ISSN 2306-7195
SMU

JAD 11 (1) 2021

Journal of Agriculture and Development

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Factors Affecting Time Management Practices: The Case of Undergraduate Students in Management Program at St. Mary's University

Biannual Journal of Institute of Agriculture and Development Studies (IADS)
St. Mary's University

Agriculture is the most important sector in the Ethiopian economy, contributing the lion's share of the GDP. Nearly 80% of the population live in the rural areas and derive their livelihoods directly or indirectly from agriculture. Given its importance, the performance of the sector is therefore reflected in the performance of the whole economy. With this background, the Journal of Agriculture and Development aims to stimulate research and thinking on agriculture and development studies in Ethiopia. The articles contained in the journal reflect the views of their authors and do not necessarily coincide with those of the Editorial Committee, Institute of Agriculture and Development Studies, JADS or of SMU.

Journal of Agriculture and Development

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Journal of Agriculture and Development

JAD 11 (1) 2021 June 2021

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Determinants of Economic Growth in Ethiopia: An Autoregressive Distributed Lag (ARDL) Approach

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Abstract

The paper sought to study the determinants of economic growth in Ethiopia. The study made use of secondary data from a world development indicator and the World Bank. The main objective of the study was to investigate the determinants of economic growth in Ethiopia. An advanced econometric technique, the ARDL model, was applied in the data analysis to realize the objective of the study. The results of the study indicate that foreign direct investment, human capital, and physical capital formation had a positive sign and significantly influence economic growth in the long-run. Nevertheless, terms of trade and foreign aid had an adverse consequence on economic growth in the long-run. Moreover, the results reveal that capital formation, terms of trade, and foreign direct investment were the main determinants of economic growth in the short-run. Based on the findings, policymakers should pursue policies that will boost the quality of human capital to promote and sustain economic growth and enhance the contribution of the physical capital formation. Finally, the study recommends a detailed study on more variables and long enough time series data, including the significant variables, to get a factual picture of economic growth in the country; and policymakers need to focus on these factors in formulating any economic development policy.

Keywords: Determinants, economic growth, ARDL, bounds test, Ethiopia

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Introduction

There have been questions on what influences economic growth, why some nations develop much quicker than others, and the major reason for the unequal rates in the growth amidst some nations have received far-reaching attention in the economic literature (Kaur and Singh, 2016; Saccone, 2017). The economic growth of any nation is usually quantified by the rise in its gross domestic product always denoted by GDP, and which transpires when the productivity ability of a nation's economy rises, which in turn is used to produce more goods and services. The influence of factors on a nation's economic growth varies, because some factors have a positive effect, while others have an undesirable consequence (Brynjolfsson *et al*., 2018).

Identification of the determinants that enhance or hamper economic growth has been one of the central issues amongst theoretical and empirical growth researchers and has reached little consensus and is still an inconclusive issue. Hence, it is difficult to draw a single conclusion regarding the macroeconomic determinants of economic growth of countries. What is central in one country may not be that important in another country. Even within the same country, because of the nature of data, time, and methodology used for analysis, the outcome might be different (Chirwa and Odhiambo, 2016; Snowdon and Vane, 2005).

The Ethiopian second phase of the Growth and Transformation Plan II (GTP II), was launched in 2015/16 and run to 2019/20, anticipating an annual growth rate of 11.2% in the GDP, and growth rates in value-added of 8.6 percent in the agricultural sector, 10.2 percent in the service sector, and 21.4 percent in the industrial sector. The growth rate in the industrial sector showed a one-percentage-point margin above the targeted growth whereas

the service and agricultural sectors exhibited a less-than-target performance in terms of growth. The growth in the industry sector was consistent with the objectives of the second Growth and Transformation Plan (GTP II) (EEA, 2017). Growth has been driven by public investments in agriculture and infrastructure as well as the expansion of the services and manufacturing sectors (AEIB, 2018). The service sector leads the Ethiopian economy accounting for 47.3 percent of the GDP followed by the agriculture sector with a share of 36.7 percent. The decline in the share of agriculture from 38.4 percent in 2013/14 to 36.4 percent in 2015/16 is largely attributed to the weak performance of the sector due to drought rather than the normal structural change (EEA, 2017). In the last decade, the Ethiopian economy has faced multiple challenges such as severe drought caused by El Nino, political instability, and a slow-down in the global commodity prices as well as in the global economy.

