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THE IMPACT OF EXTERNAL DEBT ON ECONOMIC GROWTH IN SOME SELECTED EAST AFRICAN COUNTRIES: PANEL DATA APPROACH

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This is to certify that the project prepared by Lewam Teshome, entitled: The Impact of external debt on economic growth in some selected east African countries and submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Applied Economic Modeling and Forecasting (Financial policy analysis and planning) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ACRONYMS

GDPPC	Gross domestic production per capita
GNI	Gross National Income
FE	Fixed Effects
RE	random effect
IMF	International Monetary Fund
IDA	International Financial Statistical
ESRF	economic and social Research foundation
HIPC	Highly Indebted Poor Countries
LDC	least development countries
MOFEC	Ministry of Finance and Economic cooperation
ADF	Augmented Dickey Fuller
IDAWB	International Development Association World Bank
ADB	Africa Development Bank
GMM	generalized method of moments
WDI	World Bank Indictor
BOP	Balance of payment
CPI	Consumer Price Index
DSA	debt sustainability analysis

Abstract

The study aims at understanding the effect of external debt on economic growth in five East African countries namely, Ethiopia, Kenya, Tanzania, Uganda, and Rwanda, by using data of about 30 years starting from 1980-2014.Two panel data methods (fixed and random variables) to conduct this part of the test and find clear support for the hypothesis. In order to compare the findings of the fixed and random effect models, we also conduct the Hausman test, and find select for the fixed effect model. The fixed effect results of external debt on economic growth revealed that external debt expansion has a negative and insignificant effect on economic growth of the East African countries.

The study external debt of the countries is not significantly related to the economic growth measured in terms of real GDP per capita; however, the sign of the coefficient is negative with no statistical significance. Also found that macroeconomic factors, specifically, inflation rate and exchange rate did have positive and significant effect on the economic growth. The interest payment did negatively and significantly affects economic growth of the East African countries while a depreciation of local currencies led to an increase in public debt. The investment and Term of trade did have positive and significant effect on the economic growth.

CHAPTER ONE

Introduction

1.1 Back ground

Economic growth is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. Economic growth can be measured in nominal terms, which include inflation, or in real terms, which are adjusted for inflation. For comparing one country's economic growth to another, GDP or GNP per capita should be used as these take into account population differences between countries.

In this period of lucid growth and development in every field of life, it is very difficult for a country to finance all of its development spending with its own resources. Therefore, external debt is considered as a significant source of income for developing countries to realize sustainable economic growth in their countries. The Government spends money to finance its various activities. The activities include building of infrastructure, defense of a country's national boundaries, provision of social services such as health, education, maintenance of security, payments of salaries for its employees and many others. To meet these expenditures the Government needs to have financial resources (revenue). Essentially the Government would use its domestic revenue arising from tax and non-tax sources. However, these resources may not be enough to meet these expenditures. This means that the expenditures will be greater than revenue hence creating a gap. This gap is called a deficit. To bridge this gap the Government is compelled to borrow from either domestic sources or external sources. This is referred to as Budget Financing. Sometimes the Government may have balance of payments problems whereby the country's exports cannot pay for imports. In this case the Government may borrow to solve this problem. This is sometimes referred to as balance of payments (BOP) financing.

External debt is an accumulation of annual loans entered it to between one's country government and creditors nation (public external debt), or guaranteed by the government (publicly guaranteed external debt) and between private and creditor nation (private external debt). According to Cline (1995), one of the conditions essential for external loans to have a positive growth impact on the economy is to ensure that the marginal productivity of each foreign loan is at least, greater than the cost of the principal and interest payment.

In revisiting the 1970s with a focus of debt, the following stylized facts emerge; transitory commodity price booms, expanded access to private financial and other trade credit, and huge public expenditures were some of the features of the most indebted developing countries. When the second oil prices shock hit in the late 1970s, most countries were poorly positioned to absorb it, given their higher level of debt and its less concessional structure. During the new development of the 1980-83 period, world recession, further terms of trade deterioration, high interest rates, delayed adjustment programs, and drought all complicated by the disruption and decline in private and official lending. This resulted in the sharply deteriorated economic conditions and outlook for most of Sub-Saharan Africa (Krumm, 1985).

As per Iyoha,M.A.(1999) empirical analysis: during 1980's, the average annual growth rate of real GDP in sub-Saharan Africa countries(SSA) was 1.7%, The annual per capita income declined at an average rate of 2.2% and terms of trade knock down by 9.1%. In line with the above fact a high population growth rate in the region resulted with -0.9 % annual average growth rate of real GDP per capita. Due to this the decade of 1980's is considered as "lost decade" for Africa in terms of development opportunities.

The East African is among the fastest growing regions. Growth rates have picked up strongly in the East African countries over the last two decades, outpacing the rest of sub-Saharan African since 2000.

Ethiopia's economy continues to flourish as the government focuses on transforming the economic structure of the country. GDP expanded 10.2% in fiscal year 2014/2015 and available data for the first quarter of fiscal year

2015/2016 suggest that the economy is on solid footing: domestic investment projects soared and foreign direct investment increased. However, the low-commodity-price environment along with the ongoing transition to a more industrial-led economy is taking a toll on the country's external accounts. The trade deficit deteriorated in the first quarter of fiscal year 2015/2016 as exports fell and imports boomed.

Ethiopia's sovereign debt has grown in recent years to unsustainable levels likely to create problems for the economy. The external debt especially has not been matched by a vibrant and diversified export sector. Ethiopia recorded a Government Debt to GDP of 28.60 percent of the country's Gross Domestic Product in 2014. Government Debt to GDP in Ethiopia averaged 33.64 percent from 1992 until 2014, reaching an all time high of 41.80 percent in 2002 and a record low of 24.70 percent in 1998.

In Kenya, the early 1980s were characterized by high budget deficits, high inflation, and unsustainable current account deficits. These financial imbalances were triggered by, among other things, the erosion of fiscal discipline following an expansionary fiscal policy implemented after the coffee boom of 1977-78 and severe external shocks –external debt rose by more than 78% between 1974 and 1978 owing to increased import bill, implications of the break-up of the East Africa countries in 1977 and construction of Kasarani sports centre. During this period, the ratio of public expenditures to GDP increased from 24%in 1973-74 to over 31% in 1979-80 while the deficit increased from 3% to 10% of GDP (kiringai, 2001).after a period of stagnation, growth is picking up in Kenya- the largest of the five economies-averaging 1.9% a year since 1990-2004, providing momentum for the region as a whole. Output declined in Burundi in most of the period since 1990 reflecting periods of political conflict but has shown signs of recovery in recent years (McAuliffe et al.., 2012).

