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MACROECONOMIC DETERMINANTS OF
ECONOMIC GROWTH IN ETHIOPIA:
CO INTEGRATION APPROACH

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List of Tables

Table 1: Unit Root Test	31
Table 2: Optimal lag Length	32
Table3: Un restricted Co-integration Rank Test	32
Table 4: Co integrated coefficients	34
Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey.....	36
Table 6: Serial Correlation Test	37
Table: 7 Error Correction Model	38
Table: 8 Granger Causality Tests.....	43

List of Figures

Figure 1: Real GDP Growth Rate	29
Figure 1.2 : Growth Rates of GDP in GTP, PASDEP, SDPRP and Pre SDPRP Periods	30

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Acronyms

ADF Augmented Dickey Fuller test

CPI Consumer Price Index

ECM Error correction model

EEA Ethiopian Economic Association

EDRI Ethiopian Development Research Institute

FDI Foreign Direct Investment

GDP Gross Domestic Product

GE Government Expenditure

GTP Growth and Transformation Plan

IGNOU Indira Gandhi National Open University

IMF International Monetary Fund

INF Inflation

MEC Master of Economics

MoFED Ministry of Finance and Economic Development

ODA Official Development Assistance

PASDEP Plan for Accelerated and Sustainable Development for Eradication of Poverty

RPCGDP Real Per Capita Gross Domestic Product

RGDP Real Gross Domestic Product

SDPRP Sustainable Development and Poverty Reduction Program

UNCTAD United Nation Capital and Development

SSA Sub Saharan Africa

WB World Bank

Abstracts

The main objective of the study was to analyze the major macroeconomic determinants of economic growth in Ethiopia in the years 1981-2013 using co-integration approach. The analysis is based on time series econometrics using the variables of; growth in real GDP per capita, physical capital, labour force, foreign direct investment, foreign aid, consumer price index, and government expenditure. All variables turned out to be non-stationary at their levels but became stationary at their first difference. The results of Johansson's co integration test indicates that there exist a long run and short run relationship between growth in real GDP per capita and study variables.

The study finds out that in the long run physical capital and labour had a positive effect on growth in real GDP per capita, although labour is not statistically significant. As a result, increase in these variables lead to improvement in real GDP per capita growth.

However, foreign direct investment, foreign aid, inflation and government expenditure had negative effect on growth in real GDP per capita, though inflation is not significant statistically. Hence, in the long run, physical capital, foreign direct investment, foreign aid and government expenditure are significant determinants of growth in real GDP per capita in Ethiopia. In the short run, the error correction model (ECM) estimate indicates that there is 5.59 percentage adjustment taking place each year towards the long run periods.

The short run analysis indicates all variables are statistically insignificant except physical capital. Therefore, in the short run, physical capital is significant determinants of growth in real GDP per capita in Ethiopia.

The Granger Causality test showed that there is unilateral and bidirectional causality between variables.

The above results have an important policy implication. The findings of this paper imply that economic growth can be improved significantly when;

- 1. Policies should be put in place to increase physical capital and labour in Ethiopia since these have positive effects on growth in real GDP per capita.*
- 2. Government retain appropriate monetary and fiscal policies in order to fight inflation in the economy, since inflation have negative influence on investment and economic growth.*
- 3. Educational institutions should link up with the business organization and in rewarding sectors to know what different institutions need in terms of the labour force, to curb the current negative impact of labour on growth.*
- 4. Government device strategies to mobilize money domestically for developmental projects rather than to rely on foreign direct investment.*
- 5. Government should also spend on the most productive sectors of the economy like the health sector, educational sector, and agricultural sector and so on.*
- 6. Government put rigorous policy in place to make the best from the cheap resources of labour force so that in order to enhance their performance to the economy.*

Table of Contents

List of Tables	ii
List of Figures	ii
Acknowledgment	iii
Acronyms	iv
Abstracts	v
1. Introduction	1
1.1 Background of the Study	1
1.2 Statement of the Problem	4
1.3 Objective of the study	6
1.4 Significance of the Study	7
1.5 Limitation of the Study	8
1.6 Organization of the Study	8
2. Reviews of Literatures	9
2.1 Theoretical Models of Economic Growth	9
2.1.1 Exogenous Growth Model	10
2.1.2 Endogenous Growth model	13
2.2 Determinants of economic Growth	14
2.3 Empirical Review	15
3. Model Specification and Methodology	21
3.1 Source of data	21
3.2 Method of Data Analysis	21
3.3 Model Specification	21
3.3.1 Co-integration and Error Correction.....	23
3.3.2 Estimation techniques	23
4. Overview of Ethiopian Economy	25
4.1 The Imperial Regime Pre: 1974	25
4.2 The Socialist (Military) Regime: 1974-1991	25
4.3 EPRDF: 1991 to the present	26

5. Empirical Results and discussions	29
5.1 Descriptive Analysis: Ethiopian Economy Growth Rate	29
5.2 Unit Root Test	31
5.3 Selecting Optimal lag	31
5.4 Co integration Test	33
5.5 Error Correction Estimates	36
5.5 The Pairwise Granger Causality Test	40
6. Conclusion and Policy recommendation	43
Annexes	43
1. Bibliography	46
2. Project Proposal	48
3. Advisor’s CV	48

1. Introduction

1.1 Background of the Study

Standard of living and growth are found at different level in the world. Growth in some countries are higher than others with increasing level of income which has made it possible to consume higher quantities of goods and services as well as better quality while others remain in abject poverty. Economists have always proved that growth is an essential ingredients for economic development. Economic growth is everybody's concern and has got particular attention of economists and policy makers.

There have been attempts to explain such growth through developing economic models. Among the various models, Exogenous Solow Model and Endogenous growth model are the most known.

The sources of economic growth is different for different researchers. There is no consensus in the literature on the sources of growth. However, the general agreement is that sources of growth is both internal and external to the economy of a country.

The issues was a question of great importance for many economists in the past and is also today who are interested to know and search for factors enabling some countries to grow and develop while others suffer from miserable poverty. The economic performance of countries are different and demands close investigation as to the main causes that makes some remain poor while others performing miraculously. Experience showed that some Asian Tigers have recorded surprising economic performances while the SSA countries have showed dismal performance, if not staggering growth record.

In light of this, taking Ethiopia in place as it belongs to SSA countries the recent Ethiopian Economic Association (EEA), 2015 report showed that Ethiopia's GDP

average annual growth rate is 10.34% since 2001-2015. During the fiscal year (2013/14), all the three major sectors, namely agriculture, industry, and services performed well. During this fiscal year value-added in the agriculture sector grew by 5.4 percent, industry by 21.2 percent and while service sectors 11.9 percent.

The EEA report added that according to the national income accounts of the Ministry of Finance and Economic Development, nominal GDP stood at 1.047 trillion Birr. This translates in to a per capita GDP of 12,039 Birr which is equivalent to about US\$ 634 at the current official exchange rate. Calculated at 2010/11 constant market prices, per capita GDP of Ethiopia stood at 7,813 Birr, about US\$ 411. This is about twice the level of per capita GDP Ethiopia had in 2005.

According to the Human Development Reports of the United Nations Development Program (UNDP), Ethiopia's national income in 2013 measured by 2011 PPP \$ was 1,303. With this level of income, the nation was placed at the rank of 176 out of 187 countries. In the same year, Ethiopia was ranked 173rd out of 187 countries in human development index (HDI). The rate of growth in Ethiopia's HDI is the highest among the 187 countries with an average annual rate of improvement of 3.35 percent.

The International Monetary Fund (IMF) ranks Ethiopia as among the five fastest growing economies in the world. After a decade of continuous expansion (during which real GDP growth averaged 10.8% per annum), in 2013/14 the economy grew for its 11th consecutive year posting 10.3% growth. Over the 12 months from July 2013 all of the economy's main sectors performed well. Agriculture (which represents 40.2% of GDP) grew by 5.4%, industry (14% of GDP) expanded by 21.2% and services (46.2% of GDP) rose by 11.9%.

However, it is one of the poorest countries in the world manifested by low per capita income and low human development index.

While rapid growth in China, Malaysia and India for instance, have lifted millions beyond subsistence living, Ethiopia belongs to SAA countries where poverty is widespread though the country claimed to have recently experienced attractive economic growth.

The government have embarked on various macroeconomic policies to address these issues. The fundamental objectives of the policies include price stability, maintenance of balance of payments equilibrium, and promotion of employment, output growth and sustainable development. These objectives are necessary for promotion of long run economic growth.

Economists differ on which policies are most beneficial for long-run growth. For example, De Long and Summers (1992) argues that macroeconomic policies are necessary for long-term growth. However, Anderson and Jodon (1962) postulated that monetary policy has greater and faster impact on economic activity thus suggesting that greater reliance be place on monetary measures than fiscal measure in the conduct of stabilization policy. Uniamikogbo and Enoma (2001) asserted that monetary variable is more effective and dependable than fiscal variable in affecting changes in economic activities. Other scholars argue that the growth of human capital, that is, investment in education and training contributes significantly to long-run growth (Barro, 1990).

