THE IMPACTS OF INVESTMENT ON EONOMIC GROWTH IN ETHIOPIA

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Declaration

The Project is my original work, has not been presented for a degree in any other universityand that all sources of material used for the study have been duly acknowledged.

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ABSTRACT

The purpose of this study is to find out the impact of investment on economic growth in Ethiopia in the short run and long run time period. For this purpose co-integration and error correction model are applied covering 1981-2011 time periods. The results show that investment has positive and significant impact on economic growth in the long run and short run analysis. Along with investment other variables like imports and exchange rate also affect economic growth. The short-term dynamic behavior of this relationship was investigated by estimating an error correction model. The error correction term was found to be statistically significant and has a correct sign.

1. INTRODUCTION:

1.1 Background

The economic growth of any nation is traceable to so many factors among which investment is one of the major ones. For an economy to grow it must divert part of its resources from current consumption and invest it on capital formation. Investments break down in to public and private and the relative productivities of public and private investment in less developed countries (LDCs) are obviously an important issue.

Economic growth is usually related to growth of potential output, i.e., production at full employment. Economic growth is the major foundation of enhancement in level of literacy, improvement in technology and increase in the capital stock. In the process of investigating the economic performance of a country, key determinant of the economic growth is the investment rate. Most of those countries that grow swiftly, invest a considerable fraction of their GDP. On the contrary the slowly developing countries are those which fail to invest. This makes it clear that investment is a vital component of economic growth. Economists define the investment as the source of production of goods that will be used to produce other goods.

The impact of public and private investment on economic growth has attracted renewed attention in recent years. The worldwide shift towards a growth strategy underscoring market forces and private sector leadership prior to the ongoing global financial and economic crisis led to a curtailment of the public sector from production and to

a redefinition of its role in the development process in many countries. There is positive role for the public capital stock on infrastructural investment. More significant results are obtained because infrastructural investment supports the private investment where as other type of public investment crowd out the private sector. As the World Bank reports (World Bank, 2013) the public investment rate in Ethiopia is high, while private investment rate is low. Thus to enhance the economic growth of Ethiopia the government needs to change policy to encourage private investment. The investment made in Ethiopia would also be insufficient to meet Ethiopia's target of reaching middle-income status by 2025. The bank says that goal is still within reach, however, if the government shifts the balance from public to more private investment. The country needs to find out ways that makes it possible. This study utilizes a data set for a period from 1981 to 2011 and examines the impact of investment on the economic growth in Ethiopia using co-integration and error correction methods.

Test for co-integration means looking for stable long run equilibrium relationship among non-stationery economic variables. If co-integration exists, the specification of error correction mechanism (ECM) is appropriate. The construction of ECM with the appropriate error correction terms (residual) is derived from the estimated long-term co-integration relationship. If their relation makes I(0), the evidence is supportive of the view that there is a long run tendency for real gross domestic product and gross capital formation to hold.

The key findings of the study concluded that there is a short-run and long-run relationship between investment and economic growth in Ethiopia. This implies that investment impact positively economic growth in the short and long run process. The results of short run dynamics reveals that, the error correction term (ECM) is negative and significant (-0.38), which means that 38% of the disequilibrium will be adjusted annually and approximately after 3 (three) years short term dynamics will reach at equilibrium level. Such findings could serve as an important reference for designing investment policies in Ethiopia.

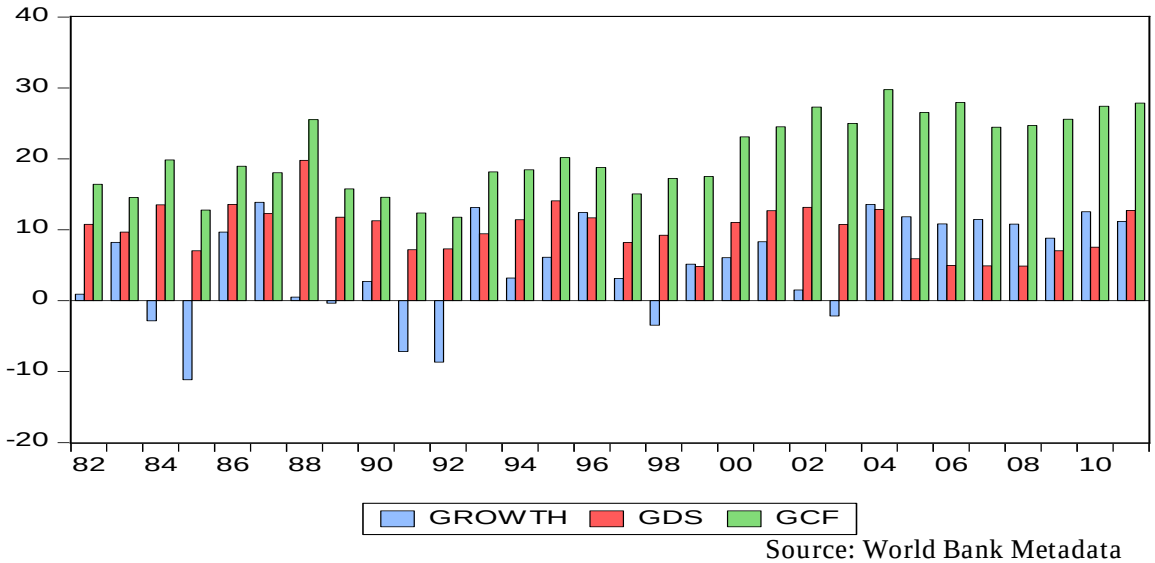
1.2 Patterns of Economic Growth and Gross Capital Formation in Ethiopia:

Ethiopia has experienced strong and broad based growth over the past decade, averaging 10.6% per year in 2004/05 - 2011/12 compared to the regional average of 4.9%. Expansion of the services and agricultural sectors account for most of this growth, while manufacturing sector performance was relatively modest. Private consumption and public investment explain demand side growth with the latter assuming an increasingly important role in recent years. Economic growth brought with it positive trends in reducing poverty, in both urban and rural areas. While 38.7% of Ethiopians lived in extreme poverty in 2004-2005, five years later this was 29.6%, which is a decrease of 9.1 percentage points as measured by the national poverty line, of less than $0.6 per day. Using the Growth and Transformation Plan (GTP), the target is to reduce this further to 22.2% by 2014-2015 (World Bank, 2013).

Figure 1: Ethiopia Annual GDP Growth Rate

In order to compare the proportion of GDP of the key variables adopted in this study, the trends of growth and gross fixed capital formation (% of GDP) and gross domestic savings (% of GDP) are illustrated in the following figure.

Figure 2: Average of Growth, Gross Fixed Capital Formation (% GDP), Gross Domestic Savings (% of GDP) (Data, 1982-2011)



Source: World Bank Metadata

Figure 2 illustrates the trends of economic growth, the average proportion of GDP of gross fixed capital formation and gross domestic savings. Gross capital formation had fluctuated and shared the largest percentage comparing to gross domestic saving in Ethiopia. Gross capital formation improved from time to time in Ethiopia and after 2000 the fluctuation reduced. The maximum gross capital formation recorded in 2004.

Reforms have enhanced the role of the private sector in the Ethiopian economy but its potential to increase investments and drive growth has not been fully exploited. In 2010/11 the private sector's share of gross capital formation in GDP was only 6.9%, which can be explained by both external and internal factors. The former include lack of access to finance and foreign exchange, the difficulty in securing land, and frequent change of government policies and regulations. The expansion in informal economic activities is also a constraint to the growth of formal enterprises. Among the internal constraints is lack of technical and managerial skills and weak entrepreneurial capacity (African Economic Outlook, 2012).

1.3 Statement of the Problem

Investment is a key economic variable in the effort to achieve economic growth and development. Long run potential growth can be increased for the following reasons: increased capital which is investment in physical capital such as factories, machinery and infrastructural investment, increase in working population, discovering of new raw materials and technological improvements to productivity of capital and labor. They all lower the cost of economic activity. In Ethiopia like other developing countries investment is lower as a percentage of GDP. Therefore, to sustain high economic growth, increasing the amount of investment as a percentage of GDP is crucial. However, implementing policy recommendations such as this should be supported by empirical findings before resources are committed. Thus whether investment determines GDP growth needs to be empirically proved. Therefore, the basic aim of this study is to investigate the effects of investment, i.e. joint public and private investments on Economic Growth in Ethiopia over the last three decades.

1.4 Objectives of The Study

The objectives of this study are to:

- Examine the impact of public and private investment on economic growth in Ethiopia using co-integration and error correction techniques.
- Forward policy recommendations based on the findings of the study.

1.5 Significance of the Study

The study will be important for Policy makers to design appropriate policies and also the study can serve as a reference to subsequent research works.

1.6 Limitation of the Study

The difficulties involved in managing raw data collected from the multiple sources to make them usable was posed some limitations given the short period of time available for this study.

1.7 Organization of the Paper

The rest of the study is arranged as follows, Chapter two reviews the relevant theoretical and empirical literatures, and Chapter three presents model specification, data sources, methodology and hypothesis followed by discussion of empirical estimations in Chapter four. Chapter five covers discussion of regression results. The last Chapter summarizes the findings and suggests some recommendations.

