

# The nexus between foreign direct investment, domestic investment and economic growth: Evidence from Ethiopia

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## Abstract

This study is an effort to show the long-run effects of foreign direct investment and domestic investment on economic growth of Ethiopia and tested the hypotheses that whether foreign direct investment crowds-in or crowds-out domestic investment in Ethiopia. A macroeconomic annual basis data covering 1981 up to 2019 is used and an auto regressive distributive lag (ARDL) econometric regression technique is employed. The result from domestic investment equation shows that foreign direct investment crowd-in domestic investment in Ethiopia. The implication is that in order to increase more domestic investment activity in the country, the government and policy makers have to harmonize the countries investment policy by bringing more FDI inflow from the rest of the world. This might be done by securing peace and political stability in the country, reducing the existing problems of access in electricity, transportation and telecommunication services, reasonable devaluation of domestic currency and by decreasing import tariff on intermediate products. Besides, GDP growth rate of the country can increase the domestic investment activity of the country. But, FDI is found to be insignificant in affecting economic growth of the country rather its positive effect is witnessed only on domestic investment of the country. Domestic public investment and private investment are found to be significant in affecting real GDP growth rate of the country. This might induce the government to liberalization of the goods and factor markets for the private sector, public sector and tax reform and diversifying the economy in order to generate more revenue for investment and so as to achieve long run economic growth in the country.

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## 1. Introduction

Many economic growth theories such as Solow (1956), Barro (1990) and Romer (1996) highly acknowledged about the positive effect of investment or capital accumulation on economic growth. To be more specific, the positive contribution of capital formation on economic growth is undeniable. Capital formation or investment has the wide and deep effect on economic growth under two channels. These channels are through aggregate demand and aggregate supply. Investment affects aggregate demand through government expenditure and aggregate supply through productivity and thereby it can increase economic growth (Nguyen and Trinh, 2018).

The relationship between foreign direct investment and domestic investment has been a hot debatable issue in macroeconomics for decades. Literatures such as Ndikumana and Verick (2008), Hooi and Wah (2010) and Lasbrey et.al. (2018), forwarded that an increase of FDI will bring positive impact to the domestic investment

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and there appears complementary effect from FDI to domestic investment. That is, inflow of foreign direct investment can encourage domestic investment through inflow of new technologies market spillover, new managerial skills, competition with domestic firms and reducing the burden of import. Hence, National policies should aim at harnessing complementarities between domestic investment and FDI rather than regarding them as substitutes. Contrary to this, according to literatures such as Wang (2010), Selmi (2016), Yahia et al. (2018); FDI has a negative effect and crowding-out effect on domestic investment and results in displacement effect by competing for resources, local companies forced to leave the market because of the competitive pressure and insufficient institutional support. On the other side, Saglam and Yalta (2011) and Ditimi and Matthew (2015) forwarded that there is no long-run relationship between foreign direct investment with domestic investment. This debate leads to the need for further analysis to prove the complementary and substitution effects between FDI and domestic investment specifically in Ethiopia.

Cognizant this fact, since it is very crucial for formulation of good and secured macroeconomic policy of nations; specially for developing countries; assessing the relationship between these important macroeconomic variables is very vital. Melak (2018) did a study on the contribution of foreign direct investment on economic growth of Ethiopia by using OLS regression method and found positive effect of FDI on Ethiopian economy. But this study used a methodology which is traditional and may lead to misleading result. Furthermore, no one is devoted to figure out the relationship between foreign direct investment with domestic investment in Ethiopia. Hence, this paper will contribute in filling the above research gap and will contribute to the existing literature on the nexus between foreign direct investment, domestic investment and economic growth of Ethiopia by using the latest and suitable ARDL approach of co-integration. The link between foreign and domestic investment constitutes the key point in evaluating the FDI-growth relations and to do fiscal and financial reforms. Remarkably, this consideration will enable us the necessary policy implications that can be utilized to maximize the gains from foreign direct investment at large. Hence, whether foreign direct investment crowds out or complements domestic investment should be very clear through empirical study. After all, it strongly affects government policy decisions in allocating national resources and achieving economic growth.