With this background the paper tries to investigate what actually the macroeconomic determinants of economic growth are and what are the sources of the economic growth?

1.2 Statement of the Problem

Ethiopia in the last four decades has experienced two different regimes, in terms of their economic management and policy they pursue. In the military regime it has recorded overall stagnation while in the last 10 years the official reports showed that Ethiopia registered high growth rate. The growth rate on average since 2001-2014 was 10.34% for consecutive 15 years. The growth rate varies across sectors of agriculture, manufacturing and services sectors.

Although, high rate of growth has been recorded, challenge remains to sustain in order to reduce extreme poverty, narrow inequality, overcome illiteracy, improve the health of the citizen, decrease rampant inflation, mitigate unemployment etc, so that to become the middle income countries.

In this aspect, a number of researchers, Geda (2014) for instance, questioned the sustainability of such a higher growth due to the dependence of growth on rain-fed agriculture as well as low level of domestic resource mobilization (including shortage of foreign exchange). In general, growth is central for poverty reduction, and macroeconomic stability is a necessary condition for growth.

Since 2005, however, although growth remained strong, macroeconomic management had its fair share of problems resulting in higher inflation, and problems with the balance of payments (ibid).

Geda (2014), argued that a cursory look at people's livelihoods across the country (including Addis Ababa) reveals that things are not as rosy as it is made out in the official reports and that many are unable to sustain themselves, especially following the rampant inflation that began in 2005.

Geda (ibid), further question the source of this growth with examining the structural change in this growth process. He noted that a surprising finding of recent similar growth accounting study by IMF (2012) as well as in his analysis

that the main source of growth in Ethiopia in the last decade is factor productivity (which is about 5 to 7 percent and hence contributed more than 50 percent to the average official growth of 11 percent). This is followed by the contribution of capital (about 30 percent) and labor (about 23 percent).

Economic policies and macroeconomic conditions should be given due attention in studying determinants of growth since they can set the framework within which economic growth takes place. Economist like Fisher (1993), for instance argue that macroeconomic stability though not sufficient conditions for economic growth, it is necessary for stable economic growth.

Therefore, lack of properly addressing the causes of economic growth and prosperity will cause political, economic and social problem in the Ethiopian economy. In effect, it posed many questions. The major questions will be what are the macroeconomic determinants of growth that make Ethiopia GDP growth be high and sustainable to make middle income status by the year 2025. How would these factors influence economic policy formulation and implementation?

Thus lack of addressing the sources of economic growth results lack to understand why countries differ dramatically in standards of living and causes poor policy recommendation.

According to Barro et al (2004), if we want to understand why countries differ dramatically in standards of living, we have to understand why countries experience such sharp divergences in long-term growth rates. Even small differences in these growth rates, when cumulated over 40 years or more, have much greater consequences for standards of living than the kinds of short-term business fluctuations that have typically occupied most of the attention of macroeconomists. To put it another way, if we can learn about government policy options that have even small effects on long-term growth rates, we can contribute much more to improvements in standards of living than has been

provided by the entire history of macroeconomic analysis of countercyclical policy and fine-tuning.

The studies conducted in the country so far on the macroeconomic determinant of economic growth are mostly production function approach, limited in scope, number and time, in which further study is required. The present study is expected to fill this gap by investigating critically the macroeconomic determinant of economic growth in Ethiopia. Moreover, it also explores, the Long run and short run determinants of economic growth.

In this regard, this study seeks to critically analyze the macroeconomic determinants of economic growth in Ethiopia using the neoclassical growth model by applying the Johansen approach to co_integration which was developed by Johansen (1988); and thereby determine the extent to which capital stock, labor stock and other determinants of interest based on theoretical and empirical grounds, are contributing to the real GDP per capita growth within the context of the neoclassical school, both in the long-run and the short-run.

1.3 Objective of the study

1.3.1 General objective

The general objective of this study is to examine the major macroeconomic determinants of economic growth in Ethiopia.

1.3.2 Specific Objectives

The specific objective are:

- i. To examine the major macroeconomic determinants of real GDP per capita growth in Ethiopia and
- ii. To suggest policies that will help to speed up the economic growth of Ethiopia.

Hypotheses

To guide the study, the following hypotheses are going to be tested:

Ho: Physical capital does not determine real gross domestic product per capita growth.

H1: Physical capital is a determinant of real gross domestic product per capita growth.

Ho: labor force does not determine real gross domestic product per capita growth.

H1: labor force is a determinant of real gross domestic product per capita growth.

Ho: Foreign direct investment does not determine real gross domestic product per capita growth.

H1: Foreign direct investment is a determinant of real gross domestic product per capita growth.

Ho: Foreign aid does not determine real gross domestic product per capita growth.

H1: Foreign Aid is a determinant of real gross domestic product per capita growth.

Ho: Consumer price index does not determine real gross domestic product per capita growth.

H1: Consumer price index (inflation) is a determinant of real gross domestic product per capita growth.

Ho: Government expenditure does not determine real gross domestic product per capita growth.

H1: Government Expenditure is a determinant of real gross domestic product per capita growth.

1.4 Significance of the Study

Briefly, the finding of the study, based on the empirical data of macroeconomic variables (1981-2013) on economic growth Ethiopia, will be used to help in the formulation of policy for the Ethiopian Economy.

More specifically;

- It will produce general information on the relationship between macroeconomic variables development and economic growth.
- It will serve as a spring board for further studies on macroeconomic development and economic growth.

It will generate evidences for policy implications that aim to analyze how macroeconomic variables determine economic growth in short term and long term.

1.5 Limitation of the Study

The study uses long time series data covering from the period 1980/81 to 2012/13.

The study will not include comparative analysis with other countries.

The other limitation of the study is since data will be used from mixed sources, government and from international organizations (UNCTAD, IMF and WB), it may have little impact on the quality of the results.

1.6 Organization of the Study

The paper has six chapters .The first chapter deals with the introduction part of the paper. Chapter two reviews the theoretical and empirical literature regarding growth and determinant of growth. Chapter three addresses the model specification and methodology aspect of the paper. It presents the source of data and type of data analysis, test the stationary of the time series within a Granger-causality framework and error correction method.

The fourth chapter presents the overview of Ethiopian economic growth. The fifth chapter concentrates on the results and discussion part of the paper. And finally, the conclusion and recommendation part is presented in the sixth chapter.

2. Reviews of Literatures

Growth economics has in recent periods become an extremely active area of research both theoretically and empirically and as a result different growth modes which contribute to address the sources of growth are emerging in the literature. However, the major ones are exogenous and indigenous growth models.

Several researchers have examined sources of growth in developed and developing economies using a time series data and wide variety of explanatory variables. Economists and researchers are divided over whether growth was driven by labor and capital growth or Total Factor Productivity (TFP) growth. Regarding the approach they used Cobb Douglas production function, aggregate regression analysis, Vector Autoregressive (VAR) and co-integration analyses etc Thus, the model and the approaches are different.

2.1 Theoretical Models of Economic Growth

Economic growth is defined by different economist in a similar fashion though slightly different in the way it explained. According to Aigbokhan (1995), economic growth means an increase in the average rate of output produce per person usually measured on per annum. It is also the rate of change in national output or income in a given period. Economic growth is the increase of per capital gross domestic product (GDP) or other measure of aggregate income. It is often measured as the rate of change in real GDP. Economic growth refers only to the quantity of goods and services produced. Others defines economic growth as an increase in real gross domestic product (GDP). That is, gross domestic product adjusted for inflation. The growth can either be positive or negative. Negative growth can be referred to by saying that the economy is shrinking. This is characterized with economic recession and economic depression.

Ullah and Rauf (2013), noted that whenever there is increase in real GDP of a country it will boost up the overall output and we call it economic growth. The economic growth is helpful to increase the incomes of the society, help the nation to bring the unemployment at low level and also helpful in the deliveries of public services.

Regarding the models of economic growth, there are different growth models which discuss the importance of different approaches and factors in economic growth theory. There is no single comprehensive model and theory on economic growth. There are two main groups of growth models: the neoclassical, which is based on Solow-Swan Model(1956) exogenous growth model and theory of endogenous growth model developed by Romer (1986) and Lucas (1988).

2.1.1 Exogenous Growth Model

There are a number economic growth models articulated by many economists. One of the most popular economic growth models is Solow's (1956) exogenous neoclassical model. The basic idea in this theory is whether it is possible for an economy to enjoy positive growth rates forever by simply saving and investing in its capital stock (Barro & Martin, 2004).