In Uganda's a major external factor is debt crisis is the dramatic decline in export receipts due to declining coffee prices and unfavorable term of trade. The price of major export (coffee) decreased gradual from 1985 to 1993 and

Uganda suffered annual declines in its terms of trade every from 1986 to 1992. The declines in the terms of trade resulted in a sharp increase in Uganda's debt service to export ratio, which was over 60% between 1988 and 1993. Another major cause of debt was the high level of donor financed development expenditures. The reliance of the adjustment effort adopted in 1987 on external financing has created a larger debt burden for Uganda, with is the external debt more than doubling during the adjustment period from US$1,659 million to $2.9 billion as of June 1994.most of the increase was attributable to credits obtained from multilateral institutions to support the balance of payments and finance development projects. Multilateral debt as of June 1994 accounted for about 71% of the total debt stock, compared with about 43% in 1987(Mbire and Atingi, 1997).

According to economic and social Research foundation (ESRF) (1997), the debt crisis of the 1980s in Tanzania is explained by both external and domestic factors. These include: temporary high commodity prices and trade booms which led to increased foreign income earnings which, in turn, leveraged borrowing credibility, availability of cheap loans and credits abroad, particularly in the 1970s,expensive expenditure programmed in developing countries and huge of expansion of state-owned sector of the economy in the 1970s which did not perform with excellence. Tanzania's debt stock, at the end of June 2013 reached USD 17,690.5 million, an increase of 25.1 percent and 40.6 percent from the amount recorded at the end of corresponding period in 2011 and 2012. The increase was mainly on account of new disbursements, accumulation of arrears for the few Paris and non-Paris Club creditors and new issuance of domestic debt instruments. The ratio of national debt to GDP, in nominal terms, was 57.0 percent which comprises of public and private sector debt to GDP of47.1 percent and 9.9 percent, respectively.

Rwanda's external debt of the central government at the end of 2010 was 14.6% of GDP, including a small fraction which is guaranteed by the central government (0.4% of GDP). Multilateral creditors hold more than 80% of all

central government external debt, with the lion share by IDAWB (International Development Association of the World Bank) and ADB for a combined 55%. Domestic public debt (including central government and the central bank) was 8.9% of GDP at the end of 2010, of which nearly half (4.3% of GDP) were short-term maturities (IDA and IMF, 2011).

According the literature review the east African countries highly debt from the external for are mainly used to productive sectors, infrastructures etc. under this condition external debt servicing cannot affect of economic growth. But, if the borrowing country failed to service its debt, it will lose its' credit worthiness; and this in turn might affect the economic performance of the borrowing country by reducing the availability of foreign debt. (Mjema and musonda, 1994).

The study consists of panel data of five heavily indebted poor East African countries covering the period 1980 - 2014.Comparers this countries Ethiopia, Rwanda , Tanzania, Uganda, Kenya selected based on a number of criteria's like: - GDP per capita, geographical location, debt structure , political stability ,beside all data availability also considered and economy depends (a large share of agriculture in GDP).

1.2 Statement of the problem

Countries with less developed domestic debt markets often rely on external borrowing to meet their financing needs. This is because the domestic debt market is shallow and cannot match the government financing requirements. As a result, their debt portfolio is mainly composed of external debt. Although most countries in East Africa have over time deepened their domestic markets, a large proportion of their foreign borrowing is denominated in foreign currency. While the external financing is mainly from concessional sources, the challenges of managing external debt remain prevalent. For instance, the exchange rate fluctuations drive the debt service higher than projected leaving fewer resources to finance development projects. Chawdhury (2001) admits

that external debt may have huge effects on the overall performance of these countries.

The starting point of external debt is the development strategy of the country huge external debt does not necessarily imply a slow economic growth; it is a nation's inability to meet its debt service payments fueled by inadequate knowledge on the nature, structure and magnitude of the debt in question" (Were, 2001).

The overall targets of external debt are should be add developments for their peoples. It is not build-up government official's pocket and leave liabilities for the nation. Several studies have analyzed the effect of external debt on economic growth, but, the author is not aware of studies that have analyzed the effects of external debt on economic growth in the context of the East Africa countries. The aims are to:-

- What effect of External Debt on the Economic growth
- To identify the causes of external debt burden in these countries
- What is the recommend some policy options based on the findings

1.3 Objective of the study

The main objective of the study is to investigate the effect of external debt on economic growth generally in east Africa countries particularly in the five selected countries economy like:-Ethiopia, Kenya, Rwanda, Tanzania and Uganda. Therefore the study has the following specific objectives:-

- To examine the effect of external debt on economic growth
- To examine the effect of other economic variables on economic growth.
- To recommend some policy options based on the findings

1.4 Hypotheses of the study

External debt is expected to have positive impact on economic growth. This is the case when an expansion of public debt leads to an increase in public expenditure and an increase in economic growth through the government expenditure multiplier. But an increase in the external debt might indirectly

depress the level of GNP by creating debt overhang effect, crowding out effect, discouraging capital formation and encouraging capital flight due to tax increase expectation. Therefore, the effect of external debt cannot be determined a priori. It depends on the magnitude of the two effects. Moreover, this issue is discussed in detail under literature review. Therefore, since according to debt sustainability criteria east Africa countries is belongs to the HIPCs, we hypothesis that external debt burden and services negatively affect economic growth in east Africa.

1.5 Scope of Study

The study seeks to analyze external debt and its impact on economic growth. In order to fully capture its effect on the economy, Examines whether external debt impact on the economic growth of selected heavily indebted poor East African countries a thorough empirical investigation were conducted with data covering a period of 35 years 1980-2014 G.C.

1.6 Research Methodology and data sources

The methodology adopted in this study is panel data model to estimate the impact external debt using the Augmented Dickey Fuller (ADF) unit root test; Hausman test and techniques of estimation which provides coefficient estimates of the panel data used in analysis.

This study makes use of mainly secondary data for the period 1980-2014 G.C the major source of data are Ministry of Finance and Economic corporative(MFEC)(Ethiopia) ,World Bank reports (WB), International Financial Statistical of the IMF (IFS), and reports, journals and articles are used.