Objectives of the Study

The broad objective of this research is to investigate the major macro-economic determinants of economic growth in Ethiopia with the specific objectives to:

1. identify the major determinants of economic growth in Ethiopia; and
2. investigate the long-run and short-run relationship among the variables.

Research Methodology

Data Sources and Description

The study has employed 27 years of secondary annual data from the period 1992-2018. The period covered is based on the consideration of data availability. Most of the data were drawn from the World development indicator (WDI) database compiled by the World Bank (2017 and 2018). This is the most reliable and easily accessible data source, to the best of the researcher's knowledge.

Hypothesis and Definition of Variables

Real GDP (Y): is the market value of the goods and services produced by an economy over time measured in USD. It is conventionally measured as the percent rate of increase in real Gross Domestic Product. Since most economists argue that economic growth can be measured as growth in real GDP, it is included in the model as a proxy for economic growth (dependent variable) to measure economic growth in this study.

Foreign direct investment (FDI): is a category of cross-border investment associated with a resident in one economy having control over the management of an enterprise that is resident in another economy. It is measured in USD and expected that foreign direct investment will have a positive influence on the economic growth of Ethiopia.

Foreign aid (AID): is defined as aid inflows from external assistance. Ethiopia is one of the poor countries in the world. As a result, Ethiopia is getting external assistance in the form of aid. To see its effect on the

economic growth, this variable is chosen as one explanatory variable and expected to have positive signs.

Public expenditure (PUEP): is spending made by the government of a country on collective needs and wants such as education, health care, security, and infrastructure. In this study, it was proposed that an increase in public expenditure would have a positive impact on the rate of economic growth.

Trade openness (TOP): is usually measured by the ratio between the sum of exports and imports and gross domestic product (GDP). Openness affects economic growth through several channels such as exploitation of comparative advantage, technology transfer, diffusion of knowledge, increasing scale economies, and exposure to competition. In this study, it was proposed that trade openness would have higher GDP per capita and faster economic growth.

Terms of trade (TOT): is obtained by dividing the export price index by the import price index. An improvement in the terms of trade should lead to an increase in economic growth provided that the improvement in terms of trade encourages imports of capital goods.

Physical capital accumulation (GCF): is defined as Gross capital formation (formerly gross investment) in a country. However, getting such readymade time series data in Ethiopia is difficult. Therefore, in this study, gross investment was used as a proxy of this variable and has been hypothesized to have a positive impact on economic growth.

Human capita (Hucap): This refers to age group from 15 up to 65 included in the model to serve as the determinants of economic growth. In this study,

labor force was used as a proxy of human capital since theoretically, the labor force is a major element for the sustainable rate of economic expansion. It could be the engine of growth for labor-intensive economies like Ethiopia. It is incorporated in the model in its growth rate and a positive sign would be expected from the study result.

Inflation (INF): Inflation, as measured by the consumer price index (CPI), reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Recently inflation has become a serious problem in Ethiopia. Therefore, it was hypothesized to have a negative influence on the economic growth of Ethiopia.

Interest rate (IR): This refers to the commercial bank's cost of lending. It is measured by the annual average interest rates. It determines the level of credit that the government, individuals as well as investors are willing to take to finance different economic activities. It was hypothesized to have a negative relationship with economic growth because it is considered as a loan fee.

Estimation Technique

To analyze the determinants of economic growth in Ethiopia, the study employed the ARDL bounds testing approach developed by (Pesaran *et al*., 2001). This approach can be used to test for both long-run and short-run dynamics of economic growth using the co-integration technique. The ARDL approach is simple to use as compared to other co-integration techniques since the ARDL bound test does not require variables to be integrated in the same order, that is, they can be either I (0) or I (1). The test

also solves the serial correlation and endogeneity problems by specifying appropriate lags; the long- run, and short-run parameters can be estimated simultaneously. Finally, the ARDL bound test has superior small sample properties (Saccone, 2017; Pesaran *et al*., 1998 and 2001).

