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THE MACROECONOMIC DETERMINANTS OF ECONOMIC GROWTH IN ETHIOPIA: AN ARDL APPROACH

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Abstract- *The main purpose of this paper has been to examine the effects of some of the key macroeconomic variables on Ethiopia's economic growth. Unit roots first tested to determine the stationarity status of the variables using the Augmented Dickey-Fuller (ADF) and Phillips Peron (PP) tests and further investigated for Co-integration using the Autoregressive Distributed Lag Models (ARDL) based on timeseries data over the period 1974 to 2017. The study result revealed that gross domestic investment to be an important prerequisite for accelerating growth. Similarly, increasing human capital would help to contribute to growth. The empirical results also suggest that official development assistance promotes economic growth. Alternatively, the external debt and inflation are negatively related to country's economic growth. From the findings, it is recommended that relevant policies should be formulated to ensure that each of this factors move in a direction such that they enhance economic growth.*

Index Terms- Determinants and Economic Growth

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INTRODUCTION

The most important agenda in world political economy and one the major goals of all countries is economic growth. It explain much of the development aspect, countries spend much of their resources and time in an effort to ensure sustained economic growth.
According to World Bank report, from 2000 to 2018, Ethiopia was the third-fastest growing country of 10 million or more people in the world, as measured by GDP per capita.

To prescribe policies that will promote growth, we need to understand what the determinants of economic growth are. That is the foremost step, where Growth Theory comes into the picture. The topic of the determinants of economic growth in both developed and developing countries remains an unresolved debate.
Various studies have been also conducted in Ethiopia to identify the sources of Ethiopian Economic growth. However their is a lack of conclusive evidence on sources of economic growth. As such, this paper analyzed and offers some empirical evidence on macroeconomic determinants of economic growth in Ethiopia. Different bodies have keen interest in recent evidence as the base for international, national and local decision-making process and policy development.

Thus, this research evaluated the macroeconomic determinants of Ethiopian economic growth.

LITRATURE REVIEW

Why do we need economic growth? What are the main factors that fostergrowth? Many researchers, economists and Nobel Prize winners tried to answerthese questions. Economic growth can be considered a main factor in the well beingand prosperity of billions of people.

According to Boldeanu and Constatinescu (2015), economic growth measured by GDP means the increase of the growth rate ofGDP, but what determines the increase of each component is very different. Publicexpenditure, capital formation, private or public investment, employment rates,exchange rates etc. have different impacts on economic

growth and we should takeinto account that these determinants have different implications if the states are
developed or not. There are also socio-political factors and events that have a majorinfluence on the economic advancement of a country. The determinants of economic growth are inter-related factors influencing the growth rate of an economy.

Economic performance in Ethiopia is hugely interrelated with the political process. Ethiopia's history is full of drastic policy changes and reversals. Before 1974, the macroeconomic policy was mainly informed by a market-oriented economic system. The period 1974-1991 witnessed a centralized economic system (socialism), where the state played a significant role in all aspects of economic activity. The post-Derg period (since 1991) is again taking the economy back to the market-oriented system of the imperial regime. Hence the detrimental impact of such political process on macro performance has to be noticeable (Alemayehu, 2011).
Empirical studies results show that, physical capital is mainly positive and significantly associated with economic growth of Ethiopia (Fentahun 2011; Ibrahim 2011; Ahmed and Kenji 2016; Biruk 2017; Mohanty 2017; Admasu 2017; Mulugeta 2017). On the other hand, the result of Rao and Leta (2017) showed that in Ethiopia, an investment could be negatively and significantly associated with growth.

In terms of human capital development, the empirical literature reviewed in this study shows that human capital development is positively and significantly associated with economic growth (Ahmed and Kenji 2016; Biruk 2017; Mulugeta 2017; Mohanty 2017).

The relationship between trade-related variables and economic growth is mixed. The proxy variables that have been investigated include real exchange rates, trade openness, exports and imports. Most empirical results revealed that actual exchange rates, trade openness, exports and imports are positively and significantly associated with economic growth (Ahmed and Kenji 2016; Mulugeta 2017; Zewdu and Minyahil 2017; Fentahun 2011; Senait 2014). On the other hand, the result of Dechassa, Butte and Ayele (2017) showed that Import and export have no significant effect on economic growth.

Demographic factors studied in the empirical growth literature include population and growth of the labor force. The empirical research revealed mixed results, with population

and labor force either positively or negatively associated with economic growth. Four out of six empirical literatures found population and labor force to be positively and significantly associated with growth (Ahmed and Kenji 2016; Biruk 2017; Senait 2014; Admasu 2017). Rao and Leta (2017) have found a negative and significant relationship between population and economic growth. Mohanty (2017) showed that they have no significant relationship in the long run.

