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The Private Investment, And Economic Growth Nexuses in Ethiopia: Using Vector Autoregressive Approach

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Abstract

Higher private capital boosts labor productivity, resulting in elevated wages and reduced interest rates. This, in turn, fosters increased work and incentivizes higher investments in private capital. Vector Autoregressive approach was employed to investigate the relationship between private investment, and economic growth. From the descriptive analyses, the trends of Ethiopian investment show that the investment rate in Ethiopia doubled from about 18% of the Gross Domestic Product in the second half of the 1990s to about 33% of the Gross Domestic Product in 2020. This due to the government's commitment to economic reforms, including the privatization of state-owned enterprises, has stimulated investor confidence, fostering a more conducive business environment. From econometric analysis, the Wald Test result revealed that Real Private Investment jointly has a relationship with Real growth rate. From the result of VAR Long Run Estimation, the impact of real public investment and real private investment on economic growth is found to be positive and statistically significant. From the result of the Granger Causality test, there exists a unidirectional causality from Real Private Investment to Real Gross Domestic Product. Recognizing that increased private investment contributes positively to economic growth, policymakers may prioritize initiatives that create an environment conducive to business investment. Overall, a strategic focus on encouraging and sustaining private sector participation will be integral to achieving robust and inclusive economic growth in Ethiopia.

Keywords: Economic Growth, Real Government Investment, Real Private Investment

Introduction

A good investment climate provides opportunities and incentives for investors to invest profitably, create jobs, and expand national output thereby increasing private investment and economic growth (World Bank, 2004). In Ethiopia today, private investment needs an acceptable philosophy, capital to finance it, and competent labor to carry it out. However, the realities regarding these three aspects seem unclear. For large investors, the Ethiopian Investment Commission (EIC) is solely responsible for promoting the country's investment opportunities and conditions to foreign and domestic investors. The Commission seeks to create a politically conducive environment in which domestic and foreign capital can be properly invested. The government also promotes external sources of finance that also fill domestic savings and technological gaps (Oqubay & Lin, 2020).

Most researchers claim that the contribution of private investment to economic growth is larger than that of public investment. They showed that private investment plays the most important role in contributing to economic growth (Dreger and Reimers, 2016). Despite of the facts, many of the studies that have examined the relative contribution of private investment on economic growth are

limited in several ways. The majority of them have examined the impact of only public investment or its subcomponents on economic growth. An empirical study on the differential impacts of public and private investment has an important policy implication in creating an investment mix that can best grow the economy.

Eyob Feleke (2015) in their MSc thesis entitled "The Role of Private Investment to the Economic Growth of Ethiopia. They try to investigate the private sector development in Ethiopia. They found that the increase in the net public investment hurts growth and the increase in the active labor force has a positive impact on growth.

Woldemariam Fujaw (2018) on their MSc thesis entitled "The Determinants of Private Investment in Ethiopia. They try to investigate and analyze factors that determine private investment in Ethiopia from 1996 to 2016. They suggested that strengthening financial institutions is able to provide sufficient financial resources to private investors. Merga T (2022) concludes that public investment stimulates private investment in the long run. He suggests that private investment positively contributes to economic growth more than public investment. The empirical evidence from these studies underscores the need to eliminate public investment in commercial activities and maintain the minimum level of public investment enough to sustain the full working of a market economy.

The World Bank (2022) pointed out that Ethiopia has a young private sector whose growth and ability to create jobs are hampered by constraints on the business climate and competitiveness. Public investment, GDP growth, government expenditure, population growth rate, unemployment rate, trade openness, tax rate, exchange rates, and real interest rates have both short- and long-term effects on private investment.

Several research gaps persist in understanding the private investment and economic growth nexus in Ethiopia through the Vector Autoregressive approach. First, there is a need for comprehensive investigations into the dynamic interactions between private investment and various macroeconomic variables over time. Current literature lacks in-depth analyses that consider the lagged effects, feedback mechanisms, and the nuanced impact of shocks on both private investment and economic growth.

Additionally, there is a gap in exploring the sectorial dimensions of private investment and their distinct contributions to overall economic growth. The VAR approach can provide a nuanced understanding of how shocks in specific variables propagate throughout the economy. Furthermore, the role of external factors, such as broad money supply, in influencing the relationship between private investment and economic growth remains underexplored. Bridging these gaps will not only contribute to a more holistic understanding of the private investment and economic growth dynamics in Ethiopia but also offer valuable insights for the formulation of targeted and effective economic policies.