Test for unit root

Even if the ARDL model does not require pre-testing of a variable for stationarity, it is important to know the stationarity properties of the variables. This is because the tabulated F-values (Pesaran and Shin, 1999) have upper and lower bound where the upper bound assumes all the variables are I (1) stationary, and the lower bound assumes all the variables are I (0) stationary. Therefore, examining the variable whether it is I (1) or I (0) stationary helps to come up with a conclusion in a case where the calculated F-statistics lays within the upper and the lower bound. Regression involving non-stationary time series often leads to the problem of spurious regression. There are various methods of testing the stationarity of a series. In this study, the Augmented Dickey-Fuller (ADF) test was employed. If the t-value or t-statistic is more negative than the critical values, the null hypothesis (i.e., H0) is rejected and the conclusion is that the series is stationary. Conversely, if the t-statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary.

Bounds co-integration test

The study adopts the Autoregressive Distributed Lag (ARDL) co-integration approach to establish both the short-run and long-run relationships among real GDP, and the explanatory variables shown in Equation (1) below and to

capture the speed of adjustment. Pesaran and Shin were the first to introduce the ARDL approach in 1998 (Pesaran and Shin 1999). Modification of the same was later done in 2001 by Pesaran, Shin, and Smith. This study adopted the ARDL due to its numerous advantages over the other approaches to co-integration. For example, unlike the Johansen approach that needs all the variables in the model to be integrated of the same order (I (1)), the ARDL can absorb variables with different levels of integration—both I (0) and I (1) variables; likewise, it can be utilized to estimate both the long-run and short-run dynamics of the model simultaneously while avoiding the non-stationary time series data problems of endogeneity and auto-correlation. Moreover, an ARDL model produces results that are unbiased and efficient even in studies associated with small samples.

Lag length determination

To estimate the ARDL model, the maximum lag length of the system has to be chosen. Schwarz Information Criterion (SIC) technique was employed to determine the lag length of the time series data which can select the smallest possible lag length. This criterion will help us to arrive at a given fit with the smallest number of parameters per observation (Green, 2002; Schumacher, 2012).

Diagnostic Tests

Auto-correlation

A common problem in using time series regressions is that the estimated residuals tend to be correlated across time. The presence of serial correlation in OLS regressions leads to estimates that have small standard errors, and inefficient, biased, and inconsistent estimates. Testing for auto-correlation

helps to identify any relationships that may exist between the current values of the regression residuals and any of its lagged values. The null hypothesis of the LM test for auto-correlation is that there is no serial correlation on residuals. If the P-value is less than 0.05, then we reject the null hypothesis.

Heteroscedasticity

The classical linear regression assumes that the variance of the error term is constant over time, that is, the error term is homoscedastic. If the variance of the error term is changing over time, then the assumption of homoscedastic is violated, leading to heteroscedasticity. In this study, heteroscedasticity test was conducted using the Breusch-Pagan test method where the null hypothesis is when the variance of the error term is constant. If the existence of heteroscedasticity is confirmed, the ARDL model is to account for the problem of heteroscedasticity.

Model misspecification test

To test for model misspecification and the stability of the ARDL model, cumulative sum (CUSUM) was used, whereby the null hypothesis of this test is that the regression equation is correctly specified. If the plotted CUSUM line graph remains inside the 5 percent significance level, then it is concluded that the model is correctly specified; otherwise, the model is miss-specified.

Data Analysis and Model Specification

To examine macro-economic determinants of economic growth in Ethiopia, the maximum possible number of economic growth factors were considered in this study. Following broadly, the approach of the extended neoclassical

growth and endogenous growth models, the economic growth function of Ethiopia was specified as follows: real GDP is a function of foreign direct investment, foreign aid, and physical capital, human capital, changes in terms of trade, trade openness, public expenditure, and inflation. These variables were selected based on their relevance to the economic growth of the country and the availability of data. The Ethiopian economic growth function was expressed as follows:

$$Y_t = f(FDI_t, AID_t, PUBEX_t, TOP_t, TOT, GCF_t, , INF \text{ ----------} (1)$$

The majority of variables in this study were transformed into Log form data to avoid heteroscedasticity (Gujarati, 2004) and to show elasticity of the variables. Thus, based on the theoretical framework developed by Biswas and Saha (2014), the following empirically estimable log-linear type of model (with some modification to accommodate other additional variables) was specified as below:

$$Y_t = \beta_o + \beta_1 \ln FDI_t + \mathrm{B}_2 \ln AID_t + \beta_3 \ln pubEx_t + \beta_4 \ln Top_t + \beta_5 TOT + \beta_6 \ln GCF_t + \beta_7 INF_t + \mathrm{B}_8 \ln HuCa_t + \varepsilon_t \text{ ----------} (2)$$

Where:

LnY_t = Natural logarithm of real GDP per capita at time t, LnFDIt = Natural logarithm of Foreign Direct Investment at time t, lnAIDt = Natural logarithm of foreign aid at time t, $lnPUEX_t$ = Natural logarithm of public expenditure at time t, $lnTOP_t$ = Natural logarithm of trade openness at a time, TOT_t = terms of trade at the time, $lnGCF_t$ = Natural logarithm of gross capital formation at time t, INFt = Inflation rate at a time, lnHuCa*t* = Natural logarithm of human capital at time t.