According to neoclassical growth model main sources of economic growth are factor accumulation and total factor productivity. In other words the total output of an economy is the function of its resource endowments (labor, physical capital and human capital) and the productivity with which these endowments are deployed to produce a flow of goods and services.

According to Daron Acemoglu (2007), economic growth and development are dynamic processes, focusing on how and why output, capital, consumption and population change over time. The study of economic growth and development

therefore necessitates dynamic models. Despite its simplicity, the Solow growth model is a dynamic general equilibrium model.

The basic property of exogenous growth model by Solow and Swan is the hypothesis of conditional convergence. It means the lower the starting level of per capita GDP, relative to the long-run or steady-state position, the faster the growth rate (Barro & Martin, 2004).

This property derives from the assumption of diminishing returns to capital; economies that have less capital per worker (relative to their long-run capital per worker) tend to have higher rates of return and higher growth rates. The convergence is conditional because the steady-state levels of capital and output per worker depend, on the saving rate, the growth rate of population, and the position of the production function characteristics that might vary across economies (ibid).

Another prediction of the Solow–Swan model is that, in the absence of continuing improvements in technology, per capita growth must eventually cease. This prediction, also comes from the assumption of diminishing returns to capital. We have already observed, however, that positive rates of per capita growth can persist over a century or more and that these growth rates have no clear tendency to decline.

The neoclassical growth theorists of the late 1950s and 1960s recognized this modeling deficiency and usually patched it up by assuming that technological progress occurred in an exogenous manner. This device can reconcile the theory with a positive, possibly constant per capita growth rate in the long run, while retaining the prediction of conditional convergence (ibid).

After the mid-1980s, research on economic growth experienced a boom, beginning with the work of Romer (1986) and Lucas (1988). The motivation for

this research was the observation (or recollection) that the determinants of long-run economic growth are crucial issues, far more important than the mechanics of business cycles or the countercyclical effects of monetary and fiscal policies. But a recognition of the significance of long-run growth was only a first step; to go further, one had to escape the straitjacket of the neoclassical growth model, in which the long-term per capita growth rate was pegged by the rate of exogenous technological progress.

Exogenous growth model is based on the following basic assumptions: *constant returns to scale, diminishing marginal productivity of capital, exogenously determined technical progress and substitutability between capital and labor*. Further, the model include demographic variables including rates of population growth and technology as a simplifying assumption. The basic Solow growth model postulates stable equilibrium with a long run constant income growth rate. Factor accumulation and technological progress are taken in the model as determinant of economic growth. The model differentiate the short term and long term factors that determine economic growth. Savings or investment ratio determines short-run economic growth while, technological progress, taken as long term determinant of economic growth.

Labor, capital and exogenous technological progress are taken the main determinants of economic growth. However, some of the assumptions and their implications failed to explain the key drivers of economic growth as refuted by empirical evidence on the model. Specifically the Solow model has a number of limitations. First, the model is based on the assumption of a closed economy (Barro et al.1995 in Tadesse, 2011).

The second limitation is that the implicit share of income that comes from capital (as empirically estimated from the model) does not match the national accounting information (Lucas, 1988 in Tadesse, 2011).

2.1.2 Endogenous Growth model

The alternative growth model is emerged as opposed to exogenous growth model taking technological progress as endogenous to determine the long run growth. It differs from the works of neoclassical model in emphasizing that economic growth is caused by forces endogenous to the economic system rather than being influenced by factors outside the system.

Endogenous growth theory explains long-run growth as emanating from economic activities that create new technological knowledge. It is long-run economic growth at a rate determined by forces that are internal to the economic system, particularly those forces governing the opportunities and incentives to create technological knowledge.

Endogenous growth model indicate that in the long run the rate of economic growth, as measured by the growth rate of output per person, depends on the growth rate of total factor productivity (TFP), which is determined in turn by the rate of technological progress as opposed to the neoclassical growth theory of Solow (1956) and Swan (1956) which assumes the rate of technological progress to be determined by a scientific process that is separate from, and independent of, economic forces (Barro & Martin, 2004). Neoclassical theory thus implies that economists can take the long-run growth rate as given exogenously from outside the economic system.

Endogenous growth theory challenges this neoclassical view by proposing channels through which the rate of technological progress, and hence the long-run rate of economic growth, can be influenced by economic factors. It starts from the observation that technological progress takes place through innovations, in the form of new products, processes and markets, many of which are the result of economic activities. (Barro& Martin, 2004).

In response to different shortcomings of the neo classical model, endogenous growth model involves to see capital accumulation including human capital formation as a driving force behind economic growth. In this model there exists technological spill over, externalities and increasing returns to scale. They do not expect convergence. They rather accept disparities among countries can persist or even wider.

The endogenous neoclassical economic growth model assume (i) constant and increasing returns to capital (ii) the rate of growth is dependent on preferences between present and future consumption. The model suggested that the introduction of Knowledge, Innovation, Research and Development, brings about sustainable economic growth. Significant contributions to this theory are made by Romer (1986) and Lucas (1988). Romer presented a formal model that yields positive, long run growth rates on the basis of technological progress driven by the role of externalities, arising from learning by doing and knowledge spillover. Lucas introduces a model in which human capital plays a fundamental role in perpetuating economic growth and preventing diminishing returns to physical capital accumulation (Barro& Martin, 2004).

2.2 Determinants of economic Growth

As shown by the discussions above, each growth theory stresses on several factors as fundamental determinants of economic growth. Neoclassical growth theory puts emphasis on the role of rates of savings/investment and technological progress in the short and long run respectively. Endogenous growth theory underlines human capital, research & development and innovation activities as determinants of economic growth. Other theories (such as Multi sectors models, stochastic growth models, Harrod_Domar models) emphasize different economic and non-economic forces" role in growth.

Generally economists stress on three important sources of economic growth. These are:

- a) Investment in physical and human capital
- b) Technological advances, and
- c) Institutional and policy changes that improve the efficiency of economic organization. i) competitive markets, ii) stable prices, iii) free trade, iv) flexible capital markets, v) avoidance of high marginal tax rates, vi) secured property rights, and vii) political stability (IGNOU, MEC-004, 2006).

2.3 Empirical Review

There are different empirical researches related with the above discussions, examining sources of growth for cross country differences in developed and developing economies using a wide variety of explanatory variables.

One of the most recent study and approaches to explore what causes sustained increase in economic growth is the work by Mohammed and Lawrence (2015). They examine the macroeconomic determinants of economic growth in Nigeria measured by real gross domestic product (RGDP). They used time series data for a period of 26 years (1986 to 2012). Augmented Dickey-Fuller (ADF) test was used. Unit root test and Johansen's co-integration test was also conducted to establish short and long run relationships between economic growth and its macroeconomics determinants. The result shows six co-integrating equations which establish the existence of long run relationship among the variables. Ordinary Least Square statistical technique was used to assess the degree of influence the variables have on each other. The results show that gross fixed capital formation, foreign direct investment and total government expenditure are the main determinants of Nigeria economic output under a stable inflationary rate. The study recommended that there is need for government to provide necessary infrastructure, which will lower the cost of doing business in Nigeria. Further they recommended the need for the government to retain tight

monetary and fiscal policies in order to fight inflation in the Nigerian economy, since inflation have negative influence on investment and Nigeria economic growth and the needs to put stringent policy in place to minimize strike in Nigeria labour sector in order to enhance their performance to the nation economy.

Emmanuel Dodzi et al. (2013), study the Macroeconomic Determinants of Economic Growth in Ghana using Co_integration approach. The main objective of this study is to examine the major macroeconomic determinants of economic growth in Ghana between the periods 1970 and 2011 applying the Johansen method of Co_integration. All the variables are integrated at first order, as a result the Johansen's Co_integration approach was used. The study find out that physical capital and foreign aid had a positive effect on growth in real gross domestic product per capita. In the long run, physical capital, labour force, foreign direct investment, foreign aid, consumer price index, government expenditure and military rule are the significant determinants of growth in real gross domestic product per capita in Ghana. Also, in the short run, foreign direct investment and government expenditure are significant determinants of growth in real gross domestic product per capita. The result shows that there is unilateral directional causality between labour force and physical capital, physical capital and foreign direct investment, foreign aid and physical capital, physical capital and consumer price index, physical capital and military rule, labour force and foreign direct investment, consumer price index and labour force, foreign direct investment and foreign aid. They indicated also, there is bidirectional causality between consumer price index and foreign direct investment.

Based on the findings, the following policy recommendations are made: Policies should be put in place to increase physical capital and foreign aid. Educational institutions should link up with the corporate organizations to train productive labor force. Military rule had negative impact on growth in real GDP per capita,

therefore, the Government must put in place strategies to protect and sustain democratic rule in Ghana.