## 2. Empirical literature review

Melak (2018) has done an empirical study to examine the contribution of foreign direct investment (FDI) for economic growth of Ethiopia over the period of 1981- 2013 by using OLS method of time series analysis. The co- integration test shows that there is a long run relationship between the foreign direct investment and economic growth in Ethiopia. The regression result also shows that FDI has the expected positive significant effect on Ethiopian GDP. But emphasis should be given on the policy of FDI. This finding suggests that there should be better policy framework to attract and improve the volume of FDI through creating conducive environment for investment according to the context Ethiopian.

Karim and Abu (2016) have done a study on the relationships between foreign direct investment, domestic savings, domestic investment, and economic growth in 16 Sub-Saharan African countries from 1981 to 2011 and the results of VAR estimation and Granger causality tests demonstrate that there is a unidirectional causality from foreign direct investment to economic growth and domestic investment, and a bidirectional causality between economic growth and domestic investment. The results of the variance decomposition analysis reveal that foreign direct investment exerts more effect on economic growth. Based on the results of the impulse response analysis, there is a positive unidirectional causality from foreign direct investment to economic growth and domestic investment.

Jude (2019) examined a study to give an empirical answer for the question that whether foreign direct investment crowd-out or crowd-in domestic investment in transition countries. The researcher empirically investigated the relationship between foreign direct investment and domestic investment in a sample of ten central and eastern European countries over the period 1995–2015 by using Generalized Method of Moments estimation technique and found that foreign direct investment to lead to a creative destruction phenomenon, with a short-term crowding out effect on domestic investment, followed by a long-term crowding-in effect on domestic investment of those countries.

Omri and Kahouli (2013) have done a study to analyze the interrelationship between foreign direct investment, domestic capital formation and economic growth in 13 MENA countries by using a ‘growth model’ framework and simultaneous-equations models estimated by the Generalized Method of Moments (GMM) during the period 1990–2010. Their empirical results show that there is bi-directional causal relationship between foreign investment and economic growth, between domestic capital and economic growth, and there is uni directional causal relationship from foreign direct investment to domestic capital for the region as a whole. Furthermore, foreign direct investment is contributing to the growth of the domestic investment but growth in the domestic investment does not significantly contribute for the stock of foreign direct investment in MENA region.

Selmi (2016) also has done a study to measure the interactions likely to occur between Foreign Direct Investment and the local investment in the MENA region. The researcher adopted an empirical analysis based on a panel data using a sample of 7 countries and concluded that the most probable assumption for these countries is the crowding out effect of the domestic investment projects following the inflow of foreign direct investment in those countries. The study recommends that a selective policy in foreign direct investment might be beneficial.

Yahia et al. (2018) done a study to examine the impact of foreign direct investment (FDI) inflows on domestic investment of Sudan over the period 1976-2016 based on the Auto Regressive Distributive Lags (ARDL) estimation technique. The empirical result of this study shows a crowd out effect of FDI on Sudan’s domestic investment in the long-run. Economic growth, exchange rate, macroeconomic stability and natural resource rent have shown short and long-run significant association with domestic investment, whereas, FDI appears as a long-term determinant. Moreover, the error correction model reveals that system corrects previous period disequilibrium at an annual rate of 35%.

Bouchoucha (2019) done an empirical study on the Impacts of Domestic and Foreign Direct Investments on Economic Growth in Tunisia during the period 1976 to 2017 by using Auto-Regressive Distributive Lags (ARDL) approach and according to the results of the analysis, domestic investment and foreign direct investment have a negative effect on Tunisian economic growth in the long run. However, in the short run, only domestic investment positively affects economic growth. The findings of this study are important for Tunisian economic policy makers to undertake the effective policies that can promote and lead domestic and foreign investments to boost economic growth.

### 3. Methodology of the study

#### 3.1. Model specification and method of data analysis

A new Autoregressive Distributed Lag (ARDL) model is developed by Pasaran, Shin and Smith (2001) which have more advantages than the Johnson co-integration approach. *First*, the ARDL approach can be applied irrespective of whether the regressors are I(1) and I(0). *Second*, while the Johansen co-integration techniques require large data samples for validity, the ARDL procedure provides statistically significant result in small samples (Pesaran et al., 1998; Narayan, 2005). *Third*, the ARDL procedure provides unbiased and valid estimates of the long run model even when some of the regressors are endogenous (Harris and Sollis 2003 and Pesaran *et al.*, 1998). Moreover, the ARDL procedure employs only a single reduced form equation, while the other co-integration procedures estimate the long-run relationships within a context of system equations. Therefore, in order to achieve the targeted objectives of the study, the models will be estimated by using ARDL model of econometric technique.