Theoretical Background

The concept of investment is use to mean the purchase of capital goods thatactually end up

improving the welfare of a population i.e. goods which are used in the production of other goods e.g. railroads, a factory, clearing land, or putting oneself through education. In other words, they increase output. Private investment behavior is primarily influenced by profit motive and always characterized by risk and uncertainty. However, investment is considered as a risky venture, individuals invest with the hope of earning a capital gain at the time of sale (Weirich, 1983).

Again, people invest because they want a return to compensate them for the time, the expected rate of inflation (a general increase in the price of goods and services over time)and the uncertainty of the return (Pollack and Heighberger, 1998).

Ethiopian Investment Proclamation (2020) introduced that increasing the role of private sector investment in all sectors of the economy including in productive and enabling sectors has become necessary to accelerate the economic development of the country, ensure its sustainability, strengthen domestic production capacity and thereby improvethe living standards of its people. it has become necessary to create an economic framework that fast-tracks the global competitiveness of the National economy, increasesexport performance, generates more and better employment opportunities, and facilitates sustainable and entwined linkage among various economic sectors. In Ethiopia, the presence of little empirical analysis in this context makes this study vital to show the role of the private investment in the economy and to help the policy formulation to the sector.

Empirical Review

There are a number of studies that have shown a relationship between private investment and economic growth. However, they get different results depending on a sample, and method used. Rather than investigating the causal relationship between them, their focus was on the impact of private investment on economic growth (Barbosa et al., 2016; Muhammad, 2006; Woldemariam Fujaw, 2018), whether it was positive or negative.

Earlier studies of private investment in developing countries thus opted to move away from the traditional theories and placed emphasis on the role of financial sector development. Specifically, many researchers have studied private investment from different perspectives in Ethiopia focusing on different variables that determine private investment.

Adugna (2013) studied the determinants of private investment in Ethiopia by using multiple regression OLS models for the period from 1981-2010 by using Engle granger two step error correction model. According to his study variables such as public investment, real GDP and external debt had the significant positive long run effect on private investment whereas lagged private investment (a proxy for investment climate had significant negative long-run effect in the short run external debt and real GDP had the significant contribution to private investment growth.

Nevertheless, when examining the effects of these and other variables on private investment and economic growth, he neglected to include crucial private investment variables such the availability of large amounts of money, human capital, and government spending.

Materials and Methods

Data Type and Sources

This study used annual time series data from 1981 to 2020. Mainly, the data used for this study was collected from secondary sources of data. Time-series data on RGDP and Real Public Investment were collected from the World Bank. Human capital data are calculated based School enrollment ratio from the Human Development Index. Active labor force data are calculated as the product of the total population and the participation rate, based on population data collected from the Penn World database.

Method of Data Analysis

Descriptive as well as Econometric methods were employed to analyze different issues in this study. In the descriptive technique, descriptive analysis is used to show the trending behavior of economic growth concerning private investment, public investment, and other variables. In the Econometric method part, the emphasis is placed on investigating the effects of public and private investment on the growth of Real Gross Domestic Product. The data are analyzed using EView software.

Model Specification

The empirical framework of this study focused on modeling the nexus between private investment, and economic growth.

The production function takes the following form:

$Y_t = A_t f(K^p_t, Kgt_{, Z_t}) = A_t (K^p_t)^{\alpha} (K^g_t)^{\beta} (Z_t)^{\gamma}$…….…. 3.1

Where Y is the level of output; A represents technology; Kt^p and Kt^g are the private and public physical capital stocks, respectively; and Zt is the vector including other factors affecting growth.

Equation (3.1) can be expressed in terms of the growth rate as follows. By taking the total differentials of Equation (3.1), we obtain:

dY = YKdK +YzdZ + YAdA…….…….3.2

Dividing Equation (3.2) by Y and manipulating the expression, gives a growth function

$$\frac{\partial Y}{Y} = \frac{(\Delta Y.K)}{\Delta K}\frac{\partial K}{YK} + \frac{(\Delta Y.Z)}{\Delta Z}\frac{\partial Z}{YZ} + \frac{(\Delta Y.A)}{\Delta A}\frac{\partial A}{YA}$$ 3.3

The growth function becomes, $y = \alpha + \alpha k^p + \beta k^g + \gamma z$……. 3.4

Where α small letter for a variable denotes its growth rate; Equation (3.4), which represents a long-run economic relationship, can be estimated, if data are available for capital stocks. Unfortunately, most of the time, such data are unavailable in Ethiopia. Nevertheless, Equation (3.4) can be transformed into an estimable form by making some simplifying assumptions regarding physical capital stocks. Consider the following growth equations for the stocks of private and public capital, which are simple transformations of the perpetual inventory accumulation equations:

$\Delta K^p t = \underline{I^p t} - \delta p\ K^p_{t-1}$ …….....……3.5

And

$\Delta K^g t = \underline{I^g t} - \delta g\ K^g_{t-1}$…….……3.6

Where, I^p and I^g are private and public investments (both expressed in real terms), respectively; and δp and δg are the respective rates of depreciation of the private and public capital stocks.