Exogenous factors that were commonly investigated in the empirical literature include foreign aid, external debt and foreign direct investment. The empirical research revealed mixed results, with foreign aid and external debt and foreign direct investment either positively or negatively associated with economic growth. Dechassa, Butte and Ayele (2017), foreign assistance; Mohanty (2017), external debt; Zewdu and Minyahil (2017), foreign direct investment to be positively and significantly associated with economic growth. On the other hand Haile (2015), foreign aid; Becker, Palme and Fissha (2006), external debt; Admasu (2017), foreign direct investment; found to be negatively and significantly associated with economic growth. Haile (2015) investigation included the positive coefficient of aid policy index interaction. The study showed that aid has positively contributed to economic growth in Ethiopia if it interacted with stable macroeconomic policy environment.

Monetary economics variables investigated in the empirical growth studies include inflation and budget deficit. The results revealed that inflation is positively and significantly associated with economic growth (Abis 2013 and Ashagrie 2015). Abis (2013) showed that based on the conditional least square technique, the estimated threshold model suggests 10% as the optimal level of inflation that facilitates growth. Rao and Leta (2017) found an increase in the budget deficit (BD) of the country has an impact of reducing the real gross domestic product of the country as expected even though not statistically significant.

Among the financial indicator variables, real interest rate associated with economic growth was investigated by Fentahun (2011). The result of the study showed that the real interest rate was found to be negatively and significantly associated with economic growth.

Fiscal policy variables used in the empirical growth literature cited in this study include government consumption and social welfare expenditures. The empirical results revealed that real government consumption expenditure was negative and significantly associated with economic growth (Mulugeta, 2017), while government social expenditure was associated positively and significantly with country's economic growth (Rao and Leta 2017).

When we generalized their findings, they revealed that the key determinants that significantly affected the economic growth of Ethiopia, as per their order of significance, include physical capital, exogenous factors (foreign aid, external debt and foreign direct investment), demographics, trade, human capital, fiscal policy, monetary policy and financial factors.

However, the intensity of such crucial macroeconomic determinant effect varied from research to research. Hence we may find mix and inconclusive results on some sources of economic growth variables like physical capital, exogenous and demographic factors.

THE MODEL AND EMPIRICAL STRATEGY

Data and Variable Descriptions

This study entirely relies on secondary data. Data were collected from local and international organizations mainly annual reports and publications of National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED) and the World Bank's World Development Indicators. The annual time series data on Ethiopia's economy cover the period 1974-2017.In the study real gdp **(RGDP)** used as metrics for analyzing economic growth and determinants of it. To minimize the inconsistency, it expressed in base-year prices (constant-price), which is deflated by the Ministry of Finance and Economic Development (MoFED) based on the constant price of 2010/11. The variable**INV**is gross domestic investment,in an economic sense it is the purchase of goods that are not consumed today but are used in the future to create wealth. However, getting such a ready-made time series data in Ethiopia is difficult. Therefore, in this study, the gross capital formation was used as a proxy of this variable and had been expecting a

positive impact on economic growth. The variable **HC** is stands for human capitalwhich is an intangible asset or resource embedded in people. In this study, average years of schooling assumes that being in school translates into learning, has been used as a proxy of human capital, and the sign of the coefficient would be expected positive.

Export of goods and services is denoted by **EXPT,** which is one of the macroeconomic determinants of the country's economic growth. The sign of this variable is expected to be positive. The variable **ODA** denoted official development assistanceused as an indicator of international aid inflow from external assistance sources (Governments and/or Organizations). To see its effect on economic growth, this variable is chosen as one explanatory variable and expected to have a positive sign.**EXDEBT** is our measure of external debt which is the portion of a country's debt that was borrowed from foreign lenders, including commercial banks, governments, or international financial institutions. It was included in this study to analyze its effect on economic growth and would be expected a negative sign. The variable **INFL**denoted general inflation which is defined as an increase in the overall price level in a country. The coefficient of this variable would be expected as a negative sign.The variable foreign direct investment was denoted by **FDI** and it captures the net foreign direct investment inflows.

The Model

In estimating a growth model for Ethiopia the following steps are taken in achieving it. First, we test for the presence of unit roots in the variables . The Augmented Dickey-Fuller test [ADF] and the Phillips-Perron test [PP] were conducted to examine the behavior of the series. The tests allow for three options for the conduct of the tests; without intercept and trend, with the only intercept and with both intercept and trend. The Augmented Dickey-Fuller and of the Phillips-Perron tests results show that all variables were unit-roots or non-stationary at levels except inflation rate.

Stationarity of inflation at the level and others at their first difference lead to Autoregressive Distributed Lag (ARDL) approach preference for the econometric analysis of this study. The ARDL cointegration technique or bound test of cointegration (Pesaran and Shin 1999 and Pesaran et al., 2001) and, Johansen and Juselius (1990) cointegration techniques have become the solution to determining the long-run relationship between series that are non-stationary at level, as well as reparameterizing them to the Error

Correction Model (ECM). The reparameterized result gives the short-run dynamics and long-run relationship of the underlying variables. (Nkoro and Uko, 2016).