The simple generalized ARDL (p,q) model can be shown as follows (Green, 2003):

$$Y_t = C + \gamma T + \alpha_1 Y_{t-1} + \dots + \alpha_p Y_{t-p} + \beta_0 X_t + \beta_1 X_{t-1} + \dots + \beta_q X_{t-q} + \theta D + U_t \dots (1)$$

Then one can include a constant, a trend and dummy variables to the above model to obtain the final short run or error correction representation of ARDL (p, q) model. Therefore, the following ARDL approach is specified in order to determine or test the long-run co-integration relationships between variables which first proposed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001). Hence, to figure out whether foreign direct investment crowds in or crowds out domestic investment, the following ARDL equation is the final equation to check for the long-run co-integration relationships between the variables of interest.

**Equation One:** According to Yahia (2018) and Ibrahim and Hassen (2013); economic growth rate (GDPgr), foreign direct investment (FDI), macroeconomic stability indexed by Inflation (INF) are taken as explanatory variables in affecting domestic investment. Furthermore, according to Mudy and Murshid (2005) cited by Selmi (2016), vector of other capital inflows other than FDI and the real interest rate (R) are modeled in explaining domestic capital formation.

$$DI = f(\text{GDPgr}, \text{FDI}, \text{INF}, \text{R}, \text{OFI}) \dots \dots \dots (2)$$

Where, DI = Domestic investment as a share of GDP, FDI = Foreign direct investment as a share of GDP, GDPgr = Economic growth rate at time t, INF = Macroeconomic stability indexed by inflation, R = real interest rate, OFI = other capital inflows proxied by the summation of external borrowing, foreign aid and remittance.

By taking the logarithmic form of each variable for statistical reason, the ARDL form the above equation which is going to be estimate can be expressed as:

$$\Delta \ln DI_t = \beta_0 + \theta_1 GDPgr_{t-1} + \theta_2 \ln FDI_{t-1} + \theta_3 INF_{t-1} + \theta_4 R_{t-1} + \theta_5 \ln OFI_{t-1} + \sum_{j=1}^n \beta_{1j} \Delta GDPgr_{t-j} + \sum_{j=1}^n \beta_{2j} \Delta \ln FDI_{t-j} + \sum_{j=1}^n \beta_{3j} \Delta INF_{t-j} + \sum_{j=1}^n \beta_{4j} \Delta R_{t-j} + \sum_{j=1}^n \beta_{5j} \Delta \ln OFI_{t-j} + \beta_7 T + U_t \dots\dots\dots (3)$$

Where: DI= domestic investment as share of GDP at time t, GDPgr= Economic growth rate of the country at time t, INF= Inflation calculated by consumer price index at time t, R= real interest rate at time t, OFI= other foreign inflows which is a summation of official foreign aid, external borrowing and personal remittance as a share of GDP at time t, T= time trend and  $U_t$ = the usual error term.

**Equation two:** The theoretical foundation of this model is based on the augmented Solow model and endogenous growth model for economic growth equation. According to the Solow (1956), Romer (1996) and endogenous theories economic growth can be expressed as:

$$Y = f(K, HK, LF, A) \dots\dots\dots (4)$$

Where Y= is a proxy for economic growth, K= Capital stock, HK= Human Capital,  $LF$  = Labor force and A= technology.

Foreign direct investment brings technology and creates employment. It helps to adopt new methods of production and enhances productivity by bringing competition in the economy. (Aurangzeb and Haq, 2012). Moreover, Khan and Reinhart (1990) stated that investment in an economy should be composed of public sector, private sector and the foreign sector. Hence, foreign direct investment should be included as one independent variable in explaining economic growth of countries.

