP per capita growth, uncertainty, fiscal, monetary, and demographic variables -- its ultimate goal being to analyze the determinants of savings in the East African countries. In doing so, considering six selected East African countries for the period of 1991-2012, and the Hall Life-cycle-permanent income theory, this study has deployed pooled OLS and fixed effects models.

Overall, our 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 i.e. population <15 and >=65 as percentage of working age (agedp) has a negative effect upon gross domestic savings at 1%. Considering the fixed effects model which is supported by the Hausman test and is also in line with the researcher's objective too, gdpp, urb, and agedp are found to be statistically significant at 1 %. Whereas inflation rate, working age group as a percentage of total population (py), money and quasi money as a percentage of GDP (m2), and government expenditure as a percentage of GDP (ggov) are found to be not statistically significant at all conventional levels.

It would therefore be fairly important to conclude from this study that governments would need to think and/or re-thinking the issues of GDP per capita growth, urbanization, and level of age dependency much more than the other aforementioned variables while they think of boosting domestic saving. This study however is not, by and itself, resulting a conclusive remark. For this reason, the researcher has come to see much more improvement areas, or a wish to be seen and capacitating it through different research lines.

This note aims to contribute to the analysis of persistent differences in gross domestic saving rates across countries over the region. Over time, however, there is much room for further research. We see various potential avenues for future research. For example, one could analyze macro data on gross domestic saving across the region and discuss how they relate to their micro-economic aggregate. Another extension could be to look into the impact of improving data collection methodologies and further harmonize the national accounts in these sampled countries.

Lastly, a dynamic analysis of gross domestic saving in East African countries could help to better understand the short-term impact of the crisis on gross domestic saving (e.g. more in-depth analysis of the housing market bubble and burst or the dramatic loss of financial wealth).

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## Appendices:

*Table A1: Macroeconomic development of the sampled East African countries*

Countries	Time period	GDP Growth Rate	GDP per capita Growth (annual %)	Per Capita GNI in US \$	Inflation Rate	Gross Domestic Savings (% of GDP)	Current Account Balance (% of GDP)	Terms of Trade Index (2000=100)	Total Debt Service (% of Export)	External Debt Stocks (% of GNI)
<b>Ethiopia</b>	2000-2007	7.68	4.68	593.75	7.20	9.54	...	101.21	8.64	56.95
	2008-2012	10.41	7.55	1050	23.40	9.44	-4.92	125.64	4.67	20.68
<b>Rwanda</b>	2000-2007	8.01	4.89	793.75	6.99	-0.26	...	125.44	12.85	62.35
	2008-2012	7.69	4.65	1248	8.01	6.38	-7.75	224.64	2.11	16.76
<b>Mozambique</b>	2000-2007	7.36	4.45	546.25	11.65	7.45	...	104.36	5.73	96.93
	2008-2012	6.96	4.26	856	7.74	3.56	-21.60	105.13	1.67	37.66
<b>Tanzania</b>	2000-2007	6.76	3.94	1030	5.72	14.08	...	102.84	5.24	56.56
	2008-2012	6.78	3.62	1504	11.46	18.72	-11.81	136.74	2.23	37.76
<b>Uganda</b>	2000-2007	6.98	3.46	843.75	4.91	8.40	...	95.98	8.15	50.60
	2008-2012	6.37	2.86	1244	12.35	10.62	-9.82	110.43	1.85	20.02
<b>Kenya</b>	2000-2007	4.02	1.28	1602.5	9.21	9.14	...	91.15	12.59	40.36
	2008-2012	3.81	1.06	2042	12.57	5.25	-8.21	90.24	4.75	28.45

Source: Own computation, data from World Bank 2014

Notes: Data from World Bank, gross domestic savings are calculated from GDP less final consumption expenditure (total consumption). Terms of trade index is obtained from the percentage ratio of the export unit to the import unit value indexes, measured relative to the base year (2000=100) and countries report unit value indexes and its consistency demonstrate under UNCTAD quality control and in which its values complemented with UNCTAD estimation based on the previous year trade values indexes. Dots in the table indicate data not available during the course of investigation.