To analyze the determinants of economic growth, the study follows the Auto-regressive Distributed Lag (ARDL) approach to co-integration to test the long-run cointegration relationships between the variables. Therefore, the ARDL model is specified as:

$$\Delta \ln RGD_t = \beta_0 + \lambda_1 \ln RGDp_{t-1} + \lambda_2 \ln FDI_{t-1} + \lambda_3 \ln AID_{t-1} + \lambda_4 \ln PuExp_{t-1} + \lambda_5 \ln TOP_{t-1}$$
$$\lambda_6 \ln TOT_{t-1} + \lambda_7 \ln GCF_{t-1} + \lambda_8 INF_{7-1} \lambda_9 \ln HuCa_{t-1} + \beta_1 \sum_{i=1}^{n} \Delta \ln RGDP_{t-1} + \beta_2 \sum_{i=0}^{n} \Delta \ln FDI_{t-1}$$
$$+ \beta_3 \sum_{i=0}^{n} \Delta \ln AID_{t-1} + \beta_4 \sum_{i=0}^{n} \Delta \ln PuExp_{t-1} + \beta_5 \sum_{i=0}^{n} \Delta \ln TOP_{t-1} + \beta_6 \sum_{i=0}^{n} \Delta TOT_{t-1} + \beta_7 \sum_{i=0}^{n} \Delta \ln GCF_{t-1}$$
$$+ \beta_8 \sum_{i=0}^{n} \Delta INF_{t-1} + \beta_9 \sum_{i=0}^{n} \Delta \ln HuCa_{t-1} + \Sigma_t \text{ ----------(3)}$$

Where:

ΔlnRGDPt-1: the differenced and lagged logarithmic value of GDP per capita measured in USD; ΔlnFDI*t-1* is: differenced and lagged logarithmic value of Foreign Direct Investment measured in USD*;* ΔlnFAID*t* are differenced and lagged logarithmic value of foreign aid; ΔlnPuEXp*t is* differenced and lagged logarithmic value of total government expenditure; ΔlnTOP*t* differenced and lagged logarithmic value openness; ΔTOT*t* is differenced terms of trade; $\Delta \ln GCF_t$ is: differenced and lagged logarithmic value of gross capital formation/investment at time t, ΔlnHuCa*t* are differenced and lagged logarithmic value of human capital andλ are coefficients that measure long-run relationships. $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, and\ \beta_9$ are coefficients that measure short-run relationships. Ɛ is an error term and n denotes the lag length of the autoregressive process, t is the time trend of the model.

To test whether there is a long-run equilibrium relationship between the variables, bounds test for cointegration was conducted. After confirming the

existence of a long-run relationship among the variables, the following stable long-run model **is** estimated:

$$\ln GDP_t = \beta_0 + \beta_1 \sum_{i=1}^{n} \ln GDP_{t-1} + \beta_2 \sum_{i=0}^{n} \ln FDI_{t-1} + \beta_3 \sum_{i=0}^{n} \ln AID_{t-1} + \beta_4 \sum_{i=0}^{n} \ln PuEx_{t-1} +$$

$$\beta_5 \sum_{i=0}^{n} \ln TOP_{t-1} + \beta_6 \sum_{i=0}^{n} TOT_{t-1} + \beta_7 \sum_{i=0}^{n} \ln GCF_{t-1} + \beta_8 \sum_{i=0}^{n} INF_{t-1} + \beta_9 \sum_{i=o}^{n} HuCa_{t-1} + e_t \quad --(4)$$

