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An Investigation of Macroeconomic Determinants of Private Investment in Ethiopia: Co-Integrated VAR Approach

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Abstract
This study was conducted with the main objective of investigating and analyzing the macroeconomic determinants of private investment in Ethiopia over the period from 1974/75-2013/14.Both augmented dickey fuller and Philips Pearson test were employed to test the Stationarity of the variables. The study employed error Correction model to estimate the long run relationship of the variables. The regression results shows that real physical infrastructure investment, real social infrastructure investment , trade openness and bank credit have significant positive long run effect on private investment growth , where as inflation as it was measured by consumer price index has significant negative short run and long-run effect. Economic growths have significant positive impact on the real private investment both in the short run and long run. The result of the regression suggests the crowding in effect of the real physical infrastructure investment and real social infrastructure investment on real private investment in Ethiopia in the long run whereas crowding out effect for short run. Moreover, the result of the regression confirm the validity of accelerator model which states investment is the linear proportion of output in the context of Ethiopia. Thus require the need to extend the growth of national output to raise the growth of private investment. Hence, as policy implication the study recommends government provision of fertile macroeconomic and investment climate. Moreover, investment in physical and social infrastructure in line with other supplementary reforms should be extended to promote the growth of private investment and economic growth at large.
Keywords: private investment, vector error correction model, economic growth,

1.1 Introduction

Economic literatures prove that investment is, both empirically and theoretically, the key determinant to economic growth. Economic growth refers to an increase in a country's production or income per capita. It is usually measured by gross national product (GNP) or gross national income (GNI), used interchangeably, an economy's total output of goods and services.

Investment is the source of manufactured goods that will be used to produce other goods. It is the major foundation of enhancement in the level of literacy, improvement in technology and increase in the capital stock (Hashmi et al 2012).

A rate of investment is one of the key factors that differentiate developed countries from developing countries. In high-growth countries investment is high, where as it is low in low growth countries. The implication of low investment is that the productive capacity of the economy fails to increase. This in turn leads to lower rates of growth and job creation, and fewer opportunities for the poor to improve their livelihoods (White, 2005)

As evidenced in many studies, it is rather private investment that plays greater role than public investment in determining growth in most developing countries (Serven and Salimano, 1990, Khan and Rein hart 1990: and Badawi, 2003 and 2005). The tendency to boost private sector participation in economic growth has prominently shaped the policy-making process in developing countries, giving rise to a wave of privatization program and other related policies (Badawi, 2003 and 2005).

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 the 2005 World Development Report (WDR), Bernal *et al*. (2004) note that improvements in the investment climate in developing countries are key to increasing the flow of investments and, consequently, a higher level of economic growth and development. However, in the poorest developing countries, such as Ethiopia, businesses frequently operate in investment climates that undermine their incentive to invest and grow, thus undermining the performance of trade (UN, 2005). In line with this environment, Ethiopian investors complain about poor infrastructure, particularly power shortages; poor transport; poor telecom connectivity of business locations and lack of efficient tax administration (Mima and David, 2012; World Bank, 2004).

Ethiopia ranked 124th out of 148 countries in terms of the infrastructure in the 2013/14 global competitiveness report, WEF, (2013). The Ethiopian government recognized the role of private investment in particular and private sector growth in general for faster and sustainable economic growth and it has been taking various measures to that effect including formulating various development policies and plan so as to enable the private investment sector to take the lead in contributing for sustainable growth. However the contribution of

private investment sector to national output remains low.

1.2 Objective of the study

1.2.1 General Objective

The main objective of this study is to investigate the macroeconomic determinants of private investment in Ethiopia.

1.2.2 Specific objective

The specific objective of this study is:

- To examine the contribution of investment made on physical and social infrastructure to the growth of private investment in both the short run and long run.
- To provide policy recommendation to promote private investment growth in Ethiopia

2. Methodology of the study

2.1 Data type and sources

The study used secondary data that was collected for 40 years from Ministry of finance and economic development. The period of study was selected based on the availability of data.

2.2 Data analysis and estimation technique

The collected data was analyzed using descriptive and econometric technique. Appropriate tests of variables behavior was checked like Stationarity, post diagnostic tests, and co integration of the variables. Vector error correction model (VECM) to estimate the long-run and short run equilibrium relation.

2.3. MODEL SPECIFICATION AND ESTIMATION TECHNIQUE

2.3.1 Theoretical framework

The empirical frame work of this study is to model the macroeconomic determinants of private investment in Ethiopia. A variant of the flexible accelerator model was used to evaluate the determinants of private investment. This model is built based on the assumption that if the larger the gap between the existing capital stock and the desired level of capital stock, there will be greater firm rate of investment. Firms will plan to close the gap between the desired capital sock, K* and the actual capital stock, K in each period, Mbaye (2014). The flexible accelerator model has been the most popular, however in the context of developing countries due to the data limitations and structural constraints, a variant of the flexible accelerator model has often been used in empirical research Ouattara(2004), and Seruvatu and Jayaraman (2001)).

2.3.2 Model Specifications

The model adopted for this study was developed from the neoclassical flexible accelerator model formulated by Jorgensen (1967). The reason for the adoption of this model is that it ranks the most popular amongst all investment theories and the assumption of the theory is relevant in the context of developing countries in general.

According to the accelerator theory, investment is a function of economic growth. In the long-run, the desired capital stock (K) is assumed to be directly related to levels of income (Y).

$$K_t \sim Y_t$$

$$K_t = \alpha Y_t \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where α is a constant, and *t is* time-operator. Differentiating the equation