**Table A2: Results for the Hausman-Test**

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
Variables	fixed	random	Difference	S.E.
ggov	-.0317726	-.0435219	.0117493	.
gdpp	.2641091	.2373848	.0267244	.
inf	-.0330808	-.0990228	.065942	.
m2	-.0124089	.2216659	-.2340748	.0130426
agedp	1.696226	.0913242	1.604901	1.407157
py	3.851833	-.2221118	4.073945	5.219695
gdppinf	-1.254918	-.1259454	-1.128972	1.398954
urb	1.141091	-.1654796	1.30657	.1691995

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\text{chi2}(8) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 58.31$$

$$\text{Prob}>\text{chi2} = 0.0000$$

(V\_b-V\_B is not positive definite)

**Table A3: Results for Breuschand Pagan Lagrangian multiplier test for random effect Vs. Pooled OLS**

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Breusch and Pagan Lagrangian multiplier test for random effects

$$s[id,t] = Xb + u[id] + e[id,t]$$

Estimated results:

	Var	sd = sqrt(Var)
s	37.59004	6.131072
e	16.26509	4.033
u	0	0

Test:  $\text{Var}(u) = 0$

chibar2(01) = 0.00  
Prob > chibar2 = 1.0000

**Table A4: Results for Least Square Dummy Variable1 (LSDV1)**

Source	SS	df	MS			
Model	3260.91333	13	250.839487	Number of obs =	144	
Residual	2114.46207	130	16.2650928	F( 13, 130) =	15.42	
Total	5375.3754	143	37.5900378	Prob > F =	0.0000	
				R-squared =	0.6066	
				Adj R-squared =	0.5673	
				Root MSE =	4.033	

s	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
id						
2	292.2086	382.0821	0.76	0.446	-463.6951	1048.112
3	-25.56086	3.023786	-8.45	0.000	-31.54306	-19.57866
4	-5.229781	1.906499	-2.74	0.007	-9.001562	-1.458001
5	-12.38013	1.978583	-6.26	0.000	-16.29452	-8.465746
6	-9.285308	2.557262	-3.63	0.000	-14.34454	-4.226071
ggov	-.0317726	.0561356	-0.57	0.572	-.1428302	.0792851
gdpp	.2641091	.05491	4.81	0.000	.1554762	.3727421
inf	-.0330808	.0318539	-1.04	0.301	-.0961	.0299383
m2	-.0124089	.0412085	-0.30	0.764	-.0939349	.0691171
agedp	1.696226	1.408989	1.20	0.231	-1.091291	4.483743
py	3.851833	5.223581	0.74	0.462	-6.482398	14.18606
po	-1.254918	1.40334	-0.89	0.373	-4.031259	1.521423
urb	1.141091	.1868066	6.11	0.000	.7715162	1.510665
_cons	-364.2623	397.341	-0.92	0.361	-1150.354	421.8294

Note: where ‘id’ stands for country code, while the numbers 2-6 referred to countries such as Kenya, Mozambique, Rwanda, Tanzania, and Uganda, respectively. Here there is an intercept but one country is dropped to work with the LSDV

*Table A5: Results for Least Square Dummy Variable2*

Source	SS	df	MS			
Model	4892.24188	14	349.445849	Number of obs =	144	
Residual	2114.46207	130	16.2650928	F( 14, 130) =	21.48	
Total	7006.70395	144	48.6576663	Prob > F =	0.0000	
				R-squared =	0.6982	
				Adj R-squared =	0.6657	
				Root MSE =	4.033	

s	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
c1	-364.2623	397.341	-0.92	0.361	-1150.354	421.8294
c2	-72.05367	21.25478	-3.39	0.001	-114.1037	-30.00363
c3	-389.8231	397.372	-0.98	0.328	-1175.976	396.3299
c4	-369.4921	398.4359	-0.93	0.355	-1157.75	418.7658
c5	-376.6424	397.5804	-0.95	0.345	-1163.208	409.9229
c6	-373.5476	399.2021	-0.94	0.351	-1163.321	416.226
ggov	-.0317726	.0561356	-0.57	0.572	-.1428302	.0792851
gdpp	.2641091	.05491	4.81	0.000	.1554762	.3727421
inf	-.0330808	.0318539	-1.04	0.301	-.0961	.0299383
m2	-.0124089	.0412085	-0.30	0.764	-.0939349	.0691171
agedp	1.696226	1.408989	1.20	0.231	-1.091291	4.483743
py	3.851833	5.223581	0.74	0.462	-6.482398	14.18606
po	-1.254918	1.40334	-0.89	0.373	-4.031259	1.521423
urb	1.141091	.1868066	6.11	0.000	.7715162	1.510665

Note: Where c1-c6 refers to Ethiopia, Mozambique, Rwanda, Tanzania, and Uganda, respectively but there is no intercept in this case, while there is in the LSDV1.