The equivalent equation for the Equation above, which was used for estimation purposes, can be written in logarithmic form as follows:

$LRGDP_t = \beta_1 + \beta_2 LRIPt + \beta_3 LRIGt + \beta_4 LLABt + \beta_5 LHCAt + \beta_6 BRMON + \beta_7 GOVEXP\varepsilon_t$…….. 3.7

Where:

RGDP= Real Gross Domestic Product, RIP= Real Private Investment, RIG= Real Public Investment, LAB= Active Labor Force, HCA= Human Capital, BRMON= Broad Money Supply, GOVEX= Government Expenditure, ε = Stochastic Error Term

Stationarity Test

Stationary implies that the distribution of a process remains unchanged when shifted in time by an arbitrary value. More formally, a stochastic process is said to be weakly stationary if its mean and variance are constant over time and the value of the covariance between the two times depends only on the distance or gap between the two time periods and not the actual time at which the covariance is computed (Enders, 1995; and Gujarati, 2003).

Testing for Unit Roots

a) Augmented Dickey Fuller (ADF) Test

The Augmented Dickey Fuller test is used to prove whether the suspected problem of non-stationary in the graphical analysis exactly happens. To allow for various possibilities, Dickey and Fuller show that the test can be estimated in at least three different forms (Gujarati 2004).

Y_t is a random walk without drift: $\Delta Y_t = \delta Y_{t-1} + u_t$…….....…….....…… (3.8)

Y_t is a random walk with drift: $\Delta Y_t = \beta_1 + \delta Y_{t-1} + u_t$…….... (3.9)

Y_t is a random walk with drift around a stochastic trend: $\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + u_t$… (3.10)

Where *t* is the time or trend variable. In each case, the null and alternative hypothesis is: Ho: δ = 0; [or ρ=1 that is, there is a unit root or the time series is non-stationary]

Ha: δ < 0; [or ρ<1 that is, there is no unit root or the time series is stationary]

Lag Selection Criteria

The issue of finding the appropriate lag length for each of the underlying variables in the VAR model was very important. To select the appropriate number of lags for the long run underlying equation, the researcher determined the optimal lag length (k) by using the lower values of Akaike

Information Criteria (AIC), Schwarz Bayesian Criteria (SBC) or Hannan-Quinn Criteria (HQC) (Nyoro & Kelvin, 2016)

Johansen Co-integration Test

Granger causality was used to determine whether one time series is useful in forecasting another (Enders, 1995). Granger causality tested the direction of causation between Real Private Investment, and Economic Growth. Auto regressive distributed lag model was used to perform Granger causality tests. Thus, the Granger causality test was applied.

$$LNRGDP = \alpha o + \sum_{i=1}^{p} a_{1i}\, LNRIP + \sum_{i=0}^{q1} a_{2i}\, LNRIG + \sum_{i=1}^{q2} a_{3i}\, LNHCB + \sum_{i=0}^{q3} a_{4i}\, LNLAB + \sum_{i=1}^{q4} a_{5i}\, LNGOVEXPP + \sum_{i=0}^{q5} a_{6i}\, BRMON + \mu_t \quad \ldots\ldots (3.11)$$

Short Run Error Correction Model (ECM)

The Error Correction Model (ECM) was derived from the ARDL model through a simple linear transformation, which was an integrated short run adjustment with long run equilibrium without losing long run information.

$$\Delta lnRGDP = \beta o + \text{Ω}ECM_{t-1} + \sum_{t=1}^{n} \beta_1 lnRGDP_{t-1} + \sum_{t=1}^{k} \beta_2 lnRIP_{t-1} + \sum_{t=1}^{k} \beta_3 lnRIG_{t-1} + \sum_{t=1}^{k} \beta_4 lnHCB_{t-1} + \sum_{t=1}^{k} \beta_5\, lnLAB_{t-1} + \sum_{t=1}^{k} \beta_6\, lnGOVEXPP_{t-1} + \sum_{t=1}^{k} \beta_7 BRMON_{t-1} \ldots\ldots (3.12)$$

Descriptive Analysis

From the descriptive analyses, we have observed that Ethiopian investment has been extremely weak as signified by its low values and share of investment to GDP. Gross private investment has been slow moving in the period 1981 to 2001 while it was reviving since 1994. Specifically, the investment rate in Ethiopia exhibited substantial expansion, doubling from approximately 18% of Gross Domestic Product (GDP) during the latter half of the 1990s to around 33% of GDP by the year 2020. This marked increase underscores a considerable upward trajectory in investment activities, signifying a positive and substantial shift in Ethiopia's economic landscape over the analyzed period.