Therefore, the final equation of the economic growth of Ethiopia can be expressed as:

$$Y = f(DPUB, DPRI, FDI, HK, LF) \dots\dots\dots (5)$$

By taking the logarithmic form of each variable for statistical reason, the ARDL form the above equation which is going to be estimate can be expressed as:

$$\Delta GDPgr = \beta_0 + \theta_1 \ln DPUB_{t-1} + \theta_2 \ln DPRI_{t-1} + \theta_3 \ln FDI_{t-1} + \theta_4 \ln LF_{t-1} + \theta_5 \ln HK_{t-1} + \sum_{j=1}^n \beta_{1j} \Delta \ln DPUB_{t-j} + \sum_{j=1}^n \beta_{2j} \Delta \ln DPRI_{t-j} + \sum_{j=1}^n \beta_{3j} \Delta \ln FDI_{t-j} + \sum_{j=1}^n \beta_{4j} \Delta \ln LF_{t-j} + \sum_{j=1}^n \beta_{5j} \Delta \ln HK_{t-j} + U_t \dots\dots\dots (6)$$

Where, GDPgr= Economic growth of the country at time t,  $\ln DPUB$ = Natual logarithm of domestic public investment as a share of GDP at time t,  $\ln DPRI$ = Natual logarithm of domestic private investment as a share of GDP at time t,  $\ln FDI$ = Natual logarithm of foreign direct investment as a share of GDP at time t,  $\ln LF$ = Natual logarithm of labor force a as a share of total population at time t,  $\ln HK$ = Natual logarithm of secondary school, vocational and tertiary school enrollment as a share of total population at time t and  $U_t$ = The usual error term.

$n$ , denotes lag length of the auto regressive process,  
 $\Delta$ , Denotes the first difference operator,  
 $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5$ , are coefficients that measure long run relationships,  
 $\beta_{1j}, \beta_{2j}, \beta_{3j}, \beta_{4j}, \beta_{5j}$ , are coefficients that measure short run relationships.

Now to test whether there is a long run equilibrium relationship between the variables, the bounds test approach for co-integration is carried out as proposed by Pesaran and Shin (1998) and Pesaran, Shin, and Smith (2001). The hypotheses of the test are shown as follows:

$H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$ , means there is no long run relationship among the variables.

$H_1: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq 0$ , means there is a long run relationship among the variables.

To test the above hypothesis the non-standard F-statistics can be used for which the critical values of the F-statistics are available in Pesaran, Shin, and Smith (2001).

### 3.2. Diagnostic tests

Another critical test in ARDL estimation technique is diagnostic tests to which is important to get valid, unbiased and leading findings. These tests are functional form test, normality test, serial correlation test and heteroscedasticity test.

## 4. Results and Discussion

### 4.1 Domestic investment equation of Ethiopia

Before presenting the estimation results for both equations, pre-estimation tests are employed and finally the results are discussed.

#### 4.1.1 Unit Root Testing

Testing for existence of unit root problem is of major interest in the study of time series models and co-integration. In the ARDL model, the presence of I(2) variables are no more valid because they are based on the assumption that the variables are I(0) or I(1). Therefore, the implementation of unit root test in the ARDL procedure is necessary in order to ensure that none of the variables are integrated of order two or beyond. As it is presented on the following table, the standard Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root (PP) tests are conducted to check the order of integration of the variables.

**Table 1.** Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test results

Variables	ADF test	PP test
lnDI	I(1)	I(0)
GDPgr	I(0)	I(0)
lnFDI	I(1)	I(1)
R	I(0)	I(0)
INF	I(0)	I(0)
lnOFI	I(1)	I(1)

**Source:** Computed by the researcher using E-views 9

**Note:** The level of significance used are 1% and 5% level of significance.

The results from the ADF and PP unit root test show that some variables are stationary at their level and some of them are stationary at their first difference. This implies that the variables are a mixture of I(0) and I(1) and there is no variable that is stationary in second difference and such result is one justification for using the ARDL approach (bounds test approach of co-integration) developed by Pesaran, Shin, and Smith (2001).

#### 4.1.2 Bound testing approach of co-integration for domestic investment equation

To apply the bounds test approach of co-integration, first estimating the ARDL model specified is needed. Then the value of F-statistics is found through the Wald-test by restricting the long run equation coefficients to be equal to zero. Then, as it is presented below the computed F-statistic value is compared with the lower bound and upper bound critical values tabulated in tables of Pesaran, Shin, and Smith (2001).