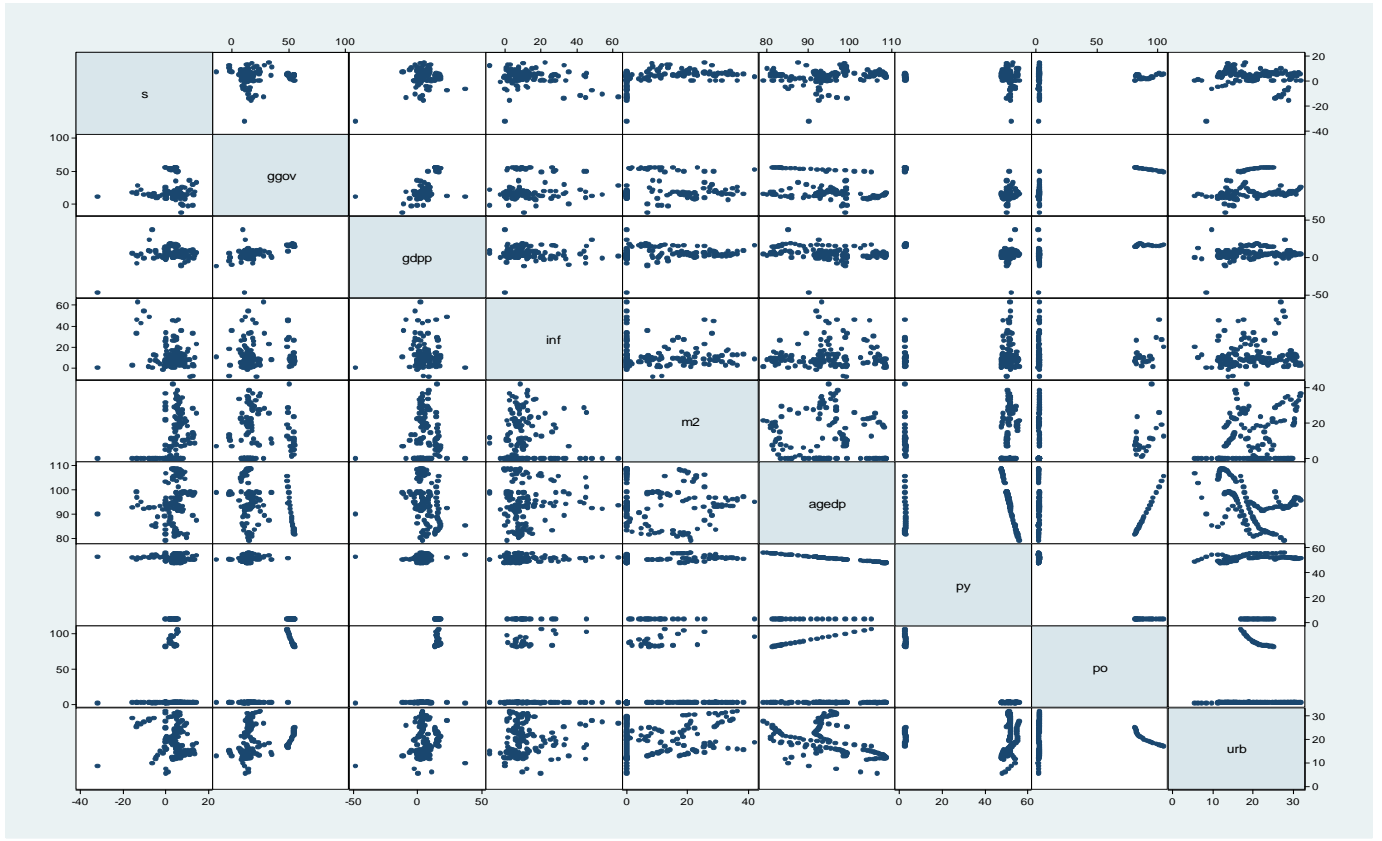


Figure A1: Graph Matrix of Gross Domestic Saving and Explanatory Variables