2. REVIEW OF LITERATURE

2.1Theoretical Literature

Growth models are fundamentally of two types: the neoclassical growth model, also known as the exogenous growth model developed primarily by Solow (1956) and the new growth theory, also known as the endogenous growth model, pioneered by Romer (1986), Lucas (1988), Barro (1990), and Rebelo (1991). Economic growth has been emphasized as a significant factor in many countries for decades. As a discipline core economic growth theory was born in the late 1960s. After two decades, growth theory became popular again in the mid 1980s by the emphasis put on the long-run growth, which is now called endogenous growth theory. It is understood that long-run economic growth is at least as important as short-run fluctuations of growth and in fact it is even more important than that. For instance, it might be important to know why GDP of a country raised three or four percent in the last couple of months. However, it might be even more important to know why African countries have quite low GDP rates than their European counterparts. Or why a country's GDP fell during the last century. The new growth theory or the endogenous growth theory, underlines the importance of the latter questions, related with the long-run growth performances, rather than the former.

The name endogenous growth models is given to these theories since according to these theories determination of long-run growth rates are explained within the models, rather than by some exogenous

variables. The development of endogenous growth theory has followed the neoclassical growth theory. Romer (1990, 1997) introduced the incorporation of resource and development and imperfect competition into the growth framework. Other researchers, especially, Aghion and Howitt (1992), and Grossman and Helpman (1991) also considered research and development (R & D) in the growth model.

Can the government decisions on the share of public expenditure in output or on the composition of expenditures and taxation affect the steady state growth rate? The answer is absolutely 'no' in the case of the neoclassical growth models of Solow (1956), Swan (1956), Cass (1965) and Koopmans (1965). In neoclassical growth models government policy cannot have sustained effects on growth rate of per capita income, although government can even influence the population growth which is assumed to affect the growth rate. In these models, if incentives to save or to invest in new capital are affected by fiscal policy, there will be a change in equilibrium capital output ratio and therefore the output path will change, leaving the steady state growth rate unchanged. The long-run growth rate is driven by exogenous factors of population growth and technological progress while public policy can only influence the transition path of the economy towards steady state growth rate. According to the economists, supporting 'endogenous growth models' (Barro 1990, King and Rebelo 1990, Lucas 1990, Mendoza et al. 1997, Stokey and Rebelo 1995, and Easterly and Rebelo 1993), the share of public expenditure in output or the composition of expenditures and

taxation affects the steady state growth rate. This is in contrast to the neoclassical growth theory where only investment in physical and human capital affects the steady state growth rate. Regarding the endogenous growth model, the long-run growth rate depends on the stable environment of business, specifically, government policies and actions on taxation, law and order, provision of infrastructure services, protection of intellectual of property rights, regulation of an international trade, financial markets, and other aspect of the economy. Therefore, long-run growth rate has also been guided by the government (Barro 1997).

In the endogenous growth model, investment is also treated as a significant factor. As noted, neoclassical growth theory assumes that the investment has a limited role in boosting economic growth and a continuous increase in the factor of production is unlikely to yield growth. Under endogenous growth theory and despite the law of diminishing returns, a marginal factor of productivity can be increased. For instance, technical progress that is funded by capital investment increases productivity. Similarly, new skills through the improvement of education and training, and better health tend to increase the productivity of labor. Also, the endogenous growth approach argues that there is a role for government institutions that can overcome any market failures associated with the various types of investment. Hence, the investment is crucial in order to promote economic growth. Further, endogenous growth theory also indicates that the improvement of technology accessed by the investment drives economic growth. Thus, long-run growth may have been contributed by the investment.

2.2 Empirical Literature

Public resources, whether from developing-country governments or from ODA are not enough to address the development challenges and goals faced by poor countries. Thus, private sources of investment are required (United Nations, 2002). These are not only necessary to supplement public resources, but also to fuel the growth of national economies and the creation of more and better employment opportunities. Increasing private investment levels is fundamental to poverty reduction. Without it, developing countries are unable to spur the growth of their economies or to sustain the reduction of poverty over the long-term. A high rate of investment is one of the key differentiating features of countries that have sustained high rates of growth. In high-growth countries, investment typically exceeds 25% of GDP, whereas it struggles to reach 20% in low-growth countries. Where investment is low, the productive Capacity of the economy fails to increase. This results in lower rates of growth and job creation, and fewer opportunities for the poor to improve their livelihoods (Simon, 2005).