**Table 2.** ARDL bound testing result for equation-1

<b>ARDL Bounds Test</b>		
Null Hypothesis: No long-run relationships exist		
<b>Test Statistic</b>	<b>Value</b>	<b>K</b>
F-statistic	4.315417	5
<b>Critical Value Bounds</b>		
<b>Significance</b>	<b>I0 Bound</b>	<b>I1 Bound</b>
10 percent	2.26	3.35
5 percent	2.62	3.79
2.5 percent	2.96	4.18
1 percent	3.41	4.68

**Source:** Eviews 9 ARDL (0, 1, 2, 0, 0, 2) result.

As Table 2 indicates, the calculated F-statistics is 4.32 and this value is higher than the upper bound critical values at 5% level of significance. The result indicates that there is evidence of long-run relationship or co-integration between the dependent variable (DI) and independent variables. This represents a co-integrated domestic investment equation in Ethiopia. Thus, the null hypothesis of no co-integration between domestic investment and its fundamentals is rejected.

#### 4.1.3 Diagnostic testing for domestic investment equation of Ethiopia

To check the reliability and verifiability of the estimated models, the following diagnostic tests are undertaken.

**Table 3:** Diagnostic tests for the selected full ARDL model

Test statistics	LM version	F version
Serial Correlation	CHSQ (1) = .030745[.861] **	F (1, 24) = .020514[.887] **
Functional Form	CHSQ (1) = 1.2973[.255] **	F (1, 24) = .89718[.353] **
Normality	CHSQ (2) = 1.5027[.472] **	Not applicable
Heteroscedasticity	CHSQ (1) = 1.1242[.289] **	F (1, 34) = 1.0960[.303] **

A: Lagrange multiplier test of residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

\*\* indicates the significance each test at 5% level of significance.

**Source:** Microfit 4.1 ARDL (0, 1, 2, 0, 0, 2) result.

The results indicate that both the LM version and the F version of the statistics are unable to reject the null hypothesis specified for each test. Hence, there is no serial correlation problem and the Ramsey functional form test confirms that the model is specified well. Likewise, the errors are normally distributed and the model doesn't suffer from heteroskedasticity problem.

#### 4.1.4 Long run ARDL estimates of domestic investment equation of Ethiopia

Once we confirmed the long run relationship for the domestic investment equation in Ethiopia; the next step is estimating the long-run coefficients of domestic investment on its regressors. The results are reported in Table 4 below:

**Table 4.** The long run coefficients for equation-1

<b>Long Run Coefficients</b>				
<b>Dependent Variable: LnDI</b>				
Variables	Coefficients	Std. Errors	t-Statistics	Prob.
GDPgr	0.036115	0.0087927	4.1074	[0.000***]
lnFDI	0.059446	0.019883	2.9898	[0.006***]
R	-0.0089044	0.0076138	-1.1695	[0.253]
INF	-0.0086571	0.0061315	-1.4119	[0.170]
lnOFI	-0.10281	0.083680	-1.2286	[0.231]
C	3.5206	0.37730	9.3311	[0.000***]

\*\*\* and \*\* indicate the significance level at 1% and 5% respectively.

**Source:** Microfit 4.1 ARDL (0, 1, 2, 0, 0, 2) result.

The long-run estimation result presented on table-4 confirms that real GDP growth rate is found to be strongly significant in increasing domestic investment of Ethiopia. The coefficient implies that, holding other things remain constant a 1 % increase on real GDP growth rate of Ethiopia leads a 0.036 % increase on domestic investment of the country. This is because of an increase on production is likely to increase demand for capital and thus lead to greater investment activity in the economy. on other words, an increase in production will increase aggregate demand and consumption. This change in aggregate demand and consumption induces the government and firms to increase their investment in the economy. The result is consistent with the findings of Omri and Kahouli (2013) and Karim and Abu (2016).