The next step is to estimate the vector error correction model that indicates the short-run dynamic parameters (adjustment parameters that measure the speed of correction to long-run equilibrium after a short-run disturbance). The standard ECM was estimated as follows:

$$\Delta \ln GDP_t = \beta_0 + \beta_1 \sum_{i=1}^{a} \Delta \ln GDP_{t-1} + \beta_2 \sum_{i=0}^{b} \Delta \ln FDI_{t-1} + \beta_3 \sum_{i=0}^{c} \Delta \ln AID_{t-1} + \beta_4 \sum_{i=0}^{d} \Delta \ln PuEx_{t-1}$$

$$+ \beta_5 \sum_{i=0}^{e} \Delta \ln TOP_{t-1} + \beta_6 \sum_{i=o}^{f} \Delta TOT_{t-1} + \beta_7 \sum_{i=0}^{g} \Delta \ln GCF_{t-1} + \beta_8 \sum_{i=0}^{h} \Delta INF_{t-1} + \beta_9 \sum_{i=o}^{i} \Delta HuCa_{t-1} +$$

$$\alpha ECT_{t-1} + u_t \quad ---(5)$$

B_1 β_2, β_3', β_4, β_5, β_6, β_7, β_8, and β_9, are coefficients that represent the short-run dynamics of the model. ECT_{-1} is an error correction term lagged by one period. U_T is a vector of white noise error terms and (a to i**)** denotes the optimal lag length of each variable in the autoregressive process. α is an error correction parameter that measures the speed of adjustment towards the long-run equilibrium. The bounds test is mainly based on the joint Wald test or F- a test whose asymptotic distribution is non-standard under the null hypothesis of no cointegration. The null hypothesis for no co-integration in the long-run among the variables in the equation: $H_{o:}$ β

β $= \beta_9 = 0$ meaning no long-run relationship among the variables) against the alternative one: H_a: β

0. To estimate the models and to perform the pre-estimation and post-estimation diagnostic tests, STATA 14 statistical packages were applied.

Results and Discussion

This section presents and discusses the diagnostic test results, and the determinants of economic growth regression results both in the long-run and short-run with the Auto-regressive Distributed Lag (ARDL) Model approach to co-integration.

Unit Root Test

To determine the degree of stationarity, the unit root test was conducted by the ADF for each variable both at levels and at first difference specifying the inclusion of intercept or intercept and trend. From the results, foreign direct investment and inflation rate had unit root at levels I (0) series at their critical values at least at the 5% significant level. On the other hand, foreign aid, trade openness, physical capital formation, public expenditure, terms of trade, and human capital became stationary at the first difference implying that it is integrated of order I (1) series at their critical values at least at the 10% significant level. See Table 1 below.

Table 1. Augmented Dickey-Fuller test for unit root

Augmented Dickey-Fuller test statistic (ADF Test)						
Variable	With Intercept			Trend and Intercept		
	At Level	At First Difference	Order of []	At Level	At First Difference	Order of []
lnRealGDP	-1.93	-2.68*	I[1] at 10%	-1.53	-3.43*	I[1] at 10%
Ln FDI	-3.34**	-4.45***	I[0] at 5%	-3.14	-4.33**	I[1] at 5%
LnFAID	-2.46	-2.73*	I[1] at 10%	-2.51	-3.72**	I[1] at 5%
LnTrade open	-2.46	-2.71*	I[1] at 10%	-0.75	-3.69*	I[1] at 10%
LnPhycapital	0.104	-2.65*	I[1] at 10%	-1.34	3.38*	I[1] at 10%
Terms of trade	0.37	-2.91*	I[1] at 10%	-1.94	-3.401*	I[1] at 10%
lnPublicExp	-2.39	-5.104***	I[1] at 1%	-3.15	5.029***	I[1] at 1%
Inflation rate	-4.91	-6.59***	I[0] at 1%	-5.03***	-6.47***	I[0] at 1%
Human capital	-0.88	-5.95***	I[1] at 1%	-2.86	-7.76***	I[1] at 5%
	constant, no trend			with constant and trend		
	Test critical values			Test critical values:		
	1% level	-3.75		1% level	-4.38	
:	5% level	-3.00		5% level	-3.600	
	10% level	-2.630		10% level	-3.24	

Source: Author's computation

Note**:** The rejection of the null hypothesis is based on the critical values. Schwarz Information Criterion (SIC) was used to determine the lag length while testing the stationarity of all variables. The ***, ** and * sign shows the rejection of the null hypothesis of non-stationary at 1%, 5%, and 10% significant level, respectively.

That variables which were non-stationary at a level became stationary at the first difference, and the null hypothesis is rejected as the t-statistics are larger than the indicated critical values. Thus, all the variables are integrated

of either order zero or order one making it possible for the study to employ ARDL bound testing approach.