From the descriptive analysis, we have observed that both real private investment and real government investment have been increasing since the beginning of 2015. From the result, we concluded that there is a positive trend between private investment and Economic growth.

Econometric Result

Result for Unit Roots

If the ADF t-statics is greater than the Critical Value at 5% in intercept and trend and intercept; then the variable is stationary.

Table4.1: Results of Phillips-Perron Unit Root Test

Variables	Values	PP test at level I(0)			PP at first difference		**Order of Integration**
		Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	
lnRGDP	**|ADF t-statics|**	0.61	3.488	2.5	**11.31**	**24.35***	**I(1)**
LnRIP	**|ADF t-statics|**	0.004	2.26	4.63	**7.36**	**7.31***	**I(1)**
LnRIG	**|ADF t-statics|**	1.1	1.98	2.87	**6.47**	**7.11***	**I(1)**
HCA	**|ADF t-statics|**	0.98	2.22	2.21	**8.14**	**8.1***	**I(1)**
LnLAB	**|ADF t-statics|**	0.33	1.69	12.95	**5.23**	**5.17***	**I(1)**
LnGOVEXP	**|ADF t-statics|**	**6.19***	**6.15**	**3.96**	37.72	38.16	**I(0)**
BRMON	**|ADF t-statics|**	*8.69**	*4.85*	*10.55*	***0.38***	***2.47***	**I(0)**

Source: Authors' computation

Mackinnon (1996) Critical Values

Note: - * show that the variables are significant at 5%

If the |PP t-statics| is greater than |Critical Value at 5%| in intercept and trend and intercept; then the variable is stationary.

Therefore, LNRGDP, LNRIP, RIG, BRMON, LNLAB, and HCA are stationary at the first difference since their P-Values are less than 5% level and also there Augmented Dickey Fuller test statistics are greater than that of their test critical values at 5% level. For example; from table 4.1; the first difference of ADF test statistics values for LNRGDP is 3.02 at intercept and 4.87 at trend and intercept which are greater than that of test statists of LNRGDP, which is 2.94 at intercept and 3.53 at trend and intercept respectively then we can reject the null hypothesis and accept the alternative hypothesis. Again, the first differences P-Values of LNRGDP are less than 5% at the intercept, which are 0%, and 0% at the trend and intercept respectively.

LNRIP (Real Private Investment) and RIG (Real Government Investment) are stationary at first difference. For LNRIP: the results of P-values at first difference are 0% at intercept and 0% at trend and intercept which is less than 5% confidence level. The first difference of LNRIP test statistics values for LNRIP is 6.86 at intercept and 6.78 at trend and intercept which are greater than that of test statists of LNRIP, which is 2.94 at intercept and 3.53 at trend and intercept respectively. For RIG: the results of P-values at first difference are 0% at the intercept and 0% at the trend and intercept which is less than 5% confidence level.

However, the Government Expenditure (LNGOVEXP) is stationary at level because the P-Values are 0% at intercept, 0% at trend and intercept and 0.03% at none; which are less than the 5% confidence level. At level, ADF test statistics values for LNGOVEXP are 6.19 at intercept and 6.15 at trend and intercept which are greater than that of test statists of LNRGDP which is 2.94 at intercept and 3.53 at trend and intercept respectively.

Results of Lag selection criteria

The Standard VAR (Vector Auto regression) model is one of the methods of obtaining the number of lag selection criteria. From the guide line of lag selection criteria, the lower the values of AIC, SC, and HQ the better the model. Since the values of lag 4 of AIC is 41.16538*, SC is 50.09467* and HQ are 44.28194* were lower than lag 3 values of AIC (48.94590), SC (55.71984) and HQ (51.31019) and as well as lower than the values of lag 2 and lag 1. Where * indicates lag order is selected by Standard VAR criterion.