The ARDL*(p,q1,q2.....qk)* model specification is given as follows;

$$\boldsymbol{\Phi(L,p)y_t = \sum_{i=1}^{k} \beta_i\,(L,q_i)x_{it} + \delta w_t + u_t}$$

Where

$$\Phi(L,p) = 1 - \Phi_1 L - \Phi_2 L^2 - \cdots - \Phi_p L^p$$

$$\beta(L,q) = 1 - \beta_1 L - \beta_2 L^2 - \cdots - \beta_q L^q$$

L is a lag operator such that $L^0 yt = Xt$, $L^1 yt = yt\text{-}1$, and wt is as x1 vector of deterministic variables such as the intercept term, time trends, seasonal dummies, or exogenous variables with the fixed lags. *P=0,1,2…,m, q=0,1,2….,m, i=1,2….,k:* namely a total of $(m+1)^{k+1}$ different ARDL models. The maximum lag order, m, is chosen by the user. Sample period, *t = m+1, m+2….,n.*

i.e

$$\boldsymbol{\Phi(L)y_t = \varphi + \theta(L)x_t + u_t,}$$

$$\text{with}\Phi(L) = 1 - \Phi_1 L - \cdots - \Phi_p L^p, \theta(L) = \beta_0 - \beta_1 L - \cdots - \beta_q L^q.$$

Hence, the general ARDL*(p,q1,q2.....qk)* model;

$$\boldsymbol{\Phi(L)y_t = \varphi + \theta_1(L)x_{1t} + \theta_2(L)x_{2t} + \theta_k(L)x_{kt} + \mu}$$

Using the lag operator L applied to each component of a vector, $L^k y = yt\text{-}k$, is convenient to define the lag polynomial *Φ(L,p)* and the vector polynomial *β(L,q).* As long as it can be assumed that the error term ut is a white noise process, or more generally, is stationary and independent of *xt, xt-1, … and yt, yt-1, …,* the ARDL models can be estimated consistently by ordinary least squares.

The model employed in this study Following the approach of the above ARDL model broadly, the mathematical relationship between real GDP and its major macroeconomic determinants in this study can be written as follows:

$$\Delta \mathbf{lnRGDP}_t = \boldsymbol{\varphi} + \sum_{i=1}^{k} \boldsymbol{\theta}_{1i}\, \Delta \boldsymbol{lnHC}_{t-i} + \sum_{i=1}^{k} \boldsymbol{\theta}_{2i}\, \Delta \boldsymbol{lnINV}_{t-i} + \sum_{i=1}^{k} \boldsymbol{\theta}_{3i}\, \Delta \boldsymbol{lnEXPT}_{t-i} + \sum_{i=1}^{k} \boldsymbol{\theta}_{4i}\, \Delta \boldsymbol{lnEXDEBT}_{t-i} + \sum_{i=1}^{k} \boldsymbol{\theta}_{5i}\, \Delta \boldsymbol{lnINFL}_{t-i} + \sum_{i=1}^{k} \boldsymbol{\theta}_{6i}\, \Delta \boldsymbol{lnODA}_{t-i} + \sum_{i=1}^{k} \boldsymbol{\theta}_{7i}\, \Delta \boldsymbol{lnFDI}_{t-i} + \boldsymbol{\beta}_1 \boldsymbol{lnHC}_{t-1} + \boldsymbol{\beta}_2 \boldsymbol{lnINV}_{t-1} + \boldsymbol{\beta}_3 \boldsymbol{lnEXPT}_{t-1} + \boldsymbol{\beta}_4 \boldsymbol{lnEXDEBT}_{t-1} + \boldsymbol{\beta}_5 \boldsymbol{lnINFL}_{t-1} + \boldsymbol{\beta}_6 \boldsymbol{lnODA}_{t-1} + \boldsymbol{\beta}_7 \boldsymbol{lnFDI}_{t-1} + \boldsymbol{\varepsilon}_t$$

Where:

- $\boldsymbol{\varphi}$ = constant or intercept term.
- $\boldsymbol{\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6}$ ***and*** $\boldsymbol{\theta_7}$Characterize the coefficients of the short-run dynamics of the model **whereas,** $\boldsymbol{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6}$ ***and*** $\boldsymbol{\beta_7}$coefficients show the long run relationship**.**

  The long-run relationship between the concerned variables can be conducted based on the Wald test (*F*-statistic) by imposing restrictions on the estimated long-run coefficients of one period lagged level of the variables equal to zero,

  that is, $\mathbf{H_0}: \boldsymbol{\beta_1} = \boldsymbol{\beta_2} = \boldsymbol{\beta_3} = \boldsymbol{\beta_4} = \boldsymbol{\beta_5} = \boldsymbol{\beta_6} = \boldsymbol{\beta_7} = \mathbf{0}$against

  $\mathbf{H_1}: \mathbf{H}_0$ is not true(the alternative hypothesis).