Diagnostic Tests Results

Before presenting the main estimation results, it is important to present the diagnostic test results to ascertain the robustness and statistical appropriateness of the model.

Auto-correlation test

A serial correlation test was conducted using the Breusch-Godfrey (BG) lags (1) test and found that there was autocorrelation. Hence, the null hypothesis of no autocorrelation is rejected as the p-value of the test became 0.0063. Thus, it is important to remove the serial correlation from the data and get an unbiased parameter estimate of the regression. To fix the problem of serial correlation, the regression analysis is re-executed by including the lagged value of dependent (real GDP) as the independent variable, and then the serial correlation problem is removed as shown in Table 2.

Table 2. Serial correlation LM test

Breusch-Godfrey LM test for autocorrelation			
lags(p)	chi2	df	Prob > chi2
1	0.72	1	0.46

Source**:** Author's computation

Heteroscedasticity test

If the assumption of constant variance is violated, it is said to be heteroscedasticity. The study carried out the heteroscedasticity test and found that there is no problem with heteroscedasticity.

Table 3. Heteroscedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Source	chi2	df	p
Heteroskedasticity	27.00	26	0.4093
Skewness	10.41	7	0.1666
Kurtosis	1.34	1	0.2465
Total	38.75	34	0.2639

Source**:** Author's computation

Long- Run ARDL bounds tests for co-integration

The first activity in the bounds test approach of cointegration is estimating the ARDL model specified in equation (4) using the appropriate lag-length selection criterion. In this paper, the Schwarz Information Criterion (SIC) was taken as a guide and a maximum lag order of 2 was chosen for the conditional ARDL model. Then F-test through the Wald-test (bound test) was performed to check the joint significance of the coefficients specified. The Wald-test is conducted by imposing restrictions on the estimated long-run coefficients of real GDP per capita, foreign direct investment, foreign aid, trade openness, terms of trade, gross capital formation, inflation, and public expenditure and human capital. After the lag length had been determined, and the calculated F-statistics within the bounds test framework was compared with critical values, the results of the study show that the computed F-statistic was found to be 9.34 which is greater than the upper and lower bound of the critical values. Therefore, the results display that there is cointegration between Ethiopian economic growth (dependent variable) and the explanatory variables (determinants). The bond test result is shown in Table 4 below.

Table 4. ARDL bounds test for co-integration

Pesaran/Shin/Smith (2001) ARDL Bounds Test							F = 9.340	
H0: no levels relationship							t = -3.063	
Critical Values (0.1-0.01), F-statistic,								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
k_7	2.03	3.13	2.32	3.50	2.60	3.84	2.96	4.26

Source**:** Author's computation

Accept if F < critical value for I (0) regressors

Reject if F > critical value for I (1) regressors

Based on the bounds test results in Table 4, the null hypothesis is rejected of no co-integration among variables since the F-statistic is greater than the upper bound critical values at all levels of significance. Therefore, the result declares the presence of a co-integration relationship between the dependent and independent variables. Consequently, the error correction model needs to be estimated.

Long-Run ARDL Model Estimation of Economic Growth

Having recognized that real growth domestic product and its determinants are cointegrated, the long-run parameters of the ARDL model were estimated and the results are presented in the table below. The long-run ARDL model was estimated based on the Schwarz Information Criterion (SIC) given the annual nature and relatively short sample properties of the data.

From Table 5 below, it can be observed that five out of eight variables included in the model were found statistically significant in the long-run

except for public expenditure, inflation, and trade openness. Additionally, virtually all the coefficients of the estimated model carry their hypothesized signs except for inflation, terms of trade, and foreign aid.

Table 5. Long-run estimates of ARDL model

ARDL(1,0,0,0,0,1,1,0) regression The SBC information criteria were used		Dependent variable**:** In real GDP		
Dependent variable**:** In real GDP	Coefficient	Standard Error	t-value	p-value
Ln FDI	0.357**	0.159	2.25	0.042
inflation rate	0.072	0.039	1.84	0.225
Δ*ln* Foreign AID	-0.02 ***	0.0039	-5.18	0.000
Δ*ln* Trade openness	0.059	0..047	1.27	0.223
ΔTerms of trade diff	-0.016***	0.0055	-6.23	0.000
Δ*ln* Physical capital CF	0.017***	0.0046	-3.75	0.002
Δ*ln* Human capital	0.035***	0.0047	7.45	0.000
Δ*ln* Public expenditure	0. 097	0.061	1.58	0.136
cons	20.72	7.003722	2.96	0.010
sample: 1994 - 2018				
		Number of obs = 25		
R-squared = 0.826		Adj R-squared = 0.67687		
Log likelihood = -29.678036		Root MSE = 1.0598		