Hossain, A. (2006), made an empirical investigation of factors that contributed to economic growth in Indonesia for the period 1966 to 2003. A Cobb-Douglas production function is estimated with a time trend to capture the rate of technological progress within a co integral and error-correction modeling framework. In the estimated production function, the coefficients on both capital and labor bear a positive sign and are statistically significant. The estimated long term parameter values are then used to compute the contributions of capital, labor and technology to economic growth for the periods 1966 to 2003, 1966 to 1981, 1982 to 1996, and 1982 to 2003. The computed sources of growth indicate that for the last 40 years the most important source of growth about 60% in Indonesia was capital accumulation. The contribution of labor to economic growth during this period was about 32 percent, while technological progress contributed the remaining 8 percent. They used an error-correction model to examine the dynamic behavior of output growth by estimating of per-capita real GDP, which explains about 83 percent of the variations of productivity growth over the period 1967 to 2003. They applied Granger-causality framework, the impacts of key indicators of macroeconomic policies and external developments, such as budget deficits, inflation, trade openness, the growth rate of the real exchange rate and the growth rate of the external terms-of-trade, on per capita output growth are also examined individually for the period 1967 to 2003. They obtained a result that suggest trade openness, the real exchange rate depreciation and changes in the external terms of trade have a feedback causal relationship with per-capita output growth.

The overall empirical results point to the importance of technical progress in raising productivity growth in Indonesia. They further noted that, given the dominant contribution of capital accumulation to economic growth, the decline

in investment would have a dampening effect on economic growth until the investment rate is raised to the pre-crisis level.

In their study they found that, inflation and budget deficits however do not have any significant causal effect on productivity growth. Based on this result they recommended that efforts should particularly be made to attract foreign direct investment that would enhance technical progress and raise economic growth.

Hari, Sharma. (2007), conducted a study to investigate the factors responsible for the high growth rate of the Chinese economy. They attempted to answer the question: is it the increase in labor, capital or Total Factor Productivity (TFP) growth that is the driving force of China's growth? They applied a Cobb-Douglas production function along with a time trend to capture the effect of technological progress after the reforms in 1978 for China within a Co-integration and Error-Correction modeling framework for the 1952-1998 period. They noted that they used an Error Correction Model (ECM) because there was a strong presence of Co-integration. Their results indicate that capital has been the most important source of growth in China so far. They estimated the contribution of capital, productivity, and labor's share of growth for the period after 1978 until 1998 and found that capital contributed about 62% of the total growth in GDP. The role of productivity was also high for the same period and accounted for about 28% of the total growth in GDP. Labor contributed the least among the three variables with a share of about 11%. In addition, ECM indicated that if the growth rate in labor productivity deviates from its long-run equilibrium due to positive or negative shocks in one period, it will move back toward its equilibrium in the next period with a speed of adjustment of about -0.79. They noted that the presence of Co-integration and hence an error correction model is the most appropriate model for the estimation of the production function.

Other interesting study was also made by Ricardo H. et al (2004), to understand what causes sustained increase in economic growth. They studied eighty-three

cases in which a country rapidly increased its growth rate. Their most statistically significant results are that financial liberalization raises the probability of growth by around 7 percent, and that a political regime change towards autocracy (from democracy or less-strict autocracy) raises the probability of increased growth by almost 11 percent. They concluded that the vast majority of growth accelerations are unrelated to standard determinants such as political change and economic reform, and that most instances of economic reform do not produce growth acceleration.

Regarding Ethiopia, few studies on Ethiopia have been made to analyze the sources and causes of economic growth.

Geda et al. (2008) conducted growth accounting exercise based on aggregate Cobb-Douglas production for Ethiopia using a time series data from 1953 to 1993. They found that average output growth rate of 3.2 of which the contributions of capital, labor and factor productivity were 0, 2.2, and 1 respectively.

Tadese (2011) examines sources growth in Ethiopia for the period 1981 to 2009 with time series empirical analysis. He used Cobb-Douglas production function for Ethiopia to estimate the production function. Growth equation is estimated with a time trend to capture the rate of technological progress within a Co-integrational framework. Assuming a constant returns to scale, the intensive production function is estimated with OLS and the regression result showed that input elasticity's for capital and labor were 0.43 and 0.57 respectively and average rate of technological progress was .001. These parameters are used to compute the growth contributions of capital, labor and technical progress. Capital, labor and technological progress contributed about 56%, 42%, and 2% respectively to GDP growth in Ethiopia the period 1981 to 2009. From 1981 to 1991 GDP, capital and labor annually grew on average by 1.2%, -0.03% and 3.1% respectively. He found that the contribution of capital, labor and technology to growth were -1.06%, 95.74% and 5.32% respectively in the same period. He noted that the dismal GDP growth performance and negative growth

of capital formation during 1981 to 1991 occurred because of the socialist government's inappropriate economic policy and fall in agricultural output due to drought. From 1992 to 2009 GDP, capital and labor grew on average by 5.9%, 8.5% and 3.2% respectively. Capital, labor and technology contributions to growth were 66%, 32% and 2% respectively. The increasing capital formation and GDP growth attributed to EPRDF regime's liberalization policy and creation of relatively favorable conditions for private sectors and increase in agricultural output. Capital labor ratio had positive effect on economic growth in short run as well as long run in Ethiopia during 1981-2009.

He stated that since 2004 agricultural sector was growing positively. He argue that these factors had contributed for good growth performance in Ethiopia for the last two decades. However given the structural condition of Ethiopian economy and its high susceptibility to exogenous shocks and high inflationary pressure, the sustainability of the current Ethiopian economic growth performance is dubious.

Thus, the papers on Ethiopian case are limited in scope, methodology and time. Though there are few studies that raised the issue of growth determinant they are not exhaustive in which further study is required. The present study is expected to fill this gap by investigating critically the significant macroeconomic determinant of economic growth in Ethiopia. Moreover, it goes further to see, the Long run and short run determinants of economic growth and direction of causality.

3. Model Specification and Methodology

3.1 Source of data

The study mainly depends on secondary sources both from domestic and international. These include: National Bank of Ethiopia (NBE), Research Papers, World Bank (WB), World Development Index and United Nations Conference on Trade and Development (UNCTAD).

3.2 Method of Data Analysis

The study use both descriptive and econometric data analysis method in determining the sources of macroeconomic variables on economic growth of Ethiopia.

3.3 Model Specification

There are different factors that influence the growth of a country. The factors include natural resources, investment, human capital, technology, economic policies, foreign aid, trade openness, institutional framework, foreign direct investment, political factors, socio-cultural factors, geography, demography and many others. In order to examine the macroeconomic determinants of economic growth in Ethiopia, the study will try to consider most of the major factors as data allows.

Based on the different theoretical base, available data and arguments the research proposes the economic growth function for Ethiopia, adopting the approach by Emmanuel Dodzi et al. (2003), to be as follows: Real (GDP) per capita growth is a function of physical capital, labor force, foreign direct investment, foreign aid, inflation and government expenditure.

It is mathematically expressed as follows:

$$\text{Real GDP (Real GDPG)} = f(\text{K, L, FDI, FAID, INF, GOV...}) \dots\dots\dots (3.1)$$

Thus, the model is specified as;

$$\text{RGDPG}_t = \beta_0 + \beta_1\text{K}_t + \beta_2\text{L}_t + \beta_3\text{FDI}_t + \beta_4\text{Faid}_t + \beta_5\text{INF}_t + \beta_6\text{GOV}_t + e_t \dots\dots(3.2)$$

where ;

RGDP_t represents the log of Real GDP growth;

- K_t represents Physical Capital at time t, measured as Gross Fixed Capital Formation as a percentage of GDP;
- L_t represents Labor Force at time t, measured as the % of total population aged 15-64;
- FDI_t represents Foreign Direct Investment at time t, measured as Foreign Direct Investment as a percentage of GDP;
- FAID_t represents Foreign Aid at time t, measured as Foreign Aid as a percentage of GDP;
- CPI_t (INF) represents the Consumer Price Index at time t;
- GOV_t represents Government Expenditure at time t, measured as Government Expenditure as a percentage of GDP;
- t = time
- e_t is the error term assumed to be normally and independently distributed with zero mean and constant variance, which captures all other explanatory variables which influence economic growth but are not captured in this model.

β₁, β₂, β₃, β₄, β₅ and β₆, are the partial elasticity's of real GDP per capita growth with respect to K_t, L_t, FDI_t, Aid_t, INF_t, and Gov_t respectively.

At the end of the study, the following signs are expected to be met.