On the other hand, there is no evidence to support the theory of a long-run crowding-out effect of foreign direct investment on domestic investment in Ethiopia. Contrary to this, there is crowd-in or complementarity between foreign direct investment and domestic investment in Ethiopia. The result reveals that, FDI strongly significant in increasing domestic investment of Ethiopia and at citrus paribus, a 1% increase on FDI leads to a 0.06 % increase on domestic investment of the country. This might be because of an inflow of foreign direct investment can encourage domestic investment through inflow of new technologies, market spillover, new managerial skills, competition with domestic firms and reducing the burden of import. Hence, it suggests FDI attracting led policy so as to boost domestic investment and economic growth of the country. This result is consistent with Karim and Abu (2016) and Jude (2019). But it is inconsistent with the finding of Selmi (2016) and Yahia et al. (2018)

Macroeconomic stability of the country indexed by Inflation rate, real interest rate at time and other foreign inflows which is a summation of official foreign aid, external borrowing and personal remittance are found to be insignificant in affecting the domestic investment activity of the country. This may be a bit surprising and will induce future researchers to be more interested on this topic.

#### 4.2. Economic growth equation of Ethiopia

Like that of domestic investment equation, the necessary pre-estimation tests are employed before presenting the estimated output.

##### 4.2.1 Unit root testing

For the economic growth equation of Ethiopia also, the stationarity of each variable is checked and the result is presented on the table below.

**Table 5.** Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test results

Variables	ADF test	PP test
GDPgr	I(0)	I(0)
lnDPUB	I(1)	I(1)
lnDPRI	I(1)	I(1)
lnFDI	I(1)	I(1)
lnLF	I(1)	I(1)
lnHK	I(1)	I(1)

**Source:** Computed by the researcher using E-views 9

**Note:** The level of significance used are 1% and 5% level of significance.

The results from the ADF and PP unit root test show that one variable is stationary at its level and the remaining variables are stationary at their first difference and such result is also justification for using the ARDL approach of co-integration so as to get valid and unbiased results.

#### 4.3 Bound testing approach of co-integration for economic growth equation of Ethiopia

The bounds test approach of co-integration presented the computed F-statistic value with the lower bound and upper bound critical values and the result indicates that there is long run relationship between the GDP growth rate of Ethiopian and the dependent variables.

**Table 6.** ARDL bound testing result for equation-2

ARDL Bounds Test		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	8.064073	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10 percent	2.26	3.35
5 percent	2.62	3.79
2.5 percent	2.96	4.18
1 percent	3.41	4.68

**Source:** Eviews 9 ARDL (2, 2, 2, 1, 1, 1) result.

As Table 6 indicates, the calculated F-statistics is 8.02 and this value is higher than the upper bound critical values at 1% level of significance. The result indicates that there is strong evidence of long-run relationship or co-integration between Economic growth and independent variables. This represents a co-integrated economic growth (GDPgr) equation in Ethiopia.



#### 4.4 Diagnostic testing for economic growth equation of Ethiopia

For the economic growth equation of Ethiopia, the following basic diagnostic tests are presented on table below.

**Table 7.** Diagnostic tests for the selected full ARDL model of economic growth

Test statistics	LM version	F version
Serial Correlation	CHSQ (1) = .79548[.372] **	F (1, 20) = .45192[.509] **
Functional Form	CHSQ (1) = .092922[.760] **	F (1, 20) = .051757[.822] **
Normality	CHSQ (2) = 3.2190[.200] **	Not applicable
Heteroscedasticity	CHSQ (1) = 3.3558[.067] **	F (1, 34) = 3.4952[.070] **

A: Lagrange multiplier test of residual serial correlation  
 B: Ramsey's RESET test using the square of the fitted values  
 C: Based on a test of skewness and kurtosis of residuals  
 D: Based on the regression of squared residuals on squared fitted values

\*\* indicates the significance each test at 5% level of significance.

**Source:** Microfit 4.1 ARDL (2, 2, 2, 1, 1, 1) result.

The result presented on table 7 shows that both the LM version and the F version of the statistics are unable to reject the null hypothesis specified for each test. Hence, there is no serial correlation problem and the Ramsey functional form test confirms that the model is specified well. Likewise, the errors are normally distributed and the model doesn't suffer from heteroskedasticity problem.