1.7 Organization of the paper

The paper is organized as follows. Section one is introduction of the study. Section two gives a review of the theoretical and empirical literatures. Section three is model specification. Section four econometric analyses of the study and section five is conclusion and policy recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is aimed at identifying and evaluating opinions, contributions, and findings of various studies that have been done before by different scholars and institutions. This chapter looks at the relevant literature done by past researchers to shed more light on the effects of external public debt on economic growth.

Economic theory suggests that reasonable levels of borrowing by a developing country are likely to enhance its economic growth. Countries at early stages of development have small stocks of capital and are likely to have investment opportunities with rates of return higher than those in advanced economies. As long as they use the borrowed funds for productive investment and do not suffer from macro-economic instability, policies that distort economic incentives, or sizeable adverse shocks, growth should increase and allow for timely debt repayments.

External debt is that part of the total debt in a country that is owed to creditors outside the country. The debtors can be governments, corporations.
According to the World Bank definition:-

"Total external debt is a debt owed to non-residents
Repayable in foreign currency, goods or services"

The gap between revenue and expenditure creates the need for borrowings. Individuals, organizations and governments borrow to fill this gap.

2.2 Historical review on the African debt

The late 1950s and early 1960s

The first period refers to the 1950's and 1960's are most often described as the "golden years" for developing countries In economic development Literature because of the rate of economic growth which was not just high but also internally generated. In the above years these LDC's increased their investment reliance on external resources.

The late 1960s and early 1970s

The second period refers to the late 1960s and early 1970s, and is marked by the first oil shock and the rise in commodity prices. The commodity price boom is followed by a sharp bust in 1974 and again after the 1977 coffee and cocoa boom. The response in most African countries was a rise in government expenditure, in the infrastructure sector in particular. When commodity prices fell, governments were unable to cut expenditure but were also in need of maintaining on-going projects. This was accompanied by increased borrowing resulting from improved credit worthiness, as export commodity prices rise and a belief in the cyclical nature of prices when these decline. . (Alemayehu Geda.1997). The major point that emerges is that following the rise in commodity prices and access to loans, there was a rise in public expenditure. Given the inherited colonial structure which necessitated spending on social and physical infrastructure, the increase in government expenditure (and the beginning of debt creation) was not a policy mistake, as seems to be depicted in the good part of the African debt literature. This spending is necessitated by fundamental problems which are historical and the resulting policies are the reflection of this reality (Alemayehu 1997).

The late 1970s and early 1980s

The third period refers to the late 1970s and early 1980s. The end of the 1970s had witnessed the second oil price shock. Major commodity prices continued to

decline, prompted, *inter alia,* by the recession in the industrial countries. The early 1980s were also characterized by an increase in real interest rate in the industrial world, chiefly due to the lax fiscal and tight monetary policy of the USA. By 1981, the real foreign interest rate was 17.4% compared to -17.9% in 1973 (Khan and Knight 1983: 2). The latter aggravated the interest rate cost of the non-concessional and private debts that became increasingly important during this period (Alemayehu 1997). This development prompted many African governments to continue borrowing (and get credit) on the assumption of a cyclical turn-around in commodity prices. These new loans were used to finance enlarged oil bills and to avoid sharp politically/socially disruptive decreases in public expenditure (Mistry 1988:7). The experiences of most countries, such as Ghana, Zambia, Malawi, Tanzania, Sierra Leone, Libya and Nigeria during this period generally confirm this pattern (Alemayehu 1997).

The late 1980s to the 1990s

The fourth period refers to the late 1980s to the 1990s. This period, similarly to the late1970s, was marked by continually declining commodity prices and the deterioration of terms of trade. For the period 1985-90 when a large number of African countries undertook adjustment programmes, the deterioration in the barter terms of trade of nine major export commodities resulted in a 40% decline in average export revenue (compared to 1977-79 average) despite a 75% increase in export volume (Husain 1994: 168). As a result, African countries became more vulnerable to further indebtedness. Moreover, the capitalization of amortization and interest payment through the Paris and London clubs rescheduling had also started pushing the debt stock upward (Alemayehu 1997).

Given this general pattern from the mid-1980s to early 1990s, African economies had become extremely indebted by the 1990s. Moreover, apart from investment in infrastructure (like the transport sector) which needed external finance for its maintenance, almost all countries had become dependent on external finance for securing imported intermediate inputs and ensuring the

smooth functioning of their economy. (Ndulu 1986; Ngwenya and Fantu 1992; Rattso 1992a and 1992b; Mbelle and Sterner 1991). Thus, throughout the two decades analyses, the value of imports was persistently increasing in most countries. This recurrent import demand problem was compounded by actual running down of the capital stock, including infrastructure.

Thus by late 1980s and early 1990s, such historically structured economies in Africa were vulnerable to events such as the recession of the industrialized economies, following the global monetary shock of 1979-81, which depressed commodity prices. This was also a time when the world economy witnessed:

(i) The emergence of high, positive real interest rate throughout the 1980s which

(Mistry 1988) increased the debt service burden of indebted countries.

(ii) Protectionism in the world market for agricultural products and low technology manufacturing which hampered diversification attempts, and finally.

(iii) The prevalence of repeated official and private rescheduling, often at penal terms (Mistry 1991: 10-11).

The increases in external debt over the years in developing countries has brought the issue of external debt out of hiding and has become a matter of concern both to the international and local community. The need to constantly borrow as a means of financing has brought about an increasing literature among various economists.

Recent Trends in Debt Flows

The combined stock of developing countries' external debt raised $437 billion to $4 trillion at end in 2010, reflecting net debt inflows of $495 billion, the downward effect of the year on year appreciation, in comparison with the US dollar, of foreign currencies in which around 30 percent of developing countries external debt is denominated, and debt forgiveness. Short term was the fastest growing component, rising by 34 percent in 2010 as compared to a 6 percent increase in the stock of outstanding long term external debt. Most short term

debt was trade related and, measured against developing countries' imports it increased only marginally, to 17 percent compared to 16 percent in 2009. The stock of long term debt at end 2010 was fairly evenly divided between publicly guaranteed debt, 54 percent, and debt owed to private non-guaranteed borrowers, 46 percent, although the former rose twice as fast as the later in 2010, by 8 percent as compared to 4 percent. Developing countries' debt stock remained moderate, an average of 21 percent of gross national income (GNI) and 69 percent of export earnings and risks associated with the fact that short term debt constituted 25 percent of debt stock at end 2010 were mitigated by international reserves.