Explanatory Variables	Expected Sign
Physical Capital	+
Labor Force	+
Foreign Direct Investment	+
Foreign Aid	+
Inflation	-
Government Expenditure	-

3.3.1 Co-integration and Error Correction

The concept of "stationary" is related to the properties of stochastic processes. Time series data is assumed to be stationary if the mean, variance and covariance of the series are independent of time. On the other hand, non-stationarity in a time series occurs when there is no constant mean, no constant variance, or both of these properties. This implies non stationary data is unpredictable and cannot be modeled and forecasted. In this case it is not possible to use simple OLS to estimate long-run linear relationships between variables. If non stationary variable is used, it would lead to spurious regression /non-sense economic analysis where R-squared is approximating unity, t and F-statistics look significant and valid.

Hence, we will be obliged to falsely conclude that there is a relationship between two unrelated non-stationary series. This kind of problem (unit root problem) can be solved by differencing or detrending the data set (Gujarati, 2004). If the variable is stationary without differencing, then it is integrated of order zero, $I(0)$. A variable is said to be integrated of order one, or $I(1)$, if it is stationary after differencing once, or of order two, $I(2)$ if differenced twice. In order to determine the degree of stationarity, a unit root testing will be carried by using the Augmented Dicky-Fuller (ADF) test.

Thus, before postulating a co- integration relationship between the time series variables a stationarity test will be undertaken. Thus, in order to avoid spurious regression and determine whether the variables have long run relationships the time series properties will be investigated with unit root tests of the Augmented Dickey Fuller test.

3.3.2 Estimation techniques

In order to examine the relationship between macroeconomic determinants and growth, the estimation is conducted using Eviews.8. In the descriptive

technique statistical measures such as mean, standard deviation, maximum and minimum are used.

In the econometric analysis part, emphasis is placed on investigating, **Firstly**, to determine whether the variables included in the model are stationary variables or not, **secondly**, to determine the number of lags necessary to appropriately capture the dynamics of the data, **thirdly**, to examine whether any long run relationships exist between various economic variables in which the widely used tests of Co integration called Engle-Granger Approach, **fourthly** to estimate the long run and short run behaviors of economic variables using Error Correction Model and **lastly** to determine the direction of causality test.

4. Overview of Ethiopian Economy

4.1 The Imperial Regime Pre: 1974

The period of the Imperial regime (Emperor Haile Selassie) was from 1930 to 1974. The major characteristics of the regime was that the land aristocracy (feudal structure) and the majority of peasants (tenants) constitute the major socio-economic agents. Land was the most important resource and source of power that served as institution to exploit the masses by the Monarchy and the Feudal land lords.

The economy was predominantly subsistence agrarian. Land and military power were the vital resource to control land and other resources. Land was the economic basis of the ruling class, which the emperor himself was at the top of the system. The economy growth rate as indicated in Geda and Degefe (2005), was on average of 4 percent per annum during 1960-1974. But it did not improve the lives of most Ethiopians. Majority of the Ethiopian population were subject to exploitation from feudal system. Most of the population was subsistence farmers who lived in abject poverty because they used most of their small production to pay taxes, rents, debt payments, and bribes to the feudal land lords and theirs affiliates.

4.2 The Socialist (Military) Regime: 1974-1991

The military regime ruled Ethiopia from 1974 to 1991. It took power following the ousting of Emperor Haile Selassie I. The military regime ideology was socialism. Based on this ideology it took different measures on behalf of the people. Of the different measures nationalization of land, other private property (land, extra houses, and manufacturing & financial firms) and abolishing of tenant land lord relationship are the major.

The economy of the country during the military period was distressing. The growth implications of the regime change and its subsequent political turmoil were devastating. The abrupt political change, the nationalization of the productive assets and the inability of the new owners to run them, the disruption in both industrial and agricultural activity following the revolution, the 1984/85 drought, have all shown themselves through the deceleration of growth (Alemayehu, 2005). Between 1974/75 –1989/90 growth decelerated to 2.3 percent (the per capita growth being -0.4 percent). Growth episodes were also extremely irregular for they depend on agricultural growth, which in turn is vulnerable to the vagaries of nature (see Alemayehu 2003a). The conflict during the period was not only detrimental to long term growth but also costly. For instance defense budget alone was above 40 percent of the total recurrent spending or 26.1 percent of GDP in the late 80s (rising from its level of 15 percent of GDP in mid 70s).

The socialist system was run the economy on centralized manner similar to socialist economies. Its policy (both monetary and fiscal) was discriminatory aimed at benefiting the socialized and penalizing the private sector. Thus, apart from the deceleration of growth throughout the period, the period witnessed deteriorating economic structure and discontent of people towards the regime. (Alemayehu, 2005)

4.3 EPRDF: 1991 to the present

The periods began after the accession to power of EPRDF in May 1991, following the demise of the military regime. EPRDF after overthrowing the military state issued New Economic Policy in November 1991 by openly adopting a market-oriented economic policy. Due to the existing international situation and domestic situation as well they are enforced to accept liberalization and decentralization which are opposite of socialism. EPRDF having made different political change accepted the reform to stimulate the crippled socialist economy by encouraging the participation of private sectors. The new regime began to

carry out liberalization according to World Bank (WB) and International Monetary Fund (IMF) policy prescriptions in a typical Structural Adjustment Program (SAP) packages. It promoted domestic private sector and opened the door to foreign investors, except in the financial industry. The government devalued the Ethiopian birr against US dollar. It minimized intervention in the market and tried to establish institutions that are compatible with a liberalized economy. The major policy reforms of post EPRDF includes:

- a) Domestic and external trade liberalization
- b) Financial sector and labor market liberalization
- c) Liberalization of the product market, in particular the agricultural sector
- d) Pursuing conservative fiscal and monetary policy: expenditure reduction and switching, tax reform, tight monetary policy, exchange rate and public sector reform.

The government has also adopted agriculture Development -led industrialization (ADLI) as grand policy direction for the development program that focuses on productivity growth on small farms and labor-intensive industrialization.

Furthermore of the above policies and strategies the government issued different policies and strategies like Sustainable Development and Poverty Reduction Program (SDPRP), Plan for Accelerated and Sustained Development to End Poverty (PASDEP to attain the goals and targets set in the MDGs at a minimum. The main objective of the PASDEP is to lay out the directions for accelerated, sustained, and people-centered economic development as well as to pave the groundwork for the attainment of the MDGs by 2015.

As per the official report of the government of Ethiopia, since 2003/04, the economy has shifted to a higher growth trajectory and the growth momentum has been sustained during the PASDEP period (2005/06-2009/10). It is reported also that infrastructure development and social services has expanded.

Involvement of private investors, and the community in general has reached its encouraging level. Domestic resource mobilization effort has increased the capacity of the country to finance development projects.

The government declare the Growth and Transformation Plan (GTP) to achieve Ethiopia's long term vision and sustaining the rapid and broad based economic growth. The overriding development agenda of GTP is to sustain rapid and broad-based growth path witnessed during the past several years and eventually end poverty.

The objective of Growth and Transformation Plan are :

1. Maintain at least an average real GDP growth rate of 11% and meet the Millennium Development goals,
2. Expand and ensure the qualities of education and health services thereby achieving the MDGs in the social sectors,
3. Establish favorable conditions for sustainable state building through the creation of stable democratic and developmental state
4. Ensure growth sustainability by realizing all the above objectives within stable macroeconomic framework.

Although, high rate of growth has been claimed by the government, challenge remains in order to reduce extreme poverty, narrow inequality, overcome illiteracy, improve the health of the citizen, decrease rampant inflation, mitigate unemployment etc, so that to become the middle income countries.

In this case, Geda (2014) argued that a cursory look at people's livelihoods across the country (including Addis Ababa) reveals that things are not as rosy as it is made out in the official reports and that many are unable to sustain themselves, especially following the rampant inflation that began in 2005.

5. Empirical Results and discussions

5.1 Descriptive Analysis: Ethiopian Economy Growth Rate

The government of Ethiopia claimed that Ethiopia continued to maintain the double digit growth started since the last eight years. In 2010/11, real GDP growth was 11.4 percent moderately higher than the 10 percent growth a year earlier. In 2013/14, real GDP growth rate was 10.3 percent. This robust and broad based economic growth, as claimed by the government places Ethiopia among the top performing African and other developing Asian countries. The figure below shows the growth rate for the last decade.