Table 4.2: Lag Selection Criteria from VAR Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LNRGDP LNRIG LNRIP LNLAB LNHCA LNGOVEXP BRMON

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1136.143	NA	8.99e+18	63.50797	63.81587	63.61543
1	-834.7622	468.8153	7.72e+12	49.48679	51.95004	50.34653
2	-788.6130	53.84070	1.25e+13	49.64517	54.26376	51.25718
3	-727.0262	47.90083	1.72e+13	48.94590	55.71984	51.31019
4	-537.9769	73.51920*	1.34e+11*	41.16538*	50.09467*	44.28194*

Exogenous variables: C

* indicates lag order selected by the criterion

Source: Authors' computation

Generally, from the VAR criteria lag 4 is the best number of lag and the better the model based on the guideline. In VAR criteria; the AIC (Akaki Information Criteria) SC and HQ values of lag 4 are lower than that of lag 3, lag 2 and lag 1.

Results from Co-integration Analysis

From the Johansen Co-integration test result; there are two ways for understanding the result of co-integrating equation at 0.05 levels. Two of the methods are either by trace statistic or by max-Eigen statistic.

From the trace statistic, the guide line to select the co-integration equation depends up on the probability values. If the p-values are less than 5% level at hypothesized number of co-integrations; then the variables are co-integrated. From the trace statistic; probability values where 0% at hypothesized number of co-integrations at none*, 0% at most 1*, 0.05% at most 2* and 1.93% at most 3*. The probability values are higher at most 4 having p – values of 25.28%, at most 5 having

p – values of 44.14%, and at most 6 having p – values of 98.16%. Therefore, the trace indicates 4 co-integrating equations at the 0.05 confidence levels.

Table 4.3: Result of Co-integration Analysis

Trend assumption: Linear deterministic trend
Series: LNRGDP LNRIG LNRIP LNLAB LNHCA LNGOVEXP BRMON
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

HypothesizedNo. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.897908	219.8244	125.6154	0.0000
At most 1 *	0.705534	135.3950	95.75366	0.0000
At most 2 *	0.643284	90.15906	69.81889	0.0005
At most 3 *	0.545240	52.01893	47.85613	0.0193
At most 4	0.326709	22.86346	29.79707	0.2528
At most 5	0.199354	8.227072	15.49471	0.4414
At most 6	1.69E-05	0.000624	3.841465	0.9816

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors' computation

Generally, from both trace statistic values and Max-Eigen test values at least there are 4 co-integrating equations at 0.05 confidence level and there are rejections of both values at hypothesized number of co-integrations at none, at most 1*, at most 2*, and at most 3* since there probability values were less than 0.05 confidence levels From both trace statistic and max-Eigen test values, the results of the variables were co-integrated.

Results of VAR Model

The researcher used Vector Auto Regressive (VAR) model to estimate the variables and to analyze the nexus between Private Investment, and Economic Growth.

Table4.4: Results of the VAR Model

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.488473	0.384979	3.866374	0.0008
C(2)	-0.093497	0.352707	-0.265085	0.7933

C(3)	4.036980	2.052046	1.967296	0.0613
C(4)	2.316731	1.931007	1.199752	0.2424
C(5)	-1.635575	0.757516	-2.159130	0.0415
C(6)	-0.915182	1.287399	-0.710877	0.4843
C(7)	-84783.52	50592.10	-1.675825	0.1073
C(8)	-94291.14	71108.03	-1.326027	0.1978
C(9)	4341.474	26480.72	0.163949	0.8712
C(10)	-14520.70	27738.92	-0.523478	0.6056
C(11)	81508318	2.16E+08	0.377541	0.7092
C(12)	46332092	1.71E+08	0.270384	0.7893
C(13)	4.974334	2.075851	2.396287	0.0251
C(14)	-7.296756	3.230643	-2.258608	0.0337
C(15)	4.20E+10	8.26E+10	0.508298	0.6161

R-squared	0.998500	Mean dependent variable	7.71E+11
Adjusted R-squared	0.997588	S.D. dependent variable	7.81E+11
S.E. of regression	3.84E+10	Akaike info criterion	51.86568
Sum squared residual	3.38E+22	Schwarz criterion	52.51209
Log likelihood	-970.4478	Hannan-Quinn criterion	52.09567
F-statistic	1093.933	Durbin-Watson stat	1.460787
Prob(F-statistic)	0.000000		

Source: Authors' computation

EView 10 software selected the VAR model to carry out different techniques. From the result; the model selection method is by Akaike information criteria (AIC) and it has a maximum dependent lag of 4, dynamic regressors are LNRGDP, LNRIP, LNRIG, LNGOVEXP, LNHCA, BRMON, and LNLAF. Hence, from six of the variables, LNRGDP is the dependent variable.