#### 4.5 Results for long run ARDL estimates of economic growth equation in Ethiopia

After the basic pre-estimation tests undertaken above, the long-run coefficients of economic growth equation of Ethiopia on its regressors result is reported in table 8 below:

**Table 8.** The long run coefficients for equation-2

Long Run Coefficients				
Dependent Variable: GDPgr				
Variables	Coefficients	Std. Errors	t-Statistics	Prob.
lnDPUB	9.0648	3.9522	2.2936	[0.032**]
lnDPRI	8.5132	3.7722	2.2568	[0.035**]
lnFDI	-1.4172	0.77628	-1.8256	[0.082]
lnLF	-41.7228	22.5389	-1.8511	[0.078]
lnHK	3.2067	2.4551	1.3062	[0.206]
C	117.0256	78.6855	1.4873	[0.152]

\*\*\* and \*\* indicate the significance level at 1% and 5% respectively.

**Source:** Microfit 4.1 ARDL (2, 2, 2, 1, 1, 1) result.

The long-run estimation result presented on table-8 shows a more detail analysis on the relationship between capital formation and economic growth of Ethiopia which might be important in harmonization of investment policy of the country. The result confirms that domestic public investment and private investment are found to be significant in affecting real GDP growth rate of the country. As it is acknowledged by many economic growth models, this is due to investment can increase productivity and aggregate demand in the economy which in turn can increase GDP growth rate of the country. But, foreign capital formation (FDI) is insignificant in affecting real GDP growth rate of the country which implies that foreign sector investment has no direct effect on economic growth of the country. This may be due to low level of FDI inflow in the last three decades in the country. The result is inconsistent with the existing findings of studies done in Ethiopia such as Gizaw (2015) and Melak (2018). Moreover, labor force and human capital proxied by secondary school, vocational and tertiary school enrollment are found to be insignificant in affecting real GDP growth rate of the country.

Domestic public investment contributed for real GDP growth rate of the country because of most likely public capital formation in transportation such as roads and railways, education, agriculture, health, housing and industry can expand the overall resource availability and perhaps more importantly it can increase output as it is forwarded by popular growth models. The result is consistent with the existing literatures such as Milbourne, Otto and Voss (2003), Aurangzeb and Haq (2012) but it is which is inconsistent with Phetsavong and Ichihashi (2012).

So far, our results tell as an increase in private capital formation can increase real GDP growth rate of the country. This is because of private sector investment can allocate resources efficiently and can be an engine for employment in the economy. Chhibber et al. (1992) also stated that it can provide infrastructure and social services to the economy and thee by it can contribute essentially for the production capacity and long-term economic growth of the country. The implication for this result is that the country requires stable macroeconomic policies with liberalization of the goods and factor markets for the private sector. The finding of this study is consistent with the existing literatures such as Phetsavong and Ichihashi (2012), Abdaljawwad and Sarmidi (2018), Aurangzeb and Haq (2012). Hence, policies be designed to encourage private investment. But it should not be at the expense of public investment rather it should be by allocating the existing national resource for both private and the public sector.

## 5. Conclusion and Implications

The long run estimate of domestic investment equation shows that crowd-in or complementarity between foreign direct investment and domestic investment in Ethiopia. That is, foreign direct investment is strongly significant in encouraging domestic investment activity of the country through inflow of new technologies, market spillover, new managerial skills, competition with domestic firms and reducing the burden of import. The implication is that the government and policy makers have to harmonize the countries investment policy focus on facilitating FDI attracting tools and bringing more capital inflow from the rest of the world. This might be done by securing peace and political stability in the country, the government should reduce the existing problems of access in electricity, transportation and telecommunication services, reasonable devaluation of domestic currency and by decreasing import tariff on intermediate products. Then, the country can achieve a win-win investment policy.

The estimation result from economic growth equation confirms that foreign capital formation (FDI) is insignificant in affecting real GDP growth rate of the country. But domestic public investment and private investment are found to be significant in affecting real GDP growth rate of the country. This is because investment provides employment opportunities, infrastructure and social services to the economy and can increase the output level. Hence, the government have to increase the public investment activity by public sector and tax reform and diversifying the economy so as to generate more revenue for the public investment and to achieve long run economic growth in the country. The government and policy makers have to also give attention to increase private sector investment by liberalization of the market and subsidizing the private sector.

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