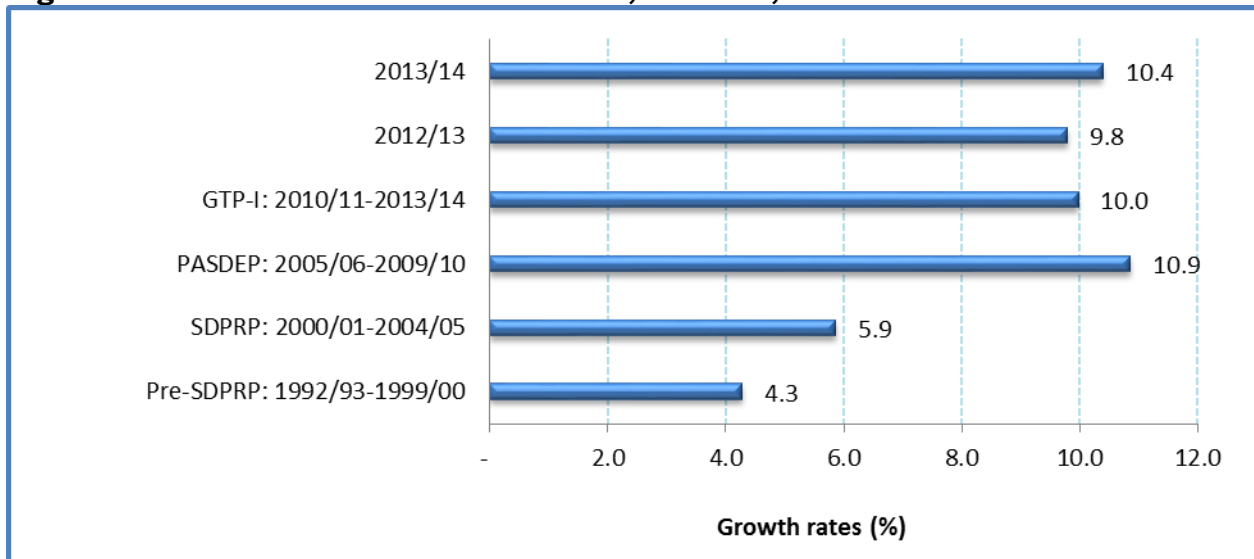


The Ethiopian economy as the official government report showed on the last decade's continued to register high growth. As the above figure shows it registered a continued growth rate except in the years of 2001-2003, 2009 and 2012 Real GDP expanded by 10.3 percent in 2013/14, compared to the GTP

target of 11.2 percent for the for 2013/14. This economic growth has also been impressive compared with the 5.4 percent growth estimated for Sub-Saharan Africa in 2014 (World Economic Outlook Update, July 2014).

The growth since 1992-2014 is briefly summarized in ‘Report on Ethiopian Economy’ by EEA, and recorded that GDP grew by 10.4 percent in the fiscal year 2013/14. Even though this rate is slightly lower than the 11.2 percent target of the GTP, it is still robust and of the fastest rates in the global economy. The average rate of growth of GDP for the first four years of GTP was 10 percent, only a 1.2 percentage points lower than the GTP target. (EEA, 2005)

Figure 1.2 : Growth Rates of GDP in GTP, PASDEP, SDPRP and Pre SDPRP Periods



Source: EEA, Report on Ethiopian Economy 2015.

However, some says that this growth rate is modest and the growth is marked absence of structural transformation in the country in the last four decades (Geda, 2014). It is also noted that growth and distribution are found to be important determinants of the change in poverty. With this brief introductory statement on growth rate the next chapters’ deal with the empirical analysis and findings of the study.

5.2 Unit Root Test

The unit root test in Table 1 including intercept shows that all variables foreign direct investment, total government expenditure, labor, physical capital, foreign aid and inflation except RGDP (real gross domestic product) are stationary at first difference I(1) while RGDP at level I(0), since the ADF value of each of the variables is greater than the McKinnon 5% critical values.

Table 1: Unit Root Test

Variables	Intercept			
	ADF value at Level	ADF value at 1 st Difference	5% Critical value	Order of Integration
LOGRGDP	3.559		-2.985	I(0)
LOGFAID	-1.626	-7.128	-2.981	I(1)
LOGFDI	-0.424	-7.148	-2.960	I(1)
LOGGOV	2.050	-4.827	-2.963	I(1)
LOGINF	1.850	-4.300	-2.967	I(1)
LOGL	-0.983	-3.774	-2.960	I(1)
LOGK	1.357	-5.838	-2.960	I(1)
LOGOPEN	-1.397	-7.636	-2.960	I(1)

Note: The null hypothesis is that the variable has a unit root. The rejection of the null hypothesis for ADF test is based on the Mackinnon(1996) critical values at 5 or 10 percent

As a result, the Johanson's co integration approach can be used to determine the number of co integrating equation.

5.3 Selecting Optimal lag

Vector Autoregressive, VAR, is used to determine the optimal lag length for the Johanson's co integration test which is based on the AIC as shown in table 2.

From the result, the optimal lag length based on AIC is 3.

Using the selected optimal lag length of 3, the likelihood ratio test which depends on the maximum Eigen values of the stochastic matrix of the Johanson (1991) procedure for exploring the number of co integrating vectors was used.

Table 2: Optimal lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	15.57437	NA	1.47e-08	-1.007828	-0.709584	-0.957353
1	134.7003	150.4748	2.90e-12	-9.757923	-7.670216	-9.404600
2	240.9941	67.13292*	8.91e-15*	-17.15727	-13.28010	-16.50110
3	2566.328	0.000000	NA	-258.1398*	-252.4732*	-257.1808*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 3 shows the results for the co-integrating test. From the table, the Maximum Eigenvalue statistics show that there are six (6) co-integrating vectors at 5 percent level of significance. The null hypothesis of zero co-integrating vector is rejected against the alternative of one co-integrating vector. Similarly the null hypothesis of at most 1, at most 2,... and at most four co-integrating vectors are also rejected against the alternative hypothesis. Therefore, it is concluded that there are six co-integrating vectors specified in the model

Table3: Co-integration Rank Test (Maximum Eigenvalue)

Included observations: 31 after adjustments

Trend assumption: Linear deterministic trend

Series: FAID GOV FDI INF K L RGDP

Lags interval (in first differences): 1 to 1

Unrestricted Co integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.979471	296.4158	125.6154	0.0000
At most 1 *	0.894293	175.9521	95.75366	0.0000
At most 2 *	0.702934	106.2924	69.81889	0.0000
At most 3 *	0.688925	68.66456	47.85613	0.0002
At most 4 *	0.409349	32.46518	29.79707	0.0241
At most 5 *	0.337581	16.14275	15.49471	0.0399
At most 6	0.103160	3.375195	3.841466	0.0662

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

5.4 Co integration Test

Economic theory often suggests that certain pairs of economic or financial variables should be linked by a long-run economic relationship. Given that the variables in the model are generally non-stationary, the co-integration and error-correction methods remain appropriate for estimation of the model. Co integration refers to a long run relationship between non-stationery, unit root process.

The Johansen procedure, is a multivariate generalization of the Dickey_Fuller tests (Endres, 1995). A number of methods for testing co integration have been proposed in the literature. We consider here two comparatively simple methods: (1) the DF or ADF unit root test on the residuals estimated from the co-integrating regression and (2) the co integrating regression Durbin-Watson Tests (CRDW) (Gujarati, 2004).

By using Dickey_Fuller procedure, the researcher has conducted co-integration test and the result of this test indicated that there is co- integration implying there is long run relationship between variables of LogGDP, FAID, FDI, GOV, INF, K , and L.

Table 4 below shows the results of the coefficient of β matrices in terms of normalized co-integrating coefficient of first equation. This results shows the long run relationship among the variables. Most of the variables are significant except labour and inflation. Foreign aid and foreign direct investment have not shown the expected signs while the rest of the variables shown the expected sign (see under 3.3). Since the growth model is specified in a log-linear form, the coefficient of the dependent variable can be interpreted as elasticity with respect to real GDP per capita.

Table 4: Co integrated coefficients

Dependent Variable: RGDP

Method: Least Squares

Sample: 1981 2013

Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FAID	-1.189444	0.313538	-3.793621	0.0008
FDI	-8.018637	3.043946	-2.634290	0.0140
GOV	-0.863276	0.430173	-2.006810	0.0553
K	4.970715	1.044046	4.761012	0.0001
L	457.7260	7147.882	0.064037	0.9494
INF	-144.2275	494.6758	-0.291560	0.7729
C	7291.760	609798.1	0.011958	0.9906
R-squared	0.972060	Mean dependent var	113409.0	
Adjusted R-squared	0.965612	S.D. dependent var	150244.8	
S.E. of regression	27861.31	Akaike info criterion	23.49370	
Sum squared resid	2.02	Schwarz criterion	23.81114	
Log likelihood	-380.6460	Hannan-Quinn criter.	23.60051	
F-statistic	150.7605	Durbin-Watson stat	2.776911	
Prob(F-statistic)	0.000000			

Estimation Equation:

$$\text{RGDP} = \text{C}(1)*\text{FAID} + \text{C}(2)*\text{GOV} + \text{C}(3)*\text{FDI} + \text{C}(4)*\text{INF} + \text{C}(5)*\text{K} + \text{C}(6)*\text{L} + \text{C}(7) \dots\dots\dots(5.1)$$

Substituted Coefficients:

$$\text{RGDP} = -1.19*\text{FAID} - 0.86*\text{GOV} - 8.018*\text{FDI} - 144.23*\text{INF} + 4.97*\text{K} + 457.72*\text{L} + 7291.7 \dots\dots (5.2)$$

The coefficient of foreign aid is -1.19. This indicates that, in the long run, holding other things constant, a one percent increase in foreign aid (proxied by the ratio of foreign direct aid to GDP) brought 1.189 unit decrease in real GDP. This means that foreign aid is being channeled to wrong sectors of the economy which do not lead to economic expansion although, it is statistically significant. Next to aid, foreign direct investment has significant long run impact on the Ethiopian economy. A one percent increase in foreign direct investment has resulted in -8.018 unit decrease change in real GDP per capita. It has a direct negative impact and it is statistically significant.