Wald Test

Wald Test 1

From the Wald Test, Real private investment jointly affects the dependent variable which is real growth rate. The guideline to accept or reject whether two of the independent variables affect or not affect the dependent value depends on the value of chi-square probability value. To accept the Wald test, the chi-square probability must be less than the 5% confidence level. From the below table; since the chi-square probability value is 0.47% which is less than the 5% confidence level. Therefore, we reject the null hypothesis and accept the alternative hypothesis; which is Real Government Investment affects the Real Gross Domestic Product.

Table4.5: Wald test 1

Wald Test:

Test Statistic	Value	Df	Probability
F-statistic	5.349638	(2, 33)	0.0097
Chi-square	10.69928	2	0.0047

Null Hypothesis: C(2)=C(3)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	6.862929	2.188605
C(3)	-0.895697	0.811528

Restrictions are linear in coefficients.

Source: Authors' computation

Wald Test 2

From the Wald Test, the Real growth rate will jointly affect the variable, which is Real Private Investment. The guideline to accept or reject whether two of the independent variables affect or not affect the dependent value depends on the value of chi-square probability value. To accept the Wald test, the chi-square probability must be less than the 5% confidence level. From the below

table; since the chi – square probability value is 0% which is way less than the 5% confidence level. Therefore, we reject the null hypothesis and accept the alternative hypothesis; which is Economic Growth will jointly affect Real Private Investment.

Table 4.6: Wald test 2

Dependent Variable: RIP

Wald Test:

Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	16.43245	(2, 33)	0.0000
Chi-square	32.86490	2	0.0000

Null Hypothesis: C(2)=C(3)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.198893	0.046148
C(3)	0.033450	0.010667

Restrictions are linear in coefficients.

Source: Authors' computation

Finally, from the test, the Real Growth rate will jointly affect the dependent variable, which is Real Private Investment. A one percent increase in RIG is associated with a 19.89% decrease in real private investment if other variables are held constant. A one percent increase in Real GDP is associated with a 3.34% increase in real private investment if other variables are held constant

Table4.7. Results of VAR Model Long Run

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRIG	0.151517	0.032237	4.700112	0.0000*

LNRIP	0.028413	0.044541	0.637909	0.0279*
LNGOVEXPP	0.528287	0.204953	2.577600	0.0146*
LNHCA	-0.029594	0.078347	-0.377732	0.7080
LNLAB	-0.318717	0.405604	-0.785786	0.4376
BRMON	1.13E-12	1.86E-13	6.058943	0.0000*
C	24.48633	5.057414	4.841671	0.000 h0

Source: Authors' computation

From Table 4.7, the researcher developed the long run ARDL model equation as follows:

LNRGDP = 24.48633 + 0.151517 LNRIG + 0.028413 LNRIP + 0.528287 LNGOVEXPP – 0.029594 LNHCA – 0.318717 LNLAB + 1.1310^{-12} BRMON

The level of Broad Money is found to influence economic growth positively and statistically significant having p-values of 0%. Ethiopia's economy has been positively increasing for many years and the Broad Money directly increases the economy of the society. By using the Broad Money; most of the people use the big money for building big house, used for buying houses equipment, saving their life, and so on. Without the other factors, a one-unit change in Broad Money was the result of increase an in economic growth by $1.13x10^{-12}$ units.

Error Correction Model

A. Results of short run

When the researcher compared the results of the long run VAR model coefficients with that of the short run VAR model; coefficients for the first difference of Government Expenditure D (LNGOVEXP) have different values which are positive in the long run and negative in the short run.

Like the long run model; the short run model has also a positive short run coefficient for Real Private Investment, and Active Labor Force but Human Capital and Government Expenditure have a negative short run coefficient.

Table 4.8: Results of the Short Run

Dependent Variable: D(LNLRGDP)

Method: Least Squares

Sample (adjusted): 1983 2020

Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.026002	0.037115	0.700582	0.0088*
D(LNRIG)	-0.01790	0.041343	-0.433166	0.0179*
D(LNRIP)	0.005096	0.036541	0.139463	0.0090*
D(LNHCA)	-0.083441	0.167879	-0.497031	0.6227
D(LNLAB)	0.642631	1.008840	0.637000	0.0088*
D(LNGOVEXP)	-0.000477	0.002233	-0.213699	0.8322
D(BRMON)	1.26E-12	4.29E-13	2.949775	0.0060*

R-squared	0.696107	Mean dependent variable	0.064321
Adjusted R-squared	0.759870	S.D. dependent variable	0.077579
S.E. of regression	0.071108	Akaike info criterion	-2.284420
Sum squared residual	0.156745	Schwarz criterion	-1.982760
Log likelihood	50.40398	Hannan-Quinn citer.	-2.177092
F-statistic	2.173467	Durbin-Watson stat	1.861707
Prob (F-statistic)	0.002728		

Source: Authors' computation

The results, after formulating the above table the **short run model** represented as follows.