Once the co-integrating relationship is ascertained, the long run and error correction estimates of the

ARDL model is obtained as given

$$\Delta \mathbf{lnRGDP}_t = \boldsymbol{\varphi} + \boldsymbol{\beta}_1 \boldsymbol{lnHC}_{t-1} + \boldsymbol{\beta}_2 \boldsymbol{lnINV}_{t-1} + \boldsymbol{\beta}_3 \boldsymbol{lnEXPT}_{t-1} + \boldsymbol{\beta}_4 \boldsymbol{lnEXDEBT}_{t-1} + \boldsymbol{\beta}_5 \boldsymbol{lnINFL}_{t-1} + \boldsymbol{\beta}_6 \boldsymbol{lnODA}_{t-1} + \boldsymbol{\beta}_7 \boldsymbol{lnFDI}_{t-1} + \boldsymbol{\varepsilon}_t$$

RESULTS AND DISCUSSIONS

The Augmented Dickey-Fuller and the Phillips-Perron results are consistent with each other. Both test results show that all variables were unit-roots or non-stationary at levels while inflation rate was stationary at level.Therefore, the primary difference of the variables was taken to make them 'stationary' and all the variables become stationary at their first differences.

Moreover, the long run ARDL model estimated in this study passes all other diagnostic tests.

Model Stability and Diagnostic Test

we carried out several model stability and diagnostic checking, which includes Serial Correlation Test (Brush &Godfray LM test), Functional form (Ramsey's RESET) test, Normality (Jaque-Bera) test, and Heteroscedasticity test. Such tests are recommended by Pesaran*et* et al., (2001).

Table 1. Diagnostic test for the long run ARDL (1 0 0 0 1 2 0 2)

Test Statistics	χ^2	LM Test
Serial Correlation	.4849	.2707
A functional form	.1053	.2473
Normality	.2064	.1043
Heteroscedasticity	.0242	.4274

Source: Own computation

Therefore, based on the result of the test the null hypothesis of no serial correlation (Brush Cod fray LM test) is failing to reject is for the reason that that the p-values associated with test statistic are higher than the standard significant level (I.e. .2707> 0.05). One quite useful approach to general test for functional form misspecification is Ramsey's Regression Equation Specification Test (RESET). In the diagnosis, we could not reject the null hypothesis test for RESET, As the test result indicates (.2473>0.05) that we can't reject Ramsey's test, which means that the model is correctly specified.

The third diagnostic test is about the residual. As a result indicates that we could not reject the null hypothesis which says that the residuals are normally distributed, for a reason, that the p-value associated with the Jaque-Berra normality test is more significant than the standard significance level (I.e. 0.1043>0.05). The last diagnostic test is for heteroscedasticity test. As we have seen from the above table, we can reject at 5% level of significance due to its p-value associated with the test statistics are higher than the standard significance level (I.e. 0.4274> 0.05).

Testing parameter stability using CUSUM and CUSUMSQ test

In addition to the above diagnostic tests, the stability of long-run estimates has been tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test.

The stability of the model for the long run and the short-run relationship is detected by using the CUSUM and the CUSUMSQ tests. The test finds severe parameter instability if the cumulative sum goes outside the area (never returns) between the two critical lines. The result shoed that the model is stable.

Plot of Cumulative Sum of Squares of Recursive Residuals (B)

Similarly, the CUSUMSQ test shows that the graphs do not cross the lower and upper critical limits. So, we can conclude that long-run estimate is stable and there is no structural break. In addition to the model stability 99.7percent of the model has been explained by the regressors. Hence the results of the estimated model are reliable and efficient.

Long Run ARDL Bounds Tests for Co-integration

Since we determined the stationary nature of the variables, the next task in the bounds test approach of co-integration is estimating the ARDL model specified in the equation using the appropriate lag-length selection criterion. According to Pesaran and Shine (1999), as cited in Narayan (2004) for the annual data are recommended to choose a maximum of two lag lengths. From this, a lag length that minimizes AIC is 2. In addition to this, we have also used AIC to determine the optimal lag because it is a better choice for smaller sample size data as this study. Apart from this, AIC found to produce the least probability of underestimation among all criteria available (Liew*et al.*, 2004) as cited in Tsadkan (2013).

Table 2: Narayan (2004) ARDL Bound Test

				F=19.643		K_7, C_3
Ho: no level relationship				t= -5.690		
	F-Statistic			t-statistic		
Critical value	Lower Bound Value	Upper Bound Value		Lower Bound Value		Upper Bound Value
1%	2.96	4.26		-3.43		-5.19
5%	2.32	3.5		-2.86		-0.457
10%	2.03	3.13		-2.57		-4.23

Source: Own compilation

Note: -accept Ho if F< critical Value or t > critical value; reject Ho if F> critical Value or t < critical value

Wald-test (bound test) is performed to check the joint significance of the coefficients. TheWald test is conducted by imposing restrictions on the estimated long-run coefficients of real GDP, gross investment, human capital, export, foreign aid, external debt, inflation and foreign direct investment. The Computed F& T statistics value is compared with the lower bound and upper bound critical values provided by Narayan (2004).