Government expenditure influenced growth of real GDP per capita negatively, as a result, a unit increase in Government expenditure will cause growth of real

GDP per capita to decrease by -0.863 units. This is inconsistent with the Keynesian (1936) view of government active intervention in the economy using various policy instruments.

However, this finding shows that the variable has significant negative impact in influencing economic growth in Ethiopia. The finding of this research regarding Government expenditure is consistent with the findings of Tofik (2012) and Teshome (2006) which indicates unproductive and inefficient government spending. The finding of this research in relation to ODA is also consistent to the findings of Rajan and Subramanian (2005), Ekanayake and Chatrna (2008), Mallik (2008), and Tasew (2011) in Kidanemariam (2013). However the finding indicates that the variable is statistically insignificant.

Consumer price index (inflation) influenced real GDP per capita negatively and influence strongly. A unit increase in consumer price index will cause growth of real GDP per capita to decrease by 144.2 unit. However, statistically it is insignificant.

The findings of this research concerning the long run positive impact of the labor force as a human capital shows a positive and strong relationship with economic growth which is consistent with the endogenous growth theories (mainly advocated and/or developed by Lucas (1988), Romer (1990), Mankiw, Romer and Weil (1992)) which argue that improvement in human capital (skilled and healthy workers) leads to productivity improvement that enhances output. With respect to the researches made in Ethiopia, the finding of this research is also similar to Teshome (2006) and Tofik (2012). However, it is statistically insignificant.

The regression result shown in Table 4, shows a significant positive relationship between gross fixed capital formation and economic growth. One percent increase in gross fixed capital formation, *ceteris paribus*, will lead to about 4.970 unit increase in economic growth. This is consistent with a priori expectation. This result supports the fact that increasing investment size enhances productivity which has a spillover effect on economic performance.

5.5 Error Correction Estimates

The ECM is the feedback and adjustment effect which indicates how much of the disequilibrium is being corrected. It further proves the stability of the long-run relationship when it is highly statistically significant (Bannerjee, et al., 1998).

To check the verifiability of the estimated short run model, some diagnostic test is undertaken. The results reported in Table-5 and 6 indicate that there is no error autocorrelation and heteroskedasticity, and the errors are normally distributed. Hence, the relationship between the variables is verifiable or valid.

Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.621829	Prob. F(7,24)	0.0084	
Obs*R-squared	16.43857	Prob. Chi-Square(7)	0.0214	
Scaled explained SS	31.11668	Prob. Chi-Square(7)	0.0001	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004500	0.012276	-0.366603	0.7171
DLOG(FAID)	-0.015092	0.014484	-1.041957	0.3078
DLOG(FDI)	0.000955	0.006347	0.150384	0.8817
DLOG(GOV)	0.017608	0.036303	0.485015	0.6321
DLOG(INF)	0.142873	0.089089	1.603716	0.1219
DLOG(K)	0.070163	0.042457	1.652569	0.1114
DLOG(L)	2.476137	2.171684	1.140192	0.2655
ET(-1)	-1.40E-06	3.69E-07	-3.799852	0.0009
R-squared	0.513705	Mean dependent var	0.021813	
Adjusted R-squared	0.371870	S.D. dependent var	0.055195	
S.E. of regression	0.043745	Akaike info criterion	-3.208566	
Sum squared resid	0.045927	Schwarz criterion	-2.842132	
Log likelihood	59.33705	Hannan-Quinn criter.	-3.087103	
F-statistic	3.621829	Durbin-Watson stat	1.829230	
Prob(F-statistic)	0.008357			

Table 6: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.875819	Prob. F(3,22)	0.4687
Obs*R-squared	3.362917	Prob. Chi-Square(3)	0.3390

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Sample: 1982 2013

Included observations: 32

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(FAID)	0.016707	0.057495	0.290575	0.7741
DLOG(FDI)	-0.003802	0.022668	-0.167742	0.8683
DLOG(GOV)	0.000317	0.157738	0.002010	0.9984
DLOG(INF)	0.013269	0.308283	0.043041	0.9661
DLOG(K)	-0.034901	0.161496	-0.216110	0.8309
DLOG(L)	-0.282603	8.376781	-0.033736	0.9734
ET(-1)	-1.69E-07	1.72E-06	-0.098459	0.9225
RESID(-1)	-0.052790	0.292447	-0.180513	0.8584
RESID(-2)	-0.372540	0.242034	-1.539210	0.1380
RESID(-3)	-0.171620	0.351579	-0.488141	0.6303
R-squared	0.105091	Mean dependent var		-0.006239
Adjusted R-squared	-0.261008	S.D. dependent var		0.149922
S.E. of regression	0.168354	Akaike info criterion		-0.475184
Sum squared resid	0.623551	Schwarz criterion		-0.017141
Log likelihood	17.60294	Hannan-Quinn criter.		-0.323356
Durbin-Watson stat	1.936420			

The short run dynamics among the variables are explored by employing error correction model (ECM). Error correction model allows the introduction of previous disequilibrium as independent variables in the dynamic behavior of existing variables. Table 7 presents the short run dynamic relationship and the set of short run coefficients in the error correction model. ECM associates the changes in growth in GDP per capita to the change with the other lagged variables and the disturbance term of lagged periods.

After the acceptance of long-run coefficients of the growth equation, the short-run ECM model is estimated.

Table: 7 Error Correction Model

Dependent Variable: DLOG(RGDP)

Method: Least Squares

Sample (adjusted): 1982 2013

Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(FAID)	-0.072942	0.054710	-1.333248	0.1945
DLOG(FDI)	0.013047	0.021850	0.597141	0.5558
DLOG(GOV)	0.106773	0.137216	0.778138	0.4438
DLOG(INF)	0.255454	0.301585	0.847036	0.4050
DLOG(K)	0.311342	0.156231	1.992826	0.0573
DLOG(L)	8.626971	8.116937	1.062836	0.2980
ET(-1)	-5.59E-06	1.41E-06	-3.968040	0.0005
R-squared	0.502915	Mean dependent var		0.084502
Adjusted R-squared	0.383615	S.D. dependent var		0.212833
S.E. of regression	0.167095	Akaike info criterion		-0.549864
Sum squared resid	0.698021	Schwarz criterion		-0.229235
Log likelihood	15.79783	Hannan-Quinn criter.		-0.443585
Durbin-Watson stat	2.027168			

Estimated Error Correction Model Equation

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$$\text{DLOG(RGDP)} = \text{C}(1)*\text{DLOG(FAID)} + \text{C}(2)*\text{DLOG(FDI)} + \text{C}(3)*\text{DLOG(GOV)} + \text{C}(4)*\text{DLOG(INF)} + \text{C}(5)*\text{DLOG(K)} + \text{C}(6)*\text{DLOG(L)} + \text{C}(7)*\text{ET}(-1) \dots\dots\dots(5.3)$$

Substituted Coefficients:

$$\text{DLOG (RGDP)} = -0.073*\text{DLOG(FAID)} + 0.013*\text{DLOG(FDI)} + 0.106*\text{DLOG(GOV)} + 0.255*\text{DLOG(INF)} + 0.311*\text{DLOG(K)} + 8.626*\text{DLOG(L)} - 5.593\text{-}06*\text{ET}(-1)\dots\dots(5.4)$$

The coefficient of determinations R² of 0.502 (Table 7) indicates that about 50 percent of the total variations in Ethiopian economic growth are explained by the variations in the independent variables. This shows that our model explains significant proportion of variations in economic growth and also represents a good measure of fit. The Durbin Watson test of autocorrelation shows an absence of serial autocorrelation. This is because the calculated value of DW (2.02) falls almost between lower critical level (DU) and 2 at 1% significant level. With this result we reject the hypothesis that there is presence of serial autocorrelation in our model.

The equilibrium error correction coefficient estimated -5.59 is highly significant, has the correct sign, and imply a very high speed of adjustment to equilibrium after a shock. Approximately 5.59 unit of the disequilibrium from the previous year's shock converges back to the long-run equilibrium in the current year. Such highly significant Error correction term is another proof for the existence of a stable long run relationship among the variables (Banerjee, et al., 2003).