D(LNRGDP) = -0.018*D(LNRIG) + 0.0051*D(LNRIP) -0.83*D(LNHCA) + 0.643*D(LNLAB) -0.0048*D(LNGOVEXP)+ 1.26*D(BRMON)

From the long run model and the short run: Real Private Investment has a positive relationship with economic growth. The long run effect was the same as that of the short run effect and the probability values are statistically significant. The short run coefficient is Negative and it is statistically significant having p-values of 1.79% for Real Government Investment.

From the long run and the short run model, Human Capital has a negative relationship with economic growth. From most of the theory, if the probability, values are not significant, there is no way of reporting the variables. Therefore, Human Capital cannot have a relationship with economic growth in the short run.

The short run active labor force has a positive and statistically significant effect on economic growth. From most of the theory and general truth, the active labor force affects economic growth positively. An increment in the active labour force by one percent increased economic growth by 64.26%. Nevertheless, in the short run result, both government expenditure and human capital have negative coefficients and are insignificant on economic growth.

From the long run model and the short run: broad money has a positive effect on economic growth and is statistically significant. The short run coefficient is positive and it is statistically significant having p-values of 0.6%. Therefore, a one-unit increase in broad money can lead to an increase in economic growth by an amount of 1.26E-12. Generally, in the short run real private investment, active labor force and broad money have a positive coefficient.

Results of the Granger Causality Test

In this article, Granger causality is conducted to examine the presence of unidirectional, bidirectional, or neutrality causality among variables used in the study to achieve the third objective.

Table 4.9: Results of the Granger Causality Test

Pairwise Granger Causality Tests

Sample: 1981 2020

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNRIP does not Granger Cause LNRGDP	38	4.75923	0.0153
LNRGDP does not Granger Cause LNRIP		0.08268	0.9208

Source: Authors' computation

From Table 4.9, the associated probability values of Real Private Investment (LNRIP) to Real Gross Domestic Product (RGDP) are 1.53%, which was less than 5%. The associated probability values of LNRGDP to LNRIP are 92.08%, which was more than 5%. Therefore, we cannot reject the null hypothesis rather we can accept the null hypothesis, which was stated as

LNRGDP, does not Grander Cause LNRIP. Generally, there exists a uni-directional flow of causality from Real Private Investment (LNRIP) to Real Gross Domestic Product (LNRGDP) or from Private Investment to Economic Growth.

To summarize, the results from the Granger causality test of the model for the period under investigation show that an increased inflow of the Real Public Investment (RIG). Real Private Investment (RIP) can lead to an increase in Real Gross Domestic Product (RGDP) of Ethiopia, while the increase in Economic growth cannot lead to an increase in Public and Private Investment at the same time.

Results of the Model Diagnostic Tests.

i. Normality Test

The Normality test also indicates that the VAR model is Normal. From VAR model is well behaved and normal. Since; its p-values (76.22 %) are greater than that of the 5% confidence level then we can deduce that the model is normal.