International capital flows rose by 68 percent to $1.1 trillion in 2010, equivalent to their 2007pre-crisis level. Measured in relation to developing country gross national income (GNI), the increase in net capital flows was less striking: from 4.1percent of GNI in 2009 to 5.8 percent in 2010 but well short of their 8.1 percent ratio in 2007. Debt flows from private creditors were close to five times their 2009 level, driven by a massive jump in short-term debt and a strong rebound in bond issuance by public and private sector borrowers. Foreign direct investment and portfolio flows were up by 27 percent and 18 percent, respectively, bringing total private equity flows to $635 billion in 2010, only slightly below their 2007 all-time high of $667 billion. (Global Development Finance, 2012)

2.2 Theoretical literature

2.2.1 *The concept Growth and Debt Theories*

Basically in economic literature we learn two ways in which a country can grow its economy. It can be growth which has been brought about by innovations in the process of competition, which can well be described by the dynamic completion model (Ellig, 2001). On the other hand according to Solow (1956) neoclassical model economic growth can be achieved by an expansion in the amount of investment. According to this model a country will attain economic growth if it increases its savings and investments. This automatically implies

that for the least developed countries to grow economically they need to implement policies and finical that support greater savings that will then increase investment and hence growth.

To finance its activities a country has a number of options of raising the funds. It can make use of the internal sources such as taxes and fees or it can borrow if the internal source is not enough to finance the budget deficit. According to Adegbite, E et al (2008) the Dual Gap theory is a better explanation of the reason for opting for external finance as opposed to domestic financing in financing the sustainable development. According to the theory in developing countries the level of domestic savings is not sufficient to finance the needed investment to ensure economic development; since investment is a function of savings it is logical to require the use of complementary external goods and services. However, the relationship between domestic savings and foreign funds gives a guide as to how a country can borrow abroad (ibid). Also since most of LDCs are far from their steady state growth any investment injection could lead then to have accelerated economic growth.

The country should borrow abroad if it is anticipated that the return on the borrowed funds will be higher than the cost, therefore we do expect a country to invest in projects having expected returns higher than the cost of foreign debt. Since if not used wisely, debt can amount to impeding the long term growth prospect of the country. External debt does not transform automatically into debt burden when a country optimally make use of the fund. According to Adegbite et al (2008) in an optimal condition, the marginal return on investment is greater than or equal to the cost of borrowing, in this case debt will show a positive impact on growth.

According to Were, M (2001) debt overhang is much wider in that the effects of debt do not only affect investment in physical capital but any activity that involves incurring costs up-front for the sake of increased output in the future. Such activities include investment in human capital (in terms of education and

health) and in technology acquisition whose effects on growth may be even stronger over time.

Why the indebted poor countries had a problem of illiquidity? In answering the question according to Jonse G. Leta (2002) in his research on external debt and economic growth in developing countries pointed out that although the indebted poor countries have been able to pay i.e. solvent, the willingness to pay decline for a variety of reasons. Among many factors there are domestic and external factors that responsible for this outcome of crisis. The domestic factors often cited include wrong macroeconomic policies such as fiscal irresponsibility and exchange rate misalignment, policies that discourage savings such as negative real interest rates, which in turn reduce investment and encourage capital flight and financing long-run projects with short-term credits. External factors include oil shocks, deterioration in the terms of trade and rising foreign interest rates.

The theory holds that both the stock of external debt and its service (the payment of interest and) affect growth by discouraging privet investment or changing the composition of public spending. Higher foreign interest payments can increase a country's budget deficit, thereby reducing public saving if privet saving do not increase to offset the different.

The theory further suggests external debt may have nonlinear effect on growth, either through capital accumulation or productivity growth. According to the "debt overhang" hypothesis, there is some likelihood that in the further debt will be larges then the country's repayment ability, expecting debt-service cost be discouraging further domestic and foreign investment. Potential investors will fear that the more there is production, the more they will be "taxed" by

creditors to service the external debt, and thus they will be less willing to incur investment cost today for the sake of increased output in the future (Krugman, 1988).

According Serven (1997) argues that high debt stocks create uncertainties especially in low- income countries with debt servicing difficulties. In highly uncertain and unstable environment, investors continue to exercise their option of waiting when considering whether to invest in costly irreversible projects. Due to high uncertain environment resources are likely to be misallocated and poor quality investment undertaken which slows productivity growth.

Debt overhang also depresses investment and growth by increasing uncertainty. As the size of the public debt increases, there is growing uncertainty about actions and policies that the government will resort to in order to meet its debt servicing obligations, with adverse effects on investment. In particular, as the stock of public sector debt increases, there may be expectations that the government's debt service obligations will be financed by distortionary measures (the inflation tax, for example), as in Agenor and Montiel (1996). The extensive literature on uncertainty and investment suggests that in these circumstances, potential private investors will prefer instead to exercise their option of waiting (Serven (1997)). Moreover, any investment that takes place is likely to be diverted to activities with quick returns rather than to long-term, high-risk, irreversible projects. Rapid accumulation of debt can also be accompanied by increasing capital flight if the private sector fears imminent devaluation and/or increases in taxes to service the debt (Oks and Wijnbergen (1995)).

2.2.2 Poor debt management practices

In terms of debt sustainability and debt management east Africa has performed poorly. The lack of understanding of the nature, structure and magnitude of external debt has not allowed for the east Africa economy to effectively meet her debt service obligations and manage appropriately.

2.2.3 Solow Growth Model and External Debt

The Neoclassical Growth model by Solow-Swan (1956) identifies two possible variation sources of output per worker: differences in capital per worker and differences in the effectiveness of labor, with a very important assumption that technical change and saving are exogenous and the technology process is labor-augmenting or Harrods-neutral The principal conclusion of Solow model is that there will be an effect on the income level of savings but the accumulation of physical capital cannot account for either the vast growth over time or the vast geographic differences in output per person, thus the long term driving force of growth is the exogenous technology change or the effectiveness of labor. This position also rests on certain points: (a) fundamental forces like resources, preferences, and technology lead to Pareto-efficient outcomes, and (b) institutions do not even influence the choice of the equilibrium. Representing the technical change function in the reduced growth models of Mariano and Villanueva (2005), external debt affects the technology change indirectly through capital accumulation. In this way, external debt should also have growth effects in the long run. However, the above mentioned models have not identified the exact meaning of "technology" or "the effectiveness of labor"; and more, what causes its change. One catchall factor corresponding to this is abstract knowledge, so the determinants of stock of knowledge will impact growth finally, and cross country difference. The possible determinants beyond the most direct understanding of technology include education level and skill qualifications of the labor force, strength of property rights, quality of infrastructure, cultural attitudes towards work, entrepreneurship and teamwork spirit during work, managerial ability level, and so on.