Shenggen fan et al. confirmed on the study investment priorities for economic growth and poverty reduction, Most Sub-Saharan African countries are still in the first phase of development. Investments in support of economic growth remain central to the reduction of their mass poverty. In these countries, governments have the central responsibility to forge a well-sequenced and coherent growth strategy and determine what public investments are required. Infrastructure

and agriculture are the main areas needing attention in terms of public investment. In recent years, some African governments have started to make progress. For instance, Ethiopia and Nigeria recently increased their public investments in agriculture and rural areas.

Empirical studies on the relationship between public and private investments and economic growth are quite extensive. Much of the research was stimulated by the empirical studies of Eberts (1986), Aschauer (1989a, 1989b) and Munnell (1990) on the relationship between government investments on economic infrastructure, and economic growth at national, regional and state levels. All these studies found a statistically significant positive relationship between public investment and economic growth. These studies sparked up remarkable interest on relationship between growth and investment. Subsequent studies conducted in this area, either using a single-equation (Aschauer 1989a) or a cross-section analysis (Easterly and Rebelo 1993) indicates a positive effect of public investment on growth. Erden and Holcombe (2006) analyze empirically the linkage between public and private investment. The results show that there is a complementary relationship between public and private investment in developing countries both in the long run and short run. They concluded that from a policy perspective, these results show the importance of public investment as a stimulus to private investment in developing economies, and also show that, perhaps because of less-developed financial institutions or because of financial regulations, the availability of credit is a constraining factor on private investment in developing economies.

Haque (2012) studied the effects of public and private investment on the Economic Growth in Bangladesh and empirically tested by using C0-integration and Error correction technique making use of the data from 1972-73 to 2010-2011 period. He found that there is a short-run and long-run relationship between public and private investment and economic growth in Bangladesh. This implies that public and private investment impact positively economic growth in the short and long run process. In addition, it confirms that private investment is more effective in the long run than public investment.

Fatima, (2012) studied to find out the joint impact of public and private investment on economic growth of Pakistan in short run and long run time period. For this purpose co integration and error correction model is applied covering 1975-2010 time period. Results shows that in the long run private investment has positive and significant impact on economic growth where as in the short run it has positive but insignificant impact on economic growth and public investment has positive and significant impact on economic growth both in short run and long run. It is concluded from empirical findings that for the higher economic growth of a country both public and private investments play very important role. If government provides sufficient opportunities for private investors for investment, it has positive effects on economy. Private investment has a stronger, more favorable effect on growth rather than public investment, probably because private investment is more efficient and less closely associated with corruption.

Phetsavong and Ichihashi (2012) the interrelationship between public investment, FDI, private domestic investment, and economic growth using a panel dataset of 15 developing countries in Asia covering the period 1984 – 2009. The empirical results show that public investment crowds out FDI and private domestic investment to some extent. Therefore, any increase in public investment more than its proper level would only reduce the positive effect of FDI and private domestic investment on economic growth. The negative effect of public investment has been recognized by FDI and private domestic investment when its proportion share in GDP exceeds 6.6%-7.5% and 4.9%-8%, respectively. Thus, the results may suggest that public investment needs to be considered carefully in order to avoid the negative impact on FDI and private domestic investment, which would reduce the growth rate of real GDP.

3. MODEL SPECIFICATION, DATA, METHODOLOGY AND HYPOTHESIS:

3.1 Theoretical Framework and Model Specification:

The neoclassical growth model framework of Solow (1956) has been adopted in this study. The framework of the growth model take as its starting point an aggregate production function of Cobb-Douglas functional which relates output to factor inputs.

Y= f (A, K, L) ..... (1)

Where, A is the technological shift parameter which is generally assumed to be exogenous.

Y is the level of output

K is the stock of physical capital

L is the labor force

F is the Production function.

In a labor surplus country like Ethiopia it is reasonable to assume that at the margin, growth of labor force has no effect on aggregate output. Therefore, aggregate potential production function has been assumed to be related to the capital input and the log form includes other control variables:

$GDP = \alpha f(\mathrm{k})$..... ..... (2)

Where, GDP= Gross domestic product

K= Gross capital formation

$LnGDP = \alpha_0 + \alpha_1 LnK + \alpha_2 LnIMP + +\alpha_3 LnEXCH + \varepsilon_t$..... (3)

It is expecting that the elasticity parameters $(\alpha_0, \alpha_1, \alpha_2, \alpha_3) \rangle 0$

This lead to the specification of a general error correction model (ECM) of the aggregated production function of the following form:

$$\Delta LnGDP_t = \alpha_0 + \alpha_{1i}\sum_{i=1}^{n}\Delta Ln\,K_{t-i} + \alpha_{2i}\sum_{i=1}^{n}\Delta Ln\,IMP_{t-i} + \alpha_{3i}\sum_{i=1}^{n}\Delta LnEXCH_{t-i} + EC_{t-1} \quad \text{..... (4)}$$

Where, $EC_{t-1}$is the error correction one time lag.