In this study, we have used critical value formulated by Narayan (2004), which is based on 30 to 80 observations. As it is depicted in the following table with F and T statistics, the calculated F statistics (19.643) is higher than Narayan upper bound critical values at the 1 % level of significance. Similarly, the calculated T value (-5.690) is lower than the Narayan lower bound critical values at the 1 % level of significance. Therefore, there is a cointegration relationship between the variables in the long run.

Long Run ARDL Model Estimation

After confirming the existence of a long-run co-integration relationship among the variables, the next step is running the appropriate ARDL model to find out the long-run coefficients, which is reported in Table.

The result indicates that the variables INV, HC, EXPT and ODA in the regression have the expected signs while variables EXDEBT, INFL and FDI in the regression have opposite sign of what we anticipated. As we have discussed in the theoretical and empirical literature parts physical capital, human capital and foreign aid, have a positive impact on Ethiopian economic growth while external debt and general inflation have an inverse effect on Ethiopian economic growth regardless of significance.

As the long-run estimated result of the above table showed, the physical capital formation, which is proxied by gross investment has a positive impact on Ethiopian economic growth and statistically significant at 1 percent significance level.

This result is in-line with the theory of economic growth, which states that capital formation is the major determinants of economic growth (Keynesian theory of growth, Solow's theory of growth). Moreover, this study's result is consistent with the study of L I and Wang (2017) in China, Biswas and Saha (2014) in India; Iqbal and Zahid (1998) in Pakistan; Ng'ang'a et al., (2012) and Enu et al., (2013) in Africa; Weeks et al.,(2004) and Mulugeta (2017) in Ethiopia.

Since we have specified the growth model in a log-linear form, the coefficients can be interpreted as elasticity with respect to real GDP. The coefficient of gross domestic investment (lnINV) is 0.5431. This indicates that, in the long run, holding other things constant, a one percent change in gross domestic investment as a percentage of GDP which is proxied by gross capital formation brought 0.5431 percent change in real GDP during the study period.

Table 3: Estimated Long Run Coefficients using the ARDL Approach

/**ARDL (**1 0 0 0 1 2 0 2**) selected based on Akaike Information Criterion/**

Sample: 1976-2017 Number of obs = 42

R-squared = 0.8975

Log-likelihood =95.247 Adj R-squared = 0.8499

variables	Coef.	Std. Err.	t	p>/ t /
lnINV	.5431***	.1508	3.6	.001
lnHC	.2041*	.1188	1.72	.097
lnEXPT	.0365	.0948	0.38	.703
lnODA	.1022**	.0377	2.71	.011
lnEXDEBT	-.0669**	.0337	-1.985	.046
lnINFL	.0393***	.0133	2.95	.006
lnFDI	-.0294	.0733	-0.41	.691
_cons	2.3268***	.4825	4.82	.000

Source: ARDL (1 0 0 0 1 2 0 2) results.

Note: *** , ** and * represent level of significant at 1%, 5% and 10% level respectively. Which indicates rejection of null hypothesis at 1%, 5% and 10% levl.

Human capital also has a long-run impact on the Ethiopian economic growth and statistically significant at 10 percent significance level. The findings of this research concerning the long-run positive impact of the human capital on Ethiopian economic growth, are consistent with the endogenous growth theories (mainly advocated eloped by Lucas (1988), Romer (1990) which argue that improvement in human capital (skilled workers) leads to productivity improvement that enhances output. Also, this research result is similar to the results found by Haldar and Mallik (2007) and Ng'ang'a et al, (2012). As a result, a one percent increase in the human capital, which is proxied by the average years of schooling has resulted in 0.2041percent change in real GDP under the study period.

Foreign aid (grant) has a positive impact on Ethiopian economic growth, and it is statistically significant at 5% significant level during the study period. The study by (Morrissey, 2015) the results differ for two reasons of aid: grants were associated with increased spending, and that government spending had a positive effect on growth. The other study by Mosley et al., (1987) shows that the rate of return of aid on capital is higher and the share of aid inflows allocated to the development budget is, on average, more top growth.

As indicated in Table, on average, a one percent increase in net ODA as a percentage of GDP will lead to a 0.1022 percent increase in economic growth in Ethiopia. This result supports the findings of Becker et al., (2004) and Anyanwu (2011) but not those of Admasu A., (2017), Haile G. (2015) and Fayissa and Nsiah (2010). They found that ODA has a negative and significant long-run effect on growth in Ethiopia. An empirical result in the literature also reports a mixed result. In my opinion, there might be possible reasons behind the different results which may be associated with the data inconsistency, which they took from various organizations.

Ethiopia is one of the highly indebted emerging countries in the world, as Hailemariam (2011) stated. According to MoFED (2019), Ethiopia's Debt Burden to GDP Ratio Exceeding Level; its internal and external debt until last March 2019 amounts 52.57 billion USD, out of which 26.93 billion USD is foreign debt.