Source: Author's computation

To estimate the ARDL model, the maximum lag length of the system has been chosen. To do this, the Schwartz Bayesian Criterion (SBC) information criteria was used for optimal lag selection. The results of the study show that an adjusted R-squared was found to be 0. 0.6768 implying that about 67.6% of the variation in economic growth in Ethiopia is accounted for by the independent variables included in the model.

The coefficient of the foreign direct investment was found to be positive and significantly associated with economic growth at a 5% significance level. A

1% increase in FDI will bring about a respective 0.357 % increase in RGDP which means that FDI stimulates economic growth in Ethiopia. This indicates that growth in the overall inflows of investment in Ethiopia from foreign investors brings about a resultant growth in the ratio of real GDP, and invariably expands private investment in Ethiopia in the long-run.

Contrary to the hypnotized, foreign had a negative and statistically significant effect on economic growth at ($p<0.01$) in Ethiopia. A 1% increase in foreign aid would result in a 0.02% decrease in real GDP in the long-run, holding other variable constant as is shown in Table 5 above. The negative coefficient foreign aid's result is consistent with the study of in Ethiopia (Tewodros, 2015). The possible reasons for the negative effect of foreign aid on the Ethiopian economic growth might be the inflow of foreign aid received in the form of grants and loans spent to use for the daily expense to assist the society in reducing poverty rather than building a fixed investment.

The results of the study show that the coefficient of inflation rate had an unexpected positive sign implying inflation would positively contribute to the economic growth of Ethiopia contrary to the hypothesis. The coefficient on inflation is positive but statistically insignificant at any conventional level in the long-run model suggesting that inflation is a spur rather than a drag on the economic growth of Ethiopia. Moreover, the result of the terms of trade went against the hypnotized positive effect on the economic growth of Ethiopia though it is insignificant.

The physical capital formation which is a proxy of gross investment had a positive and statistically significant effect at a 1% significance level on Ethiopian economic growth. A 1% increase in the physical capital formation

resulted in a 0.017% increase in real GDP, holding other variable constant in the long-run. This result is in-line with the theory of economic growth which states that capital formation is the major determinant of economic growth (Keynesian theory of growth, Solow's theory of growth) and consistent with the study of Tewodros (2015) in Ethiopia.

The results of human capital coefficient had a positive sign and statistically significant effect on the economic growth of Ethiopia at 1% significance level suggesting that if the human capital increased by 1%, the Ethiopian economic growth would increase by 0.04 % holding other variables constant in the long-run. The more humans are capable to develop skill, the more economic growth would be realized in Ethiopia. This finding is consistent with the endogenous growth theories (mainly advocated and/or developed by Lucas (1988), and Romer (1990) which argue that improvement in human capital (skilled and healthy workers) leads to productivity improvement that enhances output. Moreover, the finding is in line with the research findings of Tewodros (2015). Furthermore, the results of the study show that the coefficient of public expenditure had a positive effect on economic growth though statistically insignificant. The possible explanation is that public investment stimulates economic growth in Ethiopia.

Short-Run Error Correction Model

The results disclose that physical capital formation and foreign direct investment had a positive and statistically significant influence on economic growth in the short-run, whereas terms of trade and inflation rate had a negative and statistically significant influence on real GDP growth in the short-run. Furthermore, the short-run ECM model was estimated and found to be -0.52 which is highly significant and has the correct negative sign, and

implies a very high speed of adjustment to equilibrium. The coefficient of the error term (ECM-1) implies that the deviation from the long-run equilibrium level of real GDP in the current period is corrected by 52 % in the next period to bring back equilibrium when there is a shock to a steady-state relationship. Terms of trade, physical capital formation, and foreign direct investments were statistically significant in the long-run and also significant in the short- run. Human capital which was statistically significant in the long-run is not significant in the short-run; this is suggestive of occurrences of time-lagged effects while foreign aid formerly significant and carrying a negative sign in the long-run but turn to a positive sign and became insignificant in the short-run. The results of the short-run ARDL model are depicted in Table 6 below.