3.2 Data Sources

The data collected from Publications of the Ministry of Finance and Economic Development of Ethiopia (MoFED), National Bank of Ethiopian(NBE) and World Development Indicators (WDI) of World Bank and International Financial Statistics (IFS) of the International Monetary Fund (IMF) data set.

The variables LnGDP, LnK, LnIMP, and LnEXCH are taken as real GDP, gross capital formation, imports of goods and services and real exchange rate. All the Variables are converted into natural logarithmic form before estimation. To keep the data set consistent, the period of 30 years spanning from 1981 to 2011 is used for statistical analysis.

3.3 Methodology

Before estimating an Econometric analysis we checked whether a series is stationary or not because non-stationary variables result in spurious regression. To verify that time serious data are stationery or not we used unit root tests. There are several ways of testing for the

presence of unit root. The most common one in econometric work is the Augmented Dickey-Fuller (ADF) test. Hence the emphasis here will be on using the Augmented Dickey-Fuller (ADF) approach to testing the null hypothesis that a series contains a unit root (i.e. it is non-stationary) against the alternative that it is stationary. We tested a serious including both an intercept and time trend in the regression model used to test the presence of unit root. The null hypothesis is rejected only when there is strong evidence against it at the conventional levels of significance.

If a variable is non-stationery at level, it must be differenced one time to make it stationary; a variable is said to be integrated of order one denoted I(1) if a level stationary series is said to be integrated of order zero, it is denoted by I(0). In general if the series need to be differenced d times before it becomes stationary, it is said to be integrated of order d, denoted I(d).

Many Economic time series are not stationary at levels and are most adequately represented by first differences. Even though the individual time series are not stationary, a linear combination of these variables could be stationary (i.e. they may be co-integrated). If these variables are co-integrated, then they have a stable relationship and cannot move “too far” away from each other. In contrast lack of co-integration suggests that such variables have no long run link, in principle they can wonder arbitrarily far away from each other [Rao(1994)].

Testing for the co-integration and estimating the relationship among co-integrated variables using the Engle Granger (1987) methodology,

in this methodology the residuals from the long-run relationship are tested for stationary to determine whether the variables are co-integrated or not. The Augmented Dickey-Fuller (ADF) test could be performed on the residuals to determine their order of integration. Augmented Dickey-Fuller (ADF) test verifying unit roots of the error term and then error terms with I(0) properties the series in question are said to be co-integrated. So if the variables are co- integrated a long-run relationship between these variables exists, i.e., gross domestic product (GDP) and gross capital formation (K). The existence of a long-run relationship also has its implications for the short-run behavior of the I(1) variables, because there has to be some mechanism that drives the variables to their long-run equilibrium relationship. This mechanism is modeled by an error-correction mechanism, in which the 'equilibrium error' also drives the short-run dynamics of the series. The error correction model is used to examine how the variables adjust the discrepancy from the long run equilibrium.

3.4 Hypothesis

H0: There exists no relationship between gross capital formation and gross domestic product growth;

H1: There exists positive relationship between gross capital formation and gross domestic product growth.

If the test statistics does not reject null hypotheses, it means that gross capital formation growth does not have impact on the growth of GDP. If the null hypothesis is rejected, it indicates that gross capital formation growths have impact on the growth of GDP in Ethiopia.

4. ECONOMETRIC ANALYSIS AND EMPIRICAL RESULTS

4.1 Stationary Test

Unit Roots tests were conducted by utilizing the Augmented Dickey-Fuller (ADF) tests. The time series variables are in log form; LnGDP, LnK, LnIMP and LnEXCH. They were tested whether they are integrated of order one. The underlying models include a constant and time trend. The essence of the Augmented Dickey-Fuller (ADF) tests is to verify the null hypothesis of non-stationary, the rejection of which requires a negative and significant test statistic. The optimal lag length of the lagged differences of the tested variable is determined by minimizing the Schwarz Information Criteria (SIC).