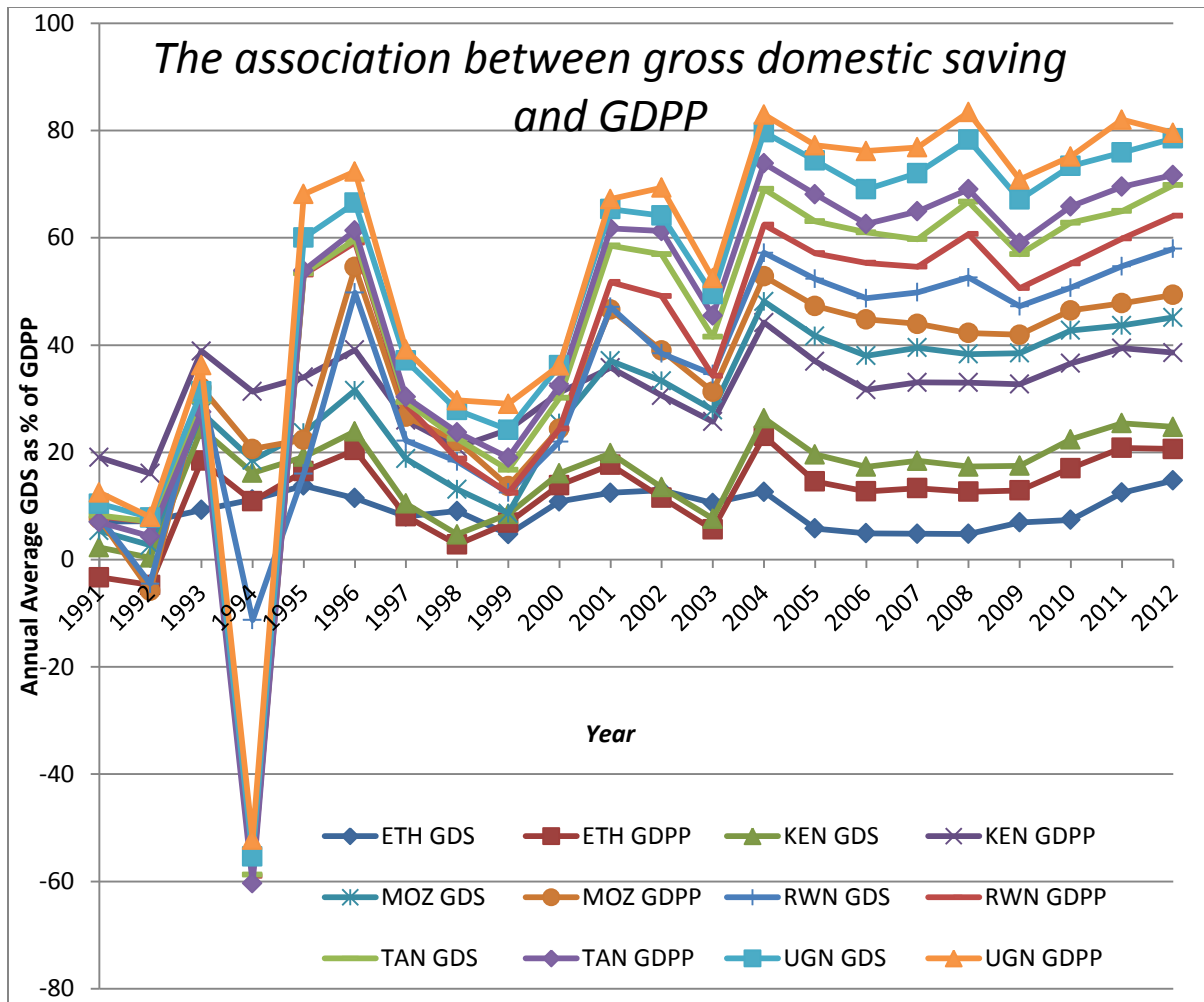


Figure A2: Performance and movements of gross domestic savings and GDP per capita growth