5.5 The Pairwise Granger Causality Test

Correlation does not necessarily imply causation in any meaningful sense of that word. Economists debate correlations which are less obviously meaningless.

The Granger (1969) approach to the question of whether to see how much of the current can be explained by past values and then to see whether adding lagged values can improve the explanation.

Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

Granger (1996) causality test has been performed in order to examine the linear causation between the concerned variables. Granger causality is useful in determining the direction of the relationships. The test is based on the model specified below.

$$Y_i = \sum a_i Y_{i-j} + \sum \beta_i X_{t-i} + U_t \dots\dots\dots(6)$$

Y_t = The Current variable caused by the last lagged Variable of Y (GDP).

Y_{t-1} = The lagged variable of Y

α_i = The measure of influence Y_{t-1} on Y_t

β_i = The measure of influence X_{t-1} on Y_t

X_{t-1} = The lagged variable of X

U_t = Error term

If X_t Granger cause Y_t then the current values of Y_t are determined by past values of X_{t-1} .

The test of **$H_0: \delta = 0$** , can be carried out with the F-test. In the view of Granger, the presence of co integration vector shows that Granger causality must exist in at least one direction.

The Granger (1969) approach to the question of whether \mathbf{x} causes \mathbf{y} is to see how much of the current \mathbf{y} can be explained by past values of \mathbf{x} and then to see whether adding lagged values of \mathbf{x} can improve the explanation. \mathbf{Y} is said to be Granger-caused by \mathbf{x} if \mathbf{x} helps in the prediction of \mathbf{y} , or equivalently if the coefficients on the lagged \mathbf{x} 's are statistically significant. Note that two-way causation is frequently the case; \mathbf{x} Granger causes \mathbf{y} and \mathbf{y} Granger causes \mathbf{x} .

It is important to note that the statement “ \mathbf{x} Granger causes \mathbf{y} ” does not imply that \mathbf{y} is the effect or the result of \mathbf{x} . Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

Using the optimum lag length of 3 based on AIC, table 8 presents the results of Granger casualty test. From the table, the result shows that there is unilateral directional causality between foreign aid and physical capital, inflation and government expenditure while there is bidirectional causality between foreign direct investment and foreign aid, government expenditure and foreign aid, real GDP and foreign aid, inflation and foreign aid, government expenditure and foreign direct investment, real GDP and foreign direct investment, inflation and direct investment, physical capital and government expenditure, real GDP and physical capital, inflation and physical capital, inflation and real GDP.

Table: 8 Granger Causality Tests**Sample: 1981 2013****Lags: 3**

Null Hypothesis:	Obs	F-Statistic	Prob.
FDI does not Granger Cause FAID	30	2.92487	0.0554
FAID does not Granger Cause FDI		9.79305	0.0002
GOV does not Granger Cause FAID	30	2.43835	0.0903
FAID does not Granger Cause GOV		148.952	3.3024
INF does not Granger Cause FAID	30	14.8715	1.3471
FAID does not Granger Cause INF		4.40155	0.0138
K does not Granger Cause FAID	30	1.01111	0.4058
FAID does not Granger Cause K		24.8667	2.1119
L does not Granger Cause FAID	30	1.25247	0.3139
FAID does not Granger Cause L		0.39578	0.7572
RGDP does not Granger Cause FAID	30	6.9173	0.0017
FAID does not Granger Cause RGDP		158.734	1.6476
GOV does not Granger Cause FDI	30	13.7338	2.4141
FDI does not Granger Cause GOV		76.9824	3.8281
INF does not Granger Cause FDI	30	18.6563	2.333
FDI does not Granger Cause INF		2.48332	0.0863
K does not Granger Cause FDI	30	11.1066	0.0001
FDI does not Granger Cause K		7.45293	0.0012
L does not Granger Cause FDI	30	0.64855	0.5919
FDI does not Granger Cause L		0.26355	0.8509
RGDP does not Granger Cause FDI	30	10.7438	0.0001
FDI does not Granger Cause RGDP		66.4478	1.7536
INF does not Granger Cause GOV	30	5.97371	0.0036
GOV does not Granger Cause INF		1.32401	0.2908
K does not Granger Cause GOV	30	38.2487	4.1763
GOV does not Granger Cause K		7.28913	0.0013
L does not Granger Cause GOV	30	0.85927	0.4762
GOV does not Granger Cause L		0.98697	0.4163
RGDP does not Granger Cause GOV	30	1083.31	6.8115
GOV does not Granger Cause RGDP		0.73606	0.5412
K does not Granger Cause INF	30	2.02897	0.1378
INF does not Granger Cause K		4.30771	0.015
L does not Granger Cause INF	30	10.3121	0.0002
INF does not Granger Cause L		0.59031	0.6276
RGDP does not Granger Cause INF	30	2.70864	0.0687
INF does not Granger Cause RGDP		3.65249	0.0274
L does not Granger Cause K	30	1.92545	0.1536
K does not Granger Cause L		1.06911	0.3816
RGDP does not Granger Cause K	30	28.9272	5.5442
K does not Granger Cause RGDP		25.0791	1.9613
RGDP does not Granger Cause L	30	0.69445	0.5648
L does not Granger Cause RGDP		0.43805	0.7279

6. Conclusion and Policy recommendation

The main objective of the study was to analyze the major macroeconomic determinants of economic growth in Ethiopia in the years 1981-2013 using co integration approach. The analysis is based on time series econometrics. It is found in the current study that all variables; growth in real GDP per capita, physical capital, labour force, foreign direct investment, foreign aid, consumer price index and government expenditure turned out to be non-stationary at their levels but became stationary at their first difference. The results of Johansson's co integration test indicates that there exist a long run and short run relationship between growth in real GDP per capita, physical capital, labour force, foreign direct investment, foreign aid, consumer price index and government expenditure.

The study finds out that in the long run physical capital and labour had a positive effect on growth in real GDP per capita, although labour is not statistically significant. As a result, increase in these variables lead to improvement in real GDP per capita growth.

However, foreign direct investment, foreign aid, consumer price index and government expenditure had negative effect on growth in real GDP per capita, though consumer price index (inflation) is not significant statistically. Therefore, decline in these variables will cause improvement in real GDP per capita growth. Hence, in the long run, physical capital, foreign direct investment, foreign aid and government expenditure are significant determinants of growth in real GDP per capita growth in Ethiopia. However, in the short run, there is 5.59 percentage adjustment taking place each year towards the long run periods.

The short run analysis (Table:7) indicates all variables are statistically insignificant except physical capital. Therefore, in the short run, physical capital is significant determinants of growth in real GDP per capita growth in Ethiopia.

The Granger Causality test also showed that there is unilateral directional causality between foreign aid and physical capital, inflation and government expenditure while there is bidirectional causality between foreign direct investment and foreign aid, government expenditure and foreign aid, real GDP and foreign aid, inflation and foreign aid, government expenditure and foreign direct investment, real GDP and foreign direct investment, inflation and direct investment, physical capital and government expenditure, real GDP and physical capital, inflation and physical capital, inflation and real GDP

Finally, the following policy recommendations are made based on the findings:

7. Policies should be put in place to increase physical capital and labour in Ethiopia since these have positive effects on growth in real GDP per capita.
8. There is need for the government to retain appropriate monetary and fiscal policies in order to fight inflation in the economy, since inflation have negative influence on investment and economic growth.
9. Since labour force had negative impact on growth in real GDP per capita, educational institutions should link up with the business organization and in rewarding sectors to know what different institutions need in terms of the labour force.
10. Government should device strategies to mobilize money domestically for developmental projects rather than to rely on foreign direct investment.
11. Government should also spend on the most productive sectors of the economy like the health sector, educational sector, and agricultural sector and so on.
12. There are needs to put rigorous policy in place to make the best from the cheap resources of labour force so that in order to enhance their performance to the economy.

Annexes

UNIT ROOT TESTS

1. Foreign aid

Null Hypothesis: D(LOGFAID) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.128195	0.0000
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

2. Foreign Direct Investment

Null Hypothesis: D(LOGFDI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.147819	0.0000
Test critical values:		
1% level	-3.670170	
5% level	-2.963972	
10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

3. Government Expenditure

Null Hypothesis: D(LOGGOV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.826980	0.0005
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

4. Inflation

Null Hypothesis: D(LOGINF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.300327	0.0020
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

5. Physical Capital

Null Hypothesis: D(LOGK) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.837994	0.0000
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

6. Labor Force

Null Hypothesis: D(LOGL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.773735	0.0076
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

6. Real GDP

Null Hypothesis: D(LOGRGDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.817164	0.0005
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

7. Error Term

Null Hypothesis: D(ET) has a unit root

Exogenous: Constant

Lag Length: 8 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.248007	0.0033
Test critical values:		
1% level	-3.752946	
5% level	-2.998064	
10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

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2. Project Proposal

3. Advisor's CV