Table 1: Augmented Dickey-Fuller: unit root test for LnRGDP at level with Intercept

Null Hypothesis: LnRGDP has a unit root Exogenous: Constant Lag Length:0(Automatic - based on SIC, maxlag=5)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.037026	0.9998
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

Table 2: Augmented Dickey-Fuller: unit root test for LnRGDP at level with trend and intercept

Null Hypothesis: LnRGDP has a unit root Exogenous: Constant, Linear Trend Lag Length:0(Automatic - based on SIC, maxlag=5)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.647948	0.9681
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

Table 3: Augmented Dicky-Fuller:unit root test for LnRGDP for first difference with intercept

Null Hypothesis: LnRGDP has a unit root Exogenous: Constant Lag Length:0(Automatic - based on SIC, maxlag=5)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.152965	0.0031
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Table 4: Augmented Dicky-Fuller:unit root test for LnRGDP
for first difference with trend and intercept

Null Hypothesis: LnRGDP has a unit root Exogenous: Constant, Linear Trend Lag Length:0(Automatic - based on SIC, maxlag=5)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.838908	0.0029
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

Table 5: Augmented Dickey-Fuller: unit root test for LnK
at level with intercept

Null Hypothesis: LnK has a unit root Exogenous: Constant Lag Length:0(Automatic - based on SIC, maxlag=4)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.587526	0.9869
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

Table 6: Augmented Dickey-Fuller: unit root test for LnK
at level with trend and intercept

Null Hypothesis: LnK has a unit root Exogenous: Constant, Linear Trend Lag Length:0(Automatic - based on SIC, maxlag=4)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.205906	0.8911
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

Table 7: Augmented Dicky-Fuller:unit root test for LnK
for first difference with intercept

Null Hypothesis: D(LnK) has a unit root Exogenous: Constant Lag Length:0(Automatic - based on SIC, maxlag=4)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.155805	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Table 8: Augmented Dicky-Fuller:unit root test for LnK
for first difference with trend and intercept

Null Hypothesis: D(LnK) has a unit root Exogenous: Constant, Linear Trend Lag Length:0(Automatic - based on SIC, maxlag=4)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.604741	0.0000
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

Table 9: Summary of Unit Root Test Results

Variable	Augmented Dickey-Fuller tests			
	level		First difference	
	Intercept	Trend and intercept	Intercept	Trend and intercept
LnGDP	2.037026	-0.647948	-4.152965	-4.838908
LnK	0.587526	-1.205906	-6.155805	-6.604741
LnIMP	0.307281	-2.166387	-6.587161	-6.892980
LnEXCH	-0.83617	-1.923568	-4.404610	-4.300624

All the variables are significant at 1% and 5% critical value.

Each variable was examined to determine if it is stationary or non-stationary employing the unit roots test. If a time series is found to be

non-stationary, subsequently tests were conducted to determine if its first difference is stationary. Using this procedure the order of integration of a time series is determined. Table 1-9 presents the results of Augmented Dickey-Fuller (ADF) test statistics for the log levels and the first differences of the logs of the annual time series data for Ethiopia for the period 1981 to 2011 G.C. All the variables are non-stationery at levels and stationery at first difference. From Table 1-9 it is evident that all-time series are integrated of the order of one I(1) in the first differences based on the Augmented Dickey-Fuller (ADF) test. The results are compatible with the hypothesis that stationary characterizes the variables in this study.

4.2 Engle-Granger Test

We now turn to apply the approach proposed by Engle and Granger (1987) methodology to examine whether the empirical evidence is consistent with co-integration relationship implied by the theory. As defined by Engle and Granger (1987), the stationary of a variable determines the degree of integration of the variable. Engle and Granger (1987) have demonstrated that the linear combination is integrated at any order less than d, and then these variables are integrated.

The results of the co-integration tests are reported in Table 10. We reject the null hypothesis of no co-integration at 5% and 10% level of significance in Augmented Dickey-Fuller (ADF) test which is strong evidence of having co-integration among the variables. The rejection of null hypothesis also implies that the empirical preference shocks

are I(0) processes. Since the error term of the variables with different combinations is stationary, we can make inference that the variables will move together and never diverge in the long run although they might show some divergence from time to time.

Table 10: Residual based Single Equation Tests for Co-integration

Null Hypothesis: ECT has a unit root Exogenous: Constant Lag Length:0(Automatic - based on SIC, maxlag=1)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.515650	0.0145
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

The residual is significant at 5% and 10% critical value.

The residuals from the ordinary least squires (OLS) regression is usually taken as a proxy for the linear combination in the empirical analysis. For example the variables in the regression equation which has the same integration degree [I (1)], will be co-integrated and have a steady state relationship, if and only if the residual of the OLS regression has the integration degree I(0) . When it is satisfied, the short-run equation can be constructed by using the error correction model (ECM) in order to realize long-run equilibrium.