2.3 Empirical literature

2.3.1 The effect of External Debt on Investment and Economic growth

The effect of external debt on investment and economic growth can studied best by having better understanding on the issue of debt overhang, a term

which is directly related with investment and economic growth. Different economists define debt overhang in different ways.

For Krugman (1988) debt overhang is:-

"A situation in which the expected repayment on external debt falls short of the contractual Value of the debt"

Eduardo Borensztein (1990) defines debt overhang as:-

"A situation in which the debtor country benefits very little from the return to any additional Investment because of the debt service obligations"

2.3.2 Debt overhang, investment and Growth

Most of the studies that have looked at the effect of external debt on economic growth in developing Ranciere (2009economies have been driven by the "Debt overhang" hypothesis, a situation where a country's debt service burden is so huge that a large portion of output increase to foreign lenders and consequently creates disincentives to invest(Krugman,1988). According Imbs and) and Pattillo et al.(2004) arguments used two-stage least squares and differenced generalized method of moments (GMM) to estimate a standard growth model over the period 1969-98. They find a nonlinear effect of external debt on growth: that is, a negative and significant impact on growth at high debt level but an insignificant impact at low debt levels. The opposite argued from the privies argument, Cordella et al. (2005) find evidence of debt overhang for intermediate debt level, but an insignificant debt-growth relationship at very low and very high levels of debt.

Milton Iyoha (1999) used macro econometric model to facilitate the simulation of the impact of external debt in economic growth in Sub-Saharan Africa. With the use of simultaneous equation models for output and investment demand he was able to conclude that, there is a significant debt overhang and crowding out effect in Sub-Saharan Africa. In other words, the large stock of external debt and heavy debt service payments had a depressing effect on investment in SSA.

He wants further in simulating the implications of the debt reduction packages on economic growth. Upon simulating at different debt stock reduction levels he found that the hypothesized debt reductions assumed would increase investment and to a lesser extent the GDP on subsequent period. Simulations showed that a 50% debt stock reduction would have raised per capita gross domestic investment by over 40% and increased GDP growth by over 3%, on average, during the 1987-1994 periods.

Fosu (1999) employed an export augmented production function to investigate the effect of external debt on economic growth in sub-Saharan Africa for the 1980-1990 periods. The study reveals that there is a negative relationship between debt and economic growth. However, the study shows a relatively weak negative impact of debt on investment level.

Pattillo et al. (2002) using a large panel data set of 93 developing countries over the period 1969-1998 found empirical support for a nonlinear effect of debt on growth: at low level, debt has positive effects on growth; but the above particular thresholds or turning points, additional debt begins to have a negative effect on growth.

Odegbite, E et al (2008) used two models to capture both linear and nonlinear relationship of external debt in economic growth in the study on the impact of Nigeria's external debt on economic development. Based on the modification of Elibadawi, Ndulu and Ndung'u (1997) model Odegbite investigated the impact of large external debt stock with its servicing requirements and resulting fiscal deficit on private investment. Analysis showed that the influence of export growth on GDP growth was confirmed with a significant statistics. This has supported what Edwards (1998) claimed on the positive role of export growth process by increasing factor productivity in Nigeria. Due to the existence of debt overhang and crowding out effect result shows that savings compresses output. It was evidenced that, a unit increase in debt burden as measured by the debt service to GDP ratio generates 185 units growth. However the

shortcoming of the model used is it considers the public sector gap only and ignores the BOP, it also takes government expenditures and revenue, interest rate and exchange rate as given.

Zouhaier and Fatma (2014) in their study of economic growth in 19 developing countries found that external public debt as a percentage of GDP and GNI had a negative and statistically significant effect on economic growth. Similarly, the external public debt had a negative effect on investment in the 19 countries. Although this study focused on developing countries such as Kenya, its findings are inconclusive. Additionally, it did not identify the channels through which external debt affect economic growth.

Georgiev (2012) studied the relationship between public debt and economic growth, investments, and economic development in 17 European countries. His study used data for the period 1980 to 2012, which was analyzed using descriptive statistics and panel data regressions. The research found that as public debt increase, the cost of servicing it rises substantially. This leads to a decrease in investments, which in turn affects economic growth negatively. The researcher concluded that public debt affects economic growth indirectly by reducing investments through high-interest rates, increased uncertainty, and high debt repayment costs. The limitation of this study is that it focused on gross debt rather than net public debt. Conceptually, the net debt-to-GDP ratio may be a better measure of public debt sustainability because it indicates the extent to which the government must rely on savings by the public to finance its future borrowing needs.

The empirical studies have shown mixed results on the effect of external debt on economic growth. Some arguments are of the view that external debt negative affect the economic growth but some are in the opinion that external debt positively affects the economic growth.

To summarize, the theoretical and empirical evidence about the impact of external debt on economic growth is mixed. Therefore, this study is focus on

analysis of the impact of external debt on economic growth particularly focusing on five selected east African countries using panel data approach.

CHAPTER THREE

3. MODEL SPECIFICATION, VARIABLE DEFINITION AND ESTIMATION TECHNIQUE

3.1 Data

The empirical frame work of this study is to model the effect of external debt on the economic growth some select countries east Africa. The data for the topic under covered five heavily indebted poor African countries selected based on a number of criteria's like: - GDP per capita, geographical location, debt structure (i.e. their total external debt and debt service), political stability (in terms of stable government). The empirical investigation is carried out with annual data over the period 1980 to 2014. The study is bounded with this time period due to the fact that the effect of debt that many African countries incurred during the major debt crisis in 1980's following the global oil shock and world economic recession, is best dealt in this time period. The main data source for the variables was World Bank data base supplemented by IMF.

3.2 MODEL SPECIFICATION

The main aim of this empirical investigation is to determine the effect between external debt and economic growth.

According to Sala-i-martin (1997), "economic theories are not enough to pin point the exact determinants of growth. As a solution for this problem they suggest a cross-sectional regression

Model of the form:-

$\gamma = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \varepsilon$

Where γ is the vector of the rates of economic growth, and $x_1 \ldots, x_n$ are vectors of potential explanatory variables which can vary from researcher to researcher." "The methodology usually used by empirical growth analysts consists of simply "trying" the variables that are thought to be potentially important determinants of Growth" Based on the above suggestions, this study uses log of GDPPC (case for convergence), log of investment, log term of trade and log interest and log exchange rate and log of inflation and the debt burden measuring variables:

external debt stock to GDP to investigate the exact effect between external debt and economic growth.