The finding revealed that a one percent increase in net external debt (EXDEBT) as a percentage of RGDP would lead to a 0.0669 percent decrease in economic growth in Ethiopia during the study period. It is statistically significant at 5% significant level. This result was consistent with the finding of (IMF, 2002) working paper for 93 developing countries. The negative impact of external debt on economic growth might be linked with the low domestic saving rate in the country. External debt creates a burden on the economy; the study by (Mulugeta F., 2014) showed that External debt influenced negatively by the past stock of external debt and debt servicing and, positively by the current external debt inflows for Ethiopia economy. The panel study of 61 developing countries by Catherine et al., (2004) revealed that high-debt countries, doubling debt will reduce output growth by about one percentage point and reduce both per capita physical capital and total factor productivity growth by somewhat less than that, which is also in line with the study of Becker et al., (2004), Hailemariam (2011), Teklu et al., (2014) and

Wessene (2014). Moreover, this result was consistent with the findings of IMF (2002) working paper for 93 developing countries and Boboye et al., (2012) for Nigeria.

The findings of this research notify that inflation and economic growth have a long-run relationship. The result of the study shows that the general inflation rate is positively related to a country's economic growth significantly at 1% significant level. This positive relationship implies that the Ethiopian macro-economic condition is similar to that of Keynesian explanation of the relationship between inflation and growth. As shown in the above table, it is widely believed that moderate and stable inflation rates promote the development process of a country, and hence economic growth. Reasonable inflation supplements the return to savers enhances investment, and therefore, accelerates economic growth of the country. This result was consistent with the findings of Ashagre (2015) and Abis (2013). However, the result of this study is inconsistent with the findings of Khan and Senhadji (2000), Yemane (2008) and Bawa and Abdullahi (2012).

Short Run Representation of the ARDL Model Bounds Test Approach (Error-Correction Representation)

Once the study identified the presence of long-run cointegration through the F-statistics and estimation of the long-run coefficients, we proceed to the estimate of the error correction representation of the long-run relationship. The ECM shows the short-run dynamics of the model, which is consistent with the long-run equilibrium of the model.

In the Short Run Model Estimation results, R-squared and R-bar-squared measures refer to the dependent variable D(LNRGDP). In cases where the error correction model is highly restricted, these measures could be negative.

The ECM coefficient shows how fast variables restore to their equilibrium value, and it should be statistically significant, negative and between zero and one. ECM term is one period lagged residual saved from the estimated dynamic long-run relationship. The ECM_{t-1}, which measures the adjustment to restore equilibrium in the dynamic model, appear with a negative sign and is statistically significant at 5% level of significance level, ensuring long-run equilibrium can be attained. Banerjee et al., (2001) hold that a highly significant error correction term is further proof of the existence of a stable long-run relationship. Indeed he has argued that testing the significance of $ECMt_{-1}$, which is supposed to carry out a negative coefficient, is a relatively more efficient way of establishing cointegration. As indicated in the bounds test approach for cointegration, the

result of F-statistic falls between the upper and lower bounds and the study is unable to make any conclusion about the long-run relationship of the variables under consideration. So, as stated in such cases, we have to check for the sign and significance of ECM(-1)to conclude about the long run and short-run relationship among the variables. The results of the ECM are reported in the table below.

The coefficient of the error correction term that captures the speed of adjustment towards long-run equilibrium is found with the correct sign and magnitude. The results of the ECM (-1), which measures the adjustment to restore equilibrium in the dynamic model, appear with a negative sign and is statistically significant at 5% level of significance level, ensuring the long-run equilibrium can be attained. Hence the value of its coefficient tells the speed of adjustment towards the long-run equilibrium, which is 0.667, which implies that around 66.7 % deviations from long-term equilibrium are adjusted every year.

The results of the ECM for the gross domestic ratio imply that all of the coefficients, except (lnRGDP(-1), are statistically significant at 1%, 5% & 10% level of significance.

Table 4: Estimated Short Run Coefficients using the ARDL Approach

Dependent Variable: D(LNRGDP)

Sample (adjusted): 1978 to 2017

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.850115	1.530271	1.862491	0.0894
D(lnRGDP(-1))	0.42963	0.300413	1.430131	0.1805
D(lnINV)	-0.269803	0.153073	-1.762584	0.1057
D(lnINV(-1))	-0.248617	0.103621	-2.399289	0.0353
D(lnHC)	0.08293	0.105807	0.783793	0.4497
D(lnHC(-1))	0.1651	0.071247	2.317286	0.0408
D(lnEXPT)	-0.004486	0.004708	-0.952865	0.3611
D(lnEXPT(-1))	0.01262	0.005119	2.465183	0.0314
D(lnODA)	0.023933	0.011161	2.144235	0.0552
D(lnEXDEBT)	0.006471	0.002054	3.149833	0.0092
D(lnINFL)	-0.00218	0.001046	-2.083118	0.0614
D(lnFDI)	-0.334641	0.110026	-3.041476	0.0112
ECM(-1)	-0.666673	0.264879	-2.516894	0.0286

R-squared	0.945257	Mean dependent var	0.049113
Adjusted R-squared	0.805911	S.D. dependent var	0.063713
S.E. of regression	0.028069	Akaike info criterion	-4.14928
Sum squared resid	0.008667	Schwarz criterion	-2.92484
Log-likelihood	111.9856	Hannan-Quinn crite.	-3.70656
F-statistic	6.783509	Durbin-Watson stat	2.511301
Prob(F-statistic)	0.000965		

Source: Own compilation

While (lnRGDP(-1), is insignificant in the short run the rest such as D(lnEXDEBT) at 1%, D(lnINV(-1)), D(lnHC(-1)), D(lnEXPT(-1))and D(lnFDI) at 5%, and D(lnODA), D(lnINFL), and D(lnOPEN(-1)) at 10% level of significant statistically in the short run.