Using Augmented Dickey-Fuller (ADF) unit root test results, the variables are integrated of order one I(1), then ordinary least square estimation(OLS) results indicate long run relationship among the variables. The long-run static model is estimated (see, Table 11) and the residual of the long-run static model is tested as to whether it is stationary. The results indicate and confirm that co-integration exists between the series. The residual is integrated of order zero, I(0) therefore can be used in the dynamic equation as an error correction mechanism.

Error Correction Term (table 12) shows the short term dynamics adjustments with the long term equilibrium relationship. The ECM term is negative and significant, which indicates that approximately 38% of the disequilibrium will be adjusted.

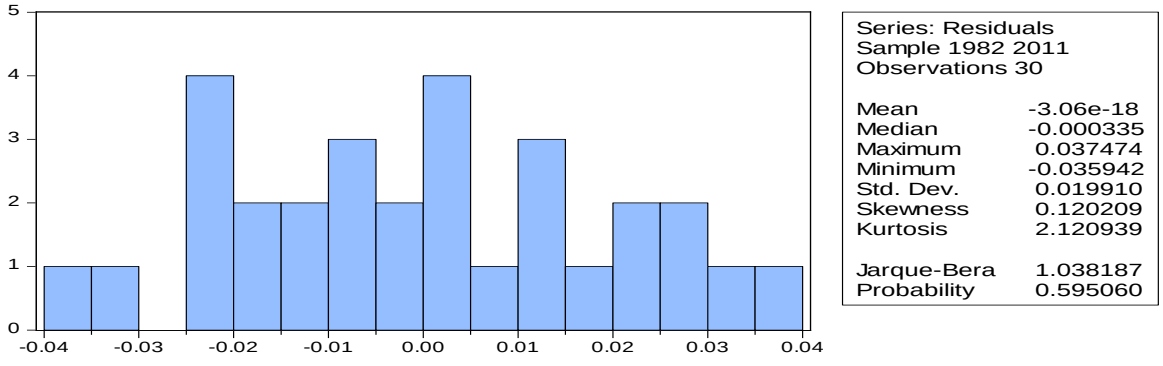
4.3 Diagnostic Tests:

Normality test

H0: All model variables are Normal;

H1: All model variables are not Normal.

Figure 3: Histogram Normality Test



Serial correlation test:

H0: There is no serial correlation between model variables;

H1: There is serial correlation between variables.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.174542	Prob. F(2,23)	0.3268
Obs*R-squared	2.780081	Prob. Chi-Square(2)	0.2491

Heteroskedasticity Test:

Ho: All model variables are homoscadestic;

H1: all model variables are Heteroskedastic.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.246946	Prob. F(4,25)	0.9088
Obs*R-squared	1.140285	Prob. Chi-Square(4)	0.8878
Scaled explained SS	0.443816	Prob. Chi-Square(4)	0.9787

The robustness of the model has been confirmed by several diagnostic tests such as Breusch-Godfrey serial correlation LM test, Jacque-Bera normality test and Breusch-Pagan-Godfrey Heteroskedasticity test. The diagnostic tests of the model fail to reject the null hypothesis of all the variables are normally distributed, there is no serial correlation between model variables and all model variables are homoscadestic at 5 percent significant level. All the tests revealed that the model has the desired econometric properties, namely, the model‘s residuals are serially uncorrelated, normally distributed and homoscadestic. Therefore, the results reported are valid for reliable interpretation.

5. RESULTS AND DISCUSSIONS

5.1 Ordinary Least Squares Regression and Error Correction Model:

Table 11 presents the estimation results of the static model, which represents the long-run model and shows the hypothesis that there exists no relationship between gross capital formation and GDP growth is rejected. This implies that the growth of investment have long run positive impact on economic growth in Ethiopia. This gives long-run relationship between economic growth and total investment (i.e. aggregate of public and private capital formation). Ghali and Al-shamsi (1997) have observed that when investment in an economy increases it affects growth in the same direction. The impact is due to the fact that increase in investment raises aggregate demand via national income identity and it also generates employment in the country which in turn also boosts the economy. The regression result shows that the coefficient of total investment affects GDP by 39 percent.

It is also observed from the results that in the long run imports and exchange rate have positive and significant impact on economic growth. When all the variables are in log form, the coefficients can be interpreted as elasticity. The variables are all significant at 5 percent significant level. This supports the theoretical and empirical findings. The goodness of fit of the model is good, because, the R-squared and R-squared adjusted are 97.64 and 97.38 percent, respectively.