Following the advantages suggested by Baltai, the study uses panel data, as they give

- More informative data
- More variability
- Less co linearity among variables
- More degrees of freedom and more efficiency

Based on economic theory, this study modeled GDPPC as a function of external debt stock to GDP, investment, interest rate, term of trade, exchange rate and Inflation. This relationship is expressed as:

GDPPC = f (EDGDP, INV, TOT, ER, INR ,INFL) Therefore, α_0, is the constant, $\alpha_1 \ldots\ldots\ldots \alpha_6$ are parameters to be estimate the equation can take the following form;

$$\mathbf{GDPPC_{it} = \alpha_0 + \alpha_1 EDGDP_{it} + \alpha_2 IR_{it} + \alpha_3 EXR_{it} + \alpha_4 TOT_{it} + \alpha_5 INV_{it} + \alpha_6 INFL_{it} + \varepsilon_{it}}$$

Where GDPPC Is the dependent variable whereas the independent variables are, EDGDP, TOT, EXR, INP and INV are External debt stock to GDP, Term of trade, exchange rate, interest rate, investment, Inflation respectively. **ε** is a stochastic error term

Expressing the variables in natural logarithmic form, an attempt has been made to look at the relative contributions (elasticity) of each variable to the growth process. Therefore, the model to be estimated is specified as

$$LGDPPC = \alpha_0 + \alpha_1 LEDGDP + \alpha_2 LIR + \alpha_3 LEXR + LTOT + \alpha_5 LINV + \alpha_6 LINFL + \varepsilon_{it}$$

3.3 Variable Definition

GDPPC-GDP per capital=> is a measure of the total output of a country that takes the gross domestic product (GDP) and divides it by the number of people in the country. The per capita GDP is especially useful when comparing one country to another because it shows the relative performance of the countries. A rise in per capita GDP signals growth in the economy and tends to translate as an increase in productivity.

INV => Investments - Investment refers to the purchase of goods that are not consumed today but are used in the future to create wealth. Theoretically, Investment is the key to economic growth; if investment rises in an economy, aggregate demand also rises and therefore economic growth .according Jorgenson (2003) obtained that investment in tangible assets is the most important source of economic growth in the group of seven (G7) nations. The contribution of capital input exceeds that of productivity for all countries for all periods. This variable is measured as a ration of GDP. The investment is expected to have a positive effect on economic growth. The data is taken from World Bank data base (WDI)

EDGDP => External debt stock to GDP ratio => External Debt Stock is the amount at which the debt was contracted and it is used as a proxy for capturing external debt burden. The a priori expectation is a negative or positive relationship between Gross Domestic Product per capita and External Debt Stock i.e. the higher the external debt stock, the lower the economic growth or the higher the external debt stock, the higher the economic growth .

TOT=>Term of Trade. Term of trade refers to the price of a country's exports(P_x) relative to the price of its imports (P_m),($TOT=P_x/P_m$),where P_x a price index for all export goods due to the fact that countries export more than one good, P_m the price index for all import goods. Mendoze (1997) proposes a stochastic Growth model whereby terms of trade uncertainty can adversely affect savings and growth. The data is taken from World Bank data base (WDI)

IR=>Interest rate payment: is the interest rate payment applicable to a loan commitment as specified in the loan contract. The average interest on all public and publicly guaranteed debt committed during the specified period.

EXR=>Official Exchange rate=>is a Measurement of Exchange rate for each country to the US dollar. Exchange rate is the price of a nation's currency in terms of another currency. It is included in the model because it is a

macroeconomic indicator and it is also a monetary aggregate in the open economy. The a priori expectation is a positive relationship between Gross Domestic Product per capita and Exchange Rate i.e. the higher the exchange rate, the higher the economic growth.

INFL=> INFLATION =>Measurement Annual Percentage change in Consumer Price Index (CPI). Inflation may also act as a proxy variable for the quality of economic management. A high rate of inflation is a sign of internal economic tension and of the inability or unwillingness of the government and the central bank to balance the budget and to restrict money supply. The higher the inflation rate, the more risky the government is perceived to be. Furthermore, inflation can influence the demand for foreign funds through its adverse impact on the trade accounts. That is, inflation would tend to cause export demand to fall and import demand to rise, and the growing trade deficit, in turn, would increase trade-financing requirements.

3.4 Estimation Procedure

3.4.1 The Fixed Effects (FE) and the Random Effects (RE) Regression

Panel data can be analyzed using two models, namely the fixed effects and the random effects models. In the proposed study, the FE was used to determine the effect external debt and economic growth within each country. The justification for using this model is that each country has a unique macroeconomic environment with variables that may or may not affect GDP per capita growth. The FE model is defined as:

$GDPPC_{it}=\alpha_i +\beta_1 X_{it} + \mu_{it}$

Where:

$\boldsymbol{\alpha_i}$ (i=1…..n) is the intercept for each country

$\boldsymbol{GDPPC_{it}}$is Gross domestic product per capita i= country and t= time

$\boldsymbol{X_{it}}$is a vector of independent variables (external debt stock to GDP, investment, interest rate, term of trade, exchange rate and inflation)

β s are the coefficients of the independent variables

$\boldsymbol{\mu_{it}}$ is a stochastic error term

The main assumption of the model is that fixed parameters represent the non-observed individual effects. Moreover, the independent variables are not correlated with the individual error term.

RE model assumes that differences across entities (countries in this case) are random and uncorrelated with the independent variables. It is also based on the assumption that the error terms of individual entities are not correlated with the independent variables. The RE model is defined as:

$GDPPC_{it}=\alpha_i +\beta_1 X_{it} + \mu_{it} + \varepsilon_{it}$

Where:

μ_{it} is the between country error term

$\varepsilon_{it}$is the within country error term

The generalized least squares method was used to estimate the RE model

3.4.2 Hausman Test

Hausman test was conducted to select either the FE or the RE model and the result is presented on the tables below. The test is based on the null hypothesis that RE is the preferred model against the alternative hypothesis that the FE is the preferred model. It basically tests whether the errors are correlated with the regresses the null hypothesis is that they are not. Hausman test looks at the difference in the coefficient estimates using fixed effect and random effect estimators. The test selected the fixed effects.