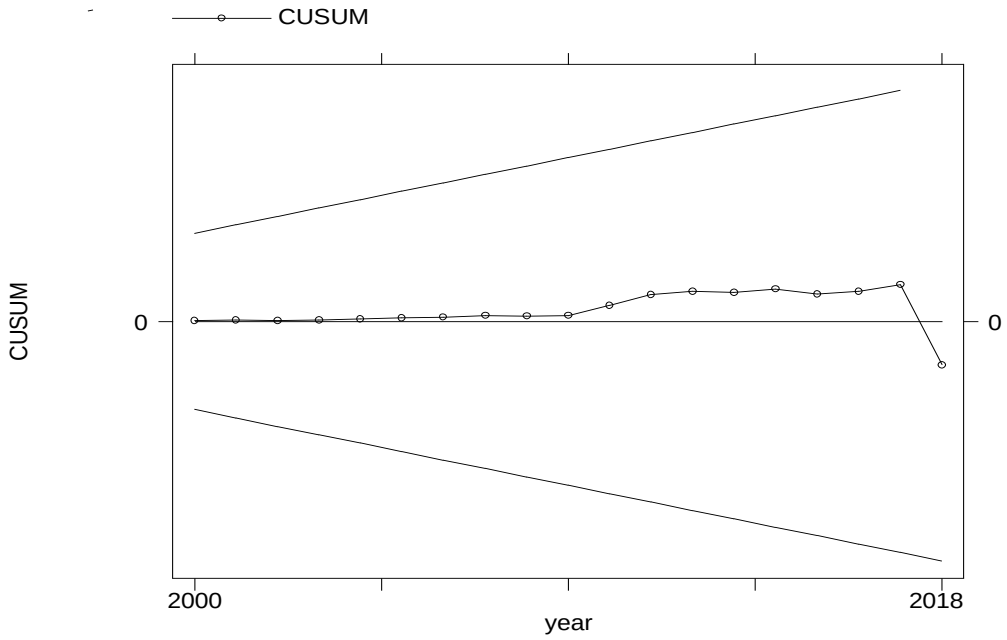
Table 6. Short-run estimates of ARDL model

Regressor	Coefficient	Standard Error	t-value	P-value
ΔTerms of trade	-0.165**	0.0492	-3.35	0.004
ΔlnPhysical capital CF	0.181**	0.0624	2.90	0.012
Δ*ln* FDI	0.261***	0.052	4.62	0.002
Δ*ln* Foreign AID	0.04	0.031	1.29	0.325
Δ*ln* Human capital	0.034	0.081	0.42	0.72
ECM(-1)	-0.52	0.19	-3.56	0.002

Source: Author's computation

Finally, the structural stability of the long-run and short-run relationships for the entire period is examined by the cumulative sum (CUSUM) of the recursive residual test proposed by (Brown *et al*., 1975). The null hypothesis of this test is that the regression equation is correctly specified. The test is presented in Figure 1. The pair of straight lines in the figure indicate the 5% significant level, and if the plotted CUSUM graph remains inside the straight lines, the null hypothesis of correct specification of the model can

be accepted. Otherwise, the null hypothesis is rejected and it can be concluded that the regression equation is miss-specified. The figure reveals that the plots of CUSUM stay within the lines, and, therefore, this confirms the equation 1 is correctly specified and stable. The selected models adopted in the study seem to be good and robust in estimating the short and long-run relationships between real GDP or economic growth and the determinants considered.



Conclusions and Recommendations

The main findings generated from the empirical work can be concluded as follows: The study found out that foreign direct investment, human capital as well as physical capital formation had a positive sign, and significantly influence the economic growth of Ethiopia in the long-run. However, terms of trade and foreign aid had an adverse consequence on economic growth in

the long-run. Furthermore, the results revealed that capital formation, terms of trade, and foreign direct investment were the main determinant of economic growth in the short-run. Based on the findings of the empirical work, policies that will boost the quality of human capital to promote and sustain economic growth and enhance the contribution of the physical capital formation, and foreign direct investment must be given due considerations to promote the economy. Finally, the study recommends a detailed study on more variables and long enough time series data including the significant variables to get a factual picture of Ethiopian economic growth realism, and the policymakers need to focus on these factors in formulating any economic development policy in Ethiopia.

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