Table 11: The Estimated Long-Run Static Model

LnRGDP = 1.62 **+ 0.39LnK + 0.17LnIMP + 0.17LnEXCH**

Dependent variable: LnRGDP Included observations: 31				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LnK	0.390414	0.058996	6.617677	0.0000
LnIMP	0.174299	0.038786	4.493884	0.0001
LnEXCH	0.166781	0.044550	3.743696	0.0009
C	1.619666	0.145761	11.11176	0.0000
R-squared	0.976400	Mean dependent var	3.935746	
Adjusted R-squared	0.973778	S.D. dependent var	0.176714	
S.E. of regression	0.028616	Akaike info criterion	-4.149808	
Sum squared resid	0.022109	Schwarz criterion	-3.964777	
Log likelihood	68.32202	Hannan-Quinn criter.	-4.089492	
F-statistic	372.3579	Durbin-Watson stat	1.162582	
Prob(F-statistic)	0.000000			

The ECM was estimated and the results are presented in Table 12. The estimation results indicate and confirm that total investments are significant and have positive short-run impact on economic growth. This implies that investment exert a short run positive effect on economic growth and one percent increase in investment increases GDP by 18 percent, thus, supporting theoretical and empirical findings. According to Blejer and Khan (1984) there is a positive relationship between investment and economic growth of a country. They urged that developing countries can achieve economic growth with high levels of investment (a well-established theory for investment and economic growth).

Table 12: Estimated Results of Dynamic Error Correction Model

Dependent variable: D(LnRGDP) Sample (adjusted): 1982 2011 Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LnK)	0.184717	0.065912	2.802496	0.0097
D(LnIMP)	0.167723	0.061056	2.747012	0.0110
D(LnEXCH)	0.115738	0.102361	1.130677	0.2689
ECT(-1)	-0.379510	0.169578	-2.237969	0.0344
C	0.006010	0.005663	1.061248	0.2987
R-squared	0.540160	Mean dependent var	0.019374	
Adjusted R-squared	0.466586	S.D. dependent var	0.029361	
S.E. of regression	0.021444	Akaike info criterion	-4.695745	
Sum squared resid	0.011496	Schwarz criterion	-4.462212	
Log likelihood	75.43617	Hannan-Quinn criter.	-4.621036	
F-statistic	7.341698	Durbin-Watson stat	1.603246	
Prob(F-statistic)	0.000470			

The ECM estimated coefficient is -0.38 and it is statistically significant at 5 percent significance level, and it has the correct sign and therefore suggests that any shock which diverge the economy from the steady state can converge to the long-run equilibrium path. In conclusion the goodness of the model is good given that the R-square and R-square adjusted is 54.02 percent and 46.67 percent respectively (Table 12).

6. SUMMARY OF FINDINGS AND RECOMENDATIONS

6.1 Summary of Findings

The study's main objective is to improve the understanding of the impact of investment (i.e. joint private and public gross capital formation) on economic growth and point to policy measures aimed at further strengthening economic growth in Ethiopia. In this regard, the study analyzed the impact of investment on economic growth in Ethiopia. The methodology adopted is the new neo-classical growth model of Cobb Douglas Production Function utilizing the error correction model (ECM). The model is implemented empirically using macroeconomic data for Ethiopia from 1981 to 2011 period. The empirical implementation follow a co-integration approach that makes use of long-run and short-run analysis. The unit root tests conducted confirm that variables are stationary in first difference and the co-integration tests also confirm the existence of long term relationship between the variables. The findings of the study concluded that there exist a short-run and long-run relationship between investment and economic growth in Ethiopia. This implies that investment impact positively economic growth in the short and long run process.

Another main finding of the study confirms that, the error correction term (ECM) is negative and significant (-0.38), which indicates that 38% of the disequilibrium will be adjusted annually and

approximately after 3 (three) years short term dynamics will reach at equilibrium level.

6.2 Recommendations

The impact of investment on economic growth is a long standing issue in macroeconomics and development economics. The empirical results of the study have useful implication for Ethiopia. Thus an important implication for policy is that investment (i.e. Private and public gross capital formation) is one of the major determinants of economic growth in Ethiopia. For the objective of accelerating economic growth; The Ethiopian Government is required to promote and encourage both domestic and foreign direct investment. The investment policy should be more transparent, attractive and competitive. This leads to a positive impact on investment in terms of volume and diversification. Therefore; the Ethiopian authority must place emphasis on the growth of investment in efforts to enhance and stimulate economic growth in Ethiopia.

Investment in any form results in productive outcomes. Economic growth is caused by growth in physical and human capital and also factors such as domestic saving rate, technology and institutional change. Most economists feel that sustained high growth is dependent on sustained technological and institutional growth; to speed up the growth policy measures to facilitate the above variables require paving the way for expanded investment.

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