Table 4.2: Hausman test results

Variable	Coefficients			
	(b) random	(B) fixed	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
EDGDP	-264.3569	-16.48821	-247.8687	37.59905
TOT	-.1161628	1.042166	-1.158328	.331285
IRP	-36.0076	-145.3039	109.2963	9.97337
INF	.0104304	1.342659	- 1.332228	.4691242
EXR	.0172309	.127224	-.1099931	.
INV	8.938418	10.23038	-1.291961	1.468459

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
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 346.94 Prob>chi2 = 0.0000

From the hausman test results in Table 4.3, the p-value is o.ooo, less than 0.05.this shows that the value is significant and therefore fixed effects model is applicable in regression. The fixed effects model was therefore chosen for other models based on Hausman tests carried out.

CHAPTER FOUR

4. ESTIMATION AND INTERPRETATION OF RESULTS

4.1 Fixed Effects Model (FEM) and Random Effects Model (REM)

To recall, the main objective of this paper was to investigate the interaction between external debt and economic growth in five countries from eastern Africa. With this interest we have developed two types of model namely the fixed effects and random effects model whose definition and intuitive explanations are given in more detail previously in the methodology section. Essentially, the choice of estimation model in panel regression, as the existing body of literature suggests, can be made grounding from the objective of the study and also standard statistical tool i.e. to use the hausman test of model selection. Based on the hausman test the fixed effect was selected and the results from the estimation of the model presented for fixed effect estimation under the methodology section is discussed as follows.

However the hausman test suggested using the fixed effects model we have managed to present the results from both model types. Since there is no such a hard rule dictating to stick with one model, and to make complete presentation the results obtained from both the random effect and the fixed effect models are presented together in Table 4.1.

External Debt and Economic Growth

As the table shows that external debt of the countries is not significantly related to the economic growth measured in terms of real GDP per capita, however, the sign of the coefficient is negative with no statistical significance. In fact, economic theory suggests that external debt can potentially be a good source of capital especially for countries lacking financial capital remarking reasonable levels of borrowing by a developing country. Countries having high population together with quite big plot of other capitals (for example land) have a potential to make the best out of any additional capital that allows combining the resources and running operation. This economic theory is entirely based on assumptions which in reality fail in the real world, particularly, in developing

economies. One potential theoretical reason for the failure of the relation under this study might be related to effective utilization of the external capital inflow in the form of debt. This actually begs further research since it is not covered under the scope of this study. When we are claiming this reason, we are not withstanding the fact that, the poor nations are also exploited unfairly from the terms and conditions signed during the debt contracts. Thus, external debt can reduce economic growth by crowding out investments in the private sector. The negative relationship between external debt and GDPPC growth could be explained in part by the fact that most of the East Africa countries have underdeveloped capital markets. External debt can discourage economic growth through several channels. To begin with, as external debt increases a large proportion of tax revenue has to be used to repay foreign loans. Thus, where there is debt overhang, foreign investors restrain to come and invest. Our findings in the above discussions are consistent with a number of studies conducted including few (Cordella et al. (2005)) (Zouhaier and Fatma (2014), among many.

Other variables like macroeconomic stability measured in terms of inflation, exchange rate, investment, terms of trade and interest rate payment have shown a significant relationship with economic growth of the countries under this study. This is quite consistent with the findings of literature have the lion's share. To see each turn by turn, the first economic variables was terms of trade. The regression result shows a positive term of trade is related to positive change in economic growth in the countries with significant coefficient (see table 4.1 below). The stylized facts on economic growth have revealed that the terms of trade that developing economies face currently are characterized by favoring for the rich nations which may be claimed on a number of reasons. The explanation for this direct relation is straight forward; positive terms of trade implies higher value of exports showing better performance of the domestic production relative to imports. Exports appear in the equation of value addition positively whereas, imports are deductibles; saying the relation (under ceteris paribus) direct for exports and indirect for imports. The second

variable is investment gauged by its ration to the GDP, having a direct and significant relation with economic growth. Once again this is directly observed and begs no further explanation. Investment is the major component of GDP. The third variable is interest rate payment made external debt. The result shows a negative and significant effect of interest rate on economic growth. This measure is inversely related to economic growth because; the higher the interest payment is made on the borrowed amount it takes a big share of the profit from investment made in the borrowing country. Firstly, no capital is accumulated from the return on investment in the borrowing country. Secondly, there will be no incentive to invest more by countries which rely on external debt as source of capital. The fourth variable of interest under the regression equation is macroeconomic stability of the borrowing countries. The macroeconomic stability of the countries demanding the external debt matters a lot as it is directly related to the effective utilization of the capital gained from external sources. Inflation by consumer price index was used as a proxy to measure macroeconomic stability; this variable is directly related to economic growth with significant effect. Obviously better macroeconomic stability provides a fertile land for benefiting from external debt in order to enhance economic growth. The last variable but in no sense the least is official exchange rate with a significant and positive sign. Higher exchange rate favoring the domestic currency implies higher value of exports relative to imports, and therefore positively affecting economic growth.

In conclusion, the regression result from the fixed effects model has shown a negative but insignificant relationship between economic growth and external debt. On the contrary, but consistently similar to previous works, investments, macroeconomic stability, terms of trade and official exchange rate have a direct and significant effect on economic growth. The exception here is the interest rate payment on the debt exhibiting a negative and significant relationship with economic growth.

Table 4.1 Fixed effects and Random effects model results

Variable	Fixed			Random		
	Coefficients	Std. Error	P>|t|	Coefficients	Std. Error	P>|t|
EDGDP	-16.48	38.35	0.668	-264.356	53.71305	0.000
TOT	1.042	0.273	0.000	-.1161	.4298575	0.787
IRP	-145.30	12.41	0.000	-36.007	15.92615	0.024
INFL	1.342	0.464	0.004	.01043	.6602183	0.987
INV	10.230	2.129	0.000	8.938	2.586314	0.001
EXR	0.127	0.029	0.000	.01723	.0270688	0.524
CONSTANT	114.149	55.567	0.042	380.16	76.69342	0.000
Sigma_u	263.56			Sigma_u	0	
Sigma_e	119.18			Sigma_e	119.18607	
rho	0.8289			rho	0	

$$\underset{}{\boldsymbol{GDPPC}} = \underset{(\mathbf{55.56})}{\mathbf{114.1}} + \underset{(\mathbf{38.35})}{(\mathbf{-16.48})\boldsymbol{EDGDP}} + \underset{(\mathbf{0.273})}{(\mathbf{1.04})\boldsymbol{TOT}} + \underset{(\mathbf{12.41})}{(\mathbf{-145.30})\boldsymbol{INR}} + \underset{(\mathbf{0.029})}{\mathbf{0.127}\boldsymbol{EXR}} + \underset{(\mathbf{2.129})}{\mathbf{10.23}\boldsymbol{INV}} + \underset{(\mathbf{0.464})}{\mathbf{1.342}\boldsymbol{INF}} + \in_{\boldsymbol{it}}$$