The long-run result of capital formation (INV) has a negative impact on Ethiopian economic growth and statistically significant at 5 % level of significance in the short term. A percentage change in the first lag of INV is associated with an average 0.25 percent decrease in RGDP citrus-paribus.

Similar to the long-run result, first lag of human capital has a positive impact on Ethiopian economic growth and statistically significant at 5 percent significance level in the short term. As a result, a one percent increase in capital formation will result in 0.1651 percent increase in real GDP in the short run.

Export is significantly affecting Ethiopian economic growth during the study period in the short run, despite their relationship is not significant in the long run. The results indicate that a one percent increase in Export leads to 0.01262percent increase in the real gross domestic product in the short term.

Similar to the long-run result, official development assistance (ODA) has a positive impact on Ethiopian economic growth in the short run. And statistically significant at a 10% significance level. As a result, a one percent increase in ODA will result in a 0.023933 percent increase in real GDP in the short run.

Unlike the long-run result, external debt (EXDEBT) has a positive impact on Ethiopian economic growth in the short run; and is statistically significant at a one percent significance level. As a result, a one percent increase in EXDEBT will result in a 0.006471 percent increase in real GDP in the short run.

In this study, general inflation (INFEL) has a positive impact on Ethiopian economic growth in the long run. However, in the short term, it is negatively associated with economic growth at 10% significant level. The results revealed that a one percent increase

in the inflation rate leads to a decrease in the real gross domestic product by 0.00218 % in the short run.

FDI also has a negative effect in the short run. Unlike its long-run impact, it has a positive and significant (the 5% level of significance) relationship with Ethiopian economic growth in the short run. A percentage change in the FDI is associated with, on average, 0.34 % decrease in RGDP citrus-paribus.

The Pair Wise Granger Causality Results

The Granger-Causality test is the most commonly used method in economic literature. This is because it not only tests the correlation between two variables but also specifies the direction of causality.

Table 5: Granger causality

Null hypothesis	**F-statistic**	**Probability**
lnRGDP does not Granger Cause lnINV	2.6322	0.0917
lnINV does not Granger Cause lnRGDP	2.4222	0.026
lnRGDP does not Granger Cause lnHC	0.35793	0.7026
lnHC does not Granger Cause lnRGDP	0.68535	0.5131
lnRGDP does not Granger Cause lnEXPORT	0.24347	0.7857
lnEXPORT does not Granger Cause lnRGDP	5.458	0.0108
lnRGDP does not Granger Cause lnODA	1.5219	0.2378
lnODA does not Granger Cause lnRGDP	4.6589	0.0191
lnRGDP does not Granger Cause lnEXDEBT	0.29898	0.7442
lnEXDEBT does not Granger Cause lnRGDP	1.5845	0.225
lnRGDP does not Granger Cause lnINFL	0.93773	0.4049
lnINFL does not Granger Cause lnRGDP	0.32314	0.7268
lnRGDP does not Granger Cause lnFDI	0.00695	0.9931
lnFDI does not Granger Cause lnRGDP	5.5369	0.0102

Source: Own compilation

In the causality test, four outcomes are possible. There may be unidirectional causality meaning that A may Granger cause B but not the other way round. There may also be the case where B Granger causes A, but not the other way round. It could happen A, and B Granger causes each other implying bi-directional causality. When the sets of the

coefficient are not statistically significant, we say that none of the variables Granger causes each other, indicating that, the variables are independent.

The Granger Causality test was performed under the error correction model. First, the variables were estimated at a level without taking the first difference in the unrestricted VAR framework. The lag length was selected using the Akaike information criterion (AIC). The unrestricted VAR model was applied.

The causalities were evaluated using the Granger Causality model. The empirical results reveal that economic growth and INV are co-integrated and thus exhibit a long-run relationship between the variables. The Granger causality test supports bi-directional causality between economic growth and INV in Ethiopia. The causality from gross domestic investment to real GDP is more robust.

The above result implies the F statistics of the first equation proved the causality between real gross domestic product (RGDP) and official development assistance (ODA) is unidirectional, indicating the ODA as the cause for RGDP during the study period. The study is consistent with the finding of (Becker et al., 2004). These results suggest that the direction of causality is from ODA RGDP since the estimated F is significant at the 5 % level of significance; Reject the null hypothesis that lnODA does not Granger Cause lnRGDP. On the other hand, because the F value is statistically insignificant, we conclude that there is no ―reverse causation from RGDP to ODA because.