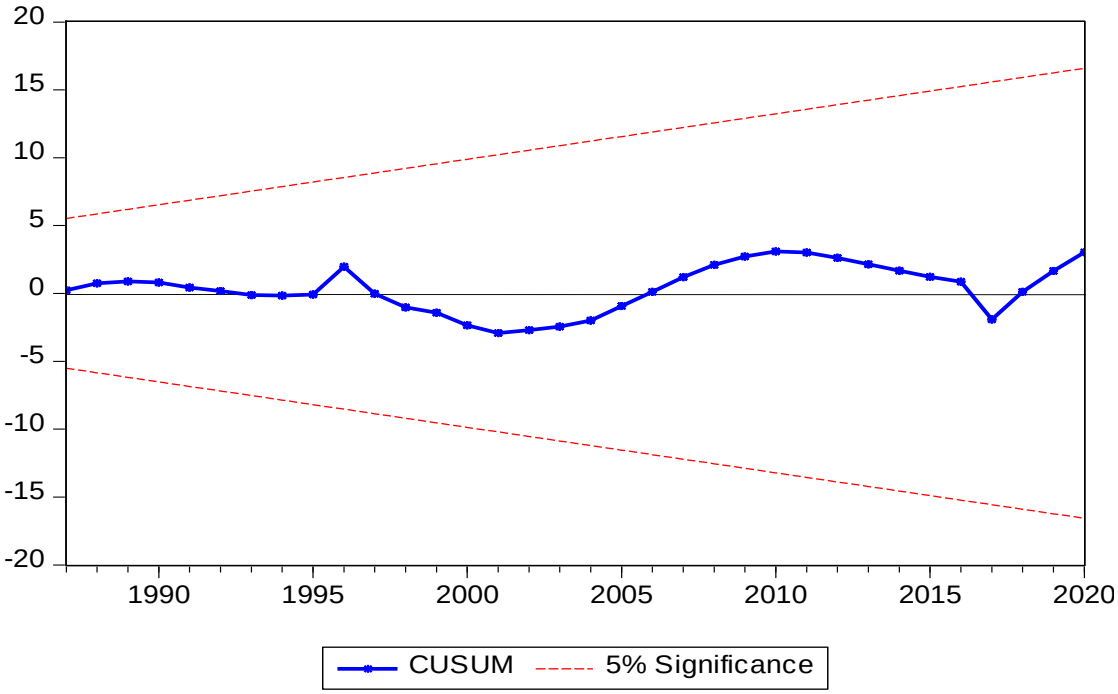
ii. Serial Correlation Test

From Breusch – Godfrey Serial Correlation LM Test; the researcher did not reject the null hypothesis. The Breusch – Godfrey Serial Correlation LM test has probability chi-square (14) values of 66.80 percent, which is a more than 5 percent level. The researcher summarized and was quite happy that the model has no serial correlation because the probability values are greater than the 5 percent level.

Results of the Stability Test

Since the blue lines lie in between the two red lines as we can see from the figure then the model was more stable.

Figure 1: Results of the Stability Test



Source: Authors' Computation

Conclusion

The descriptive analysis of Ethiopian investment trends reveals a significant and robust growth pattern. Specifically, the investment rate in Ethiopia exhibited substantial expansion, doubling from approximately 18% of Gross Domestic Product (GDP) during the latter half of the 1990s to around 33% of GDP by the year 2020. This marked increase underscores a considerable upward trajectory in investment activities, signifying a positive and substantial shift in Ethiopia's economic landscape over the analyzed period.

The results of the econometric analysis indicated that there is a long run relationship between real private investment and economic growth. In support of the theoretical foundation; in the long run, real private investment has a positive relationship with economic growth. Finally, from both Wald tests, Real Private Investment affected the dependent variable, which is the Real growth rate.

The short run active labor force has a positive and statistically significant effect on economic growth. From most of the theory and general truth, the active labor force affects economic growth positively. An increment in the active labour force by one percent increased economic growth by 64.26% if other variables are held constant.

Generally, there exists a uni-directional flow of causality from Real Public Investment (LNRIG) to Real Gross Domestic Product (LNRGDP) or from Public Investment to Economic Growth. The results from the Granger causality test of the model for the period under investigation show

that an increased inflow of Real Public Investment (RIG) and Real Private Investment (RIP) can lead to an increase in Real Gross Domestic Product (RGDP) of Ethiopia.

Real Private Investments are the main factor to affects an economy positively having a statistically significant probability value. Therefore, the nexus between Real Private Investment and economic growth is positive. Economic growth has a long run and a short run relationship with Real Private Investment.

Based on the findings of the study the following policy recommendations are given:

The results of the study revealed a positive relationship between Real Public Investment and economic growth in Ethiopia, therefore, the Ethiopian government and policymakers should plan an economic growth strategy that encourages government investment to invest more to achieve sustainable economic growth. The planned public investment must consider the country's prioritized macro and micro economic policies and strategies to improve the aggregate gross domestic product of the country

In conclusion, the identification of a strong, statistically significant, and positive relationship between private investment and economic growth in Ethiopia underscores the pivotal role of private sector participation in driving overall economic development. This empirical evidence emphasizes the importance of prioritizing policies that foster a conducive business environment, encourage investment, and promote entrepreneurship.

To capitalize on this positive effect, policymakers should focus on regulatory reforms, infrastructure development, and initiatives that enhance the ease of doing business. Additionally, targeted efforts to attract both domestic and foreign investments, coupled with measures to ensure stability and predictability in economic policies, will be instrumental. These findings highlight the need for a comprehensive economic strategy that actively supports and incentivizes private sector engagement to sustainably propel Ethiopia's economic growth trajectory.

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