CHAPTER FIVE

5. CONCULSION AND RECOMMENDATION

5.1 CONCULSION

The main objective of this study was to examine the effect of external debt on economic growth in five East African countries namely, Ethiopia, Kenya, Tanzania, Uganda, and Rwanda, by using data of about 30 years starting from 1980-2014.In addition to this paramount objective, this study has attempted to investigate effects of other control variables on economic growth. Based on the conducted Hausman test, fixed effect model was selected. The findings based on the fixed effects model are summarized as follows:

- Centering on the basic question on the relation between external debt and economic growth: the external debt was found to be negatively related to the economic growth of the countries covered under this study, though the results are statistically insignificant. Some potential theoretical explanations consistent with this result might be related to effective utilization of the external capital inflow in the form of debt. Our findings in the above discussions are consistent with a number of studies conducted including few (Cordella et al. (2005)) (Zouhaier and Fatma (2014), among many.
- Other variable like exchange rate, terms of trade, inflation and investment were found to have a positive and significant effect on the economic growth of the countries. The finding over these variables is consistent with large body of existing growth literatures and the theoretical explanations are quite straight forward.
- From all the findings the only variable exhibiting significant and negative relationship with growth is interest rate payment. Once again this result has a simple and straight theoretical explanation and also consistent with previous works.

Generally, this paper has shown us the above bulleted findings and the need for further investigation of each relation separately in a greater depth. This might help policy makers sense which area to intervene and which

directions to follow in order to achieve their developmental goals. The result especially for the negative effect of external debt needs further deep analysis to know why it failed to provide the preconceived benefits to the growth of these poor nations.

5.2 RECOMMENDATION

The policy options forwarded below are based the findings provided in the previous section:

- External debt is a very important area in any country for boosting the economic activities. It is a contradiction whether external debt stimulates economic growth or hinders growth. Some researchers found positive relation, some negative and some no significant relation between external debt and economic growth for different economic condition. This paper lies in the strand of findings of negative and insignificant relation. One point to give remark here is the negative relation may be implying to think about the optimal level of external debt that a country should be indebted. Hence, in this study it is recommended that in future plans should ensure to take an external debt which productive used and the rate of return of debt is higher than the service payment rate. It should be a serious concern for what the purpose of external debt is undertaken and to provide the efficiency of domestic resource uses and to reducing unnecessary cost of government to spend the budget in the right way in order to avoid the bulky deficit.
- The government should pay more attention to the debt management profile and particularly for its items of expenditure. It should try to the best in implementing the borrowing funds to proper and productive programs for the betterment of the whole nation. Importantly, the government should establish, maintain and manage a credible database. The database should provide timely, accurate and comprehensive data to requisite stakeholders for the purpose of disclosure and DSA.

- Moreover the government should establish a transparency of loan cycle that covers the activities for project identification, appraisal and approval, loan negotiations and contracting, loan disbursements, project implementation monitoring and evaluation as well as loan repayment.
- Finally, the government should provide a policy framework that is credibly creating an environment that will encourage investors' confidence for both local and foreign to invest in the country.

To conclude, further deep analysis of this interaction may enable all the above bulleted conclusions and the recommendation as well finally begs for deep and robust analysis of the topics raised in this paper so that careful implementations of the policy options help in realizing the ambitious development plans of governments and peoples of Africa, particularly the countries under this study. Therefore, we finally suggest that far reaching measures couples with stable macroeconomic environment and good governance must be ensured for the effective use of external debt and to be positively interpreted for its contribution to the countries growth.

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```
. xtreg gdppc TOT INR NEXR INV INF EDGDP, re

Random-effects GLS regression                   Number of obs      =       175
Group variable: countrycode                     Number of groups   =         5

R-sq:  within  = 0.3576                         Obs per group: min =        35
       between = 0.0008                                        avg =      35.0
       overall = 0.2646                                        max =        35

                                                Wald chi2(6)       =     60.45
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

gdppc	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
TOT	-.2109488	.4131122	-0.51	0.610	-1.020634	.5987363
INR	-37.08572	15.74443	-2.36	0.018	-67.94423	-6.227215
NEXR	.0173895	.0269853	0.64	0.519	-.0355007	.0702797
INV	9.242555	2.589334	3.57	0.000	4.167555	14.31756
INF	.3342164	.7024526	0.48	0.634	-1.042565	1.710998
EDGDP	-263.9939	53.48598	-4.94	0.000	-368.8245	-159.1633
_cons	381.194	76.54019	4.98	0.000	231.1779	531.21
sigma_u	0					
sigma_e	119.72941					
rho	0	(fraction of variance due to u_i)				

```
. xtreg gdppc TOT INR NEXR INV INF EDGDP, fe

Fixed-effects (within) regression               Number of obs      =       175
Group variable: countrycode                     Number of groups   =         5

R-sq:  within  = 0.6748                         Obs per group: min =        35
       between = 0.5594                                        avg =      35.0
       overall = 0.1043                                        max =        35

                                                F(6,164)           =     56.73
corr(u_i, Xb)  = -0.6323                        Prob > F           =    0.0000
```

gdppc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TOT	1.077219	.2673759	4.03	0.000	.5492756	1.605162
INR	-143.1493	12.36683	-11.58	0.000	-167.568	-118.7305
NEXR	.1241046	.0289581	4.29	0.000	.0669259	.1812833
INV	10.25771	2.120825	4.84	0.000	6.070064	14.44535
INF	1.495952	.4811685	3.11	0.002	.5458685	2.446036
EDGDP	-26.71757	37.9943	-0.70	0.483	-101.7386	48.30348
_cons	113.2485	55.33176	2.05	0.042	3.99402	222.5029
sigma_u	263.2712					
sigma_e	119.72941					
rho	.82862319	(fraction of variance due to u_i)				

```
F test that all u i=0:     F(4, 164) =    76.05              Prob > F = 0.0000
```

Declaration

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

Declared by:

Name: Lewam Teshome Fantaye

Signature: _____

Date: _____

Confirmed by (advisor)

Name: Tassew Woldehanna (PhD)

Signature: _____

Date: _____

Place and date of submission: _____