The above result in table also depicts that the null hypothesis that lnFDI does not Granger Cause lnRGDP can be rejected at the 5% level of significance. Contrarily, the null hypothesis that lnRGDP does not Granger Cause lnFDI is accepted. Hence, the results suggest that Granger-causality runs only one way in Ethiopia using the data for the period 1974-2017. The causality is from FDI to RGDP and not from RGDP to FDI. This occurrence is referred to as uni-directional causality.

Finally, the long-run estimated model presented as following with figures in the parenthesis indicates the calculated t-value.

$$\ln RGDP = \underbrace{2.3268}_{(4.82)} + \underbrace{0.5431\ln INV}_{(3.60)} + \underbrace{0.2041\ln HC}_{(1.72)} + \underbrace{0.0365\ln EXPT}_{(0.38)} + \underbrace{0.1022\ln ODA}_{(2.71)} - \underbrace{0.0659\ln EXDEBT}_{(-1.985)} + \underbrace{0.0393INFL}_{(2.95)} - \underbrace{0.0294\ln FDI}_{(-0.41)} \quad (4.1)$$

CONCLUSION

The central objective of this study has been to investigate some macroeconomic factors that have promoted or hindered Ethiopia's economic growth in the last four decades.The data used are from different national and international institutions/organizations for the period of 1974-2017.

Countries economic growth performances and comparisons were computed descriptively using tables and graphs. At the time of its government change in 1991, Ethiopia had: GDP per capita of 584 USD; agriculture, industry and service shared 58.7%, 7.27% and 29.7 percent of GDP respectively; gross national saving 5% of GDP; total investment 11.5 percent of GDP; general government revenue 11.3 percent of GDP; current account balance 0.76 percent of GDP; net lending -6 percent of GDP; money supply 29.8 percent of GDP. In 2017, Ethiopia had: GDP per capita of 1730 USD; agriculture, industry and service shared 34.2 %, 22.9 % and 36.9 percent of GDP respectively; gross national saving 32.1% of GDP; total investment 39 percent of GDP; general government revenue 14.9 percent of GDP; current account balance -8.1 percent of GDP; net lending -3.3 percent of GDP; money supply 37.7 percent of GDP.

But the economic sky was darkening with clouds. Growth had slowed, in recent years, both in aggregate and for all major sectors. Reforms continued, but at an uneven pace.

Irrespective of the econometric analysis for Ethiopia seven variablessuch as, gross domestic investment (INV) proxies by physical capital formation at a time t, human capital (HC) proxies by average years of schooling ages 15 and above, total exports of goods and service (EXPT) to the rest of the world at a time t; official net development assistance (ODA) at a time t, external net debt (EXDEBT) at a time t, general inflation at a time t ($INFL_t$) and foreign direct investment (FDI) at a time t were identified wich determined the Ethiopian real gross domestic product (RGDP) based on litratures and tests. For the reason that of regressor statonarity nature, with different order of integration, the ARDL cointegration technique was used in determining the long run relationship between series. The reparameterized result gives the short-run dynamics and long run relationship of the considered variables.

The result of the econometric analysis indicates that the five explanatory variables explained above except EXPT and FDI have a long run relationship with the dependent variable (RGDP). INV, HC, ODA and INFL have a significant and positive impact, but EXDEBT has significant and a negative impact in explaining the Ethiopian economy.

In the short run, all explanatory variables found to have statistically significant meaning in explaining real gross domestic growth in Ethiopia. The speed of adjustment has value -0.666673with a negative sign, which implies that around 66.7 percent deviation from long-term equilibrium are adjusted every year. The overall findings of the study underlined the importance of the explanatory variables in explaining the variation in the real gross domestic product of the country.

Policy Implications

Based on the results obtained, the following policy recommendations are forwarded.

The results suggest that gross domestic investment need to be considered carefully to avoid a reduced positive impact of it on the economic growth of the country.

Despite very high trade openness, it has not promoted Ethiopian economic growth. Such type of result mainly rooted in 'what country is exporting. Hence, the government should pay considerable attention to exports to fully exploit the benefits of openness and promote economic growth. It requires a high commitment to policies and, a well-functioning market and institutions that encourage exports.

There should be close monitoring and consistent debt management strategies to avoid the misallocation and mismanagement of external debt. Thus, introducing effective external debt management policy is crucial to remove mis-utilization of resources.

Conditions should be imposed by the proper agreement of the donor and the Ethiopian government so that its impact could be equally efficient as grant did. On the government side, more effort should be made to improve the capital formation of the country through other means as there is a heavy reliance on aid (other variables do not show a significant relationship to the rate of growth of the country GDP).

Finally, as Ethiopia embarks on a grand structural transformation of its economy, it will be important that the government plays a proactive, facilitating role in compensating for

externalities created by pioneer firms in industrial upgrading and coordinating the desirable investments and improvements in soft and hard infrastructure, for which individual firms cannot internalize in their decisions. This will help the country to tap the potential of the advantage of backwardness and achieve dynamic, sustainable, and inclusive growth.

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