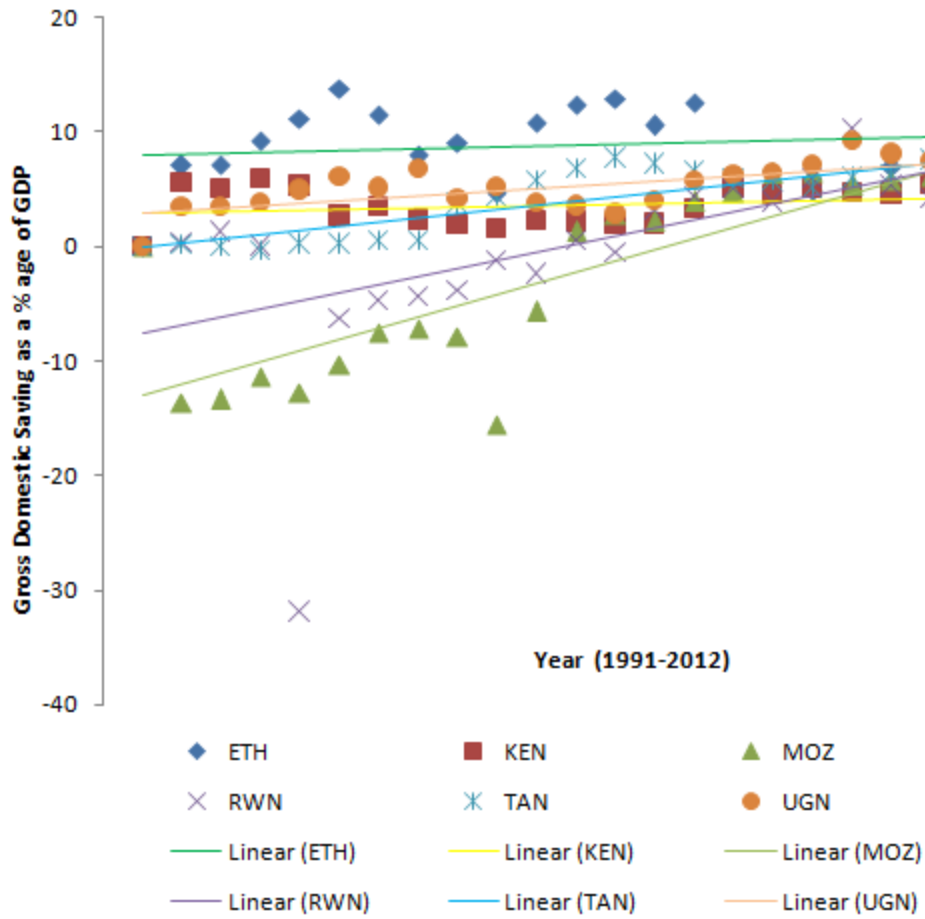


Figure A3: Trends of gross domestic savings as a percentage of GDP in six East African countries

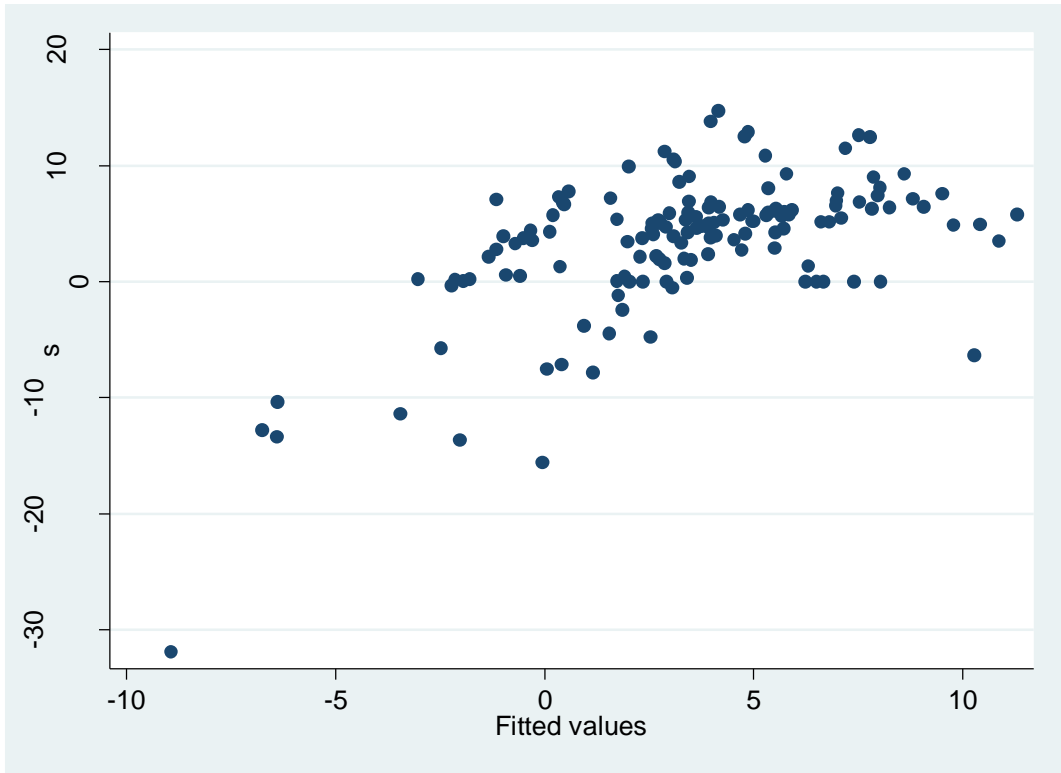


Figure A4: Actual and fitted values of the model

## **Project Declaration**

I hereby, the undersigned, declare that this project paper is my original work and has not been presented for Master's degree in any other university, and that all sources of material used for the project have been duly acknowledged.

Declared by:

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Place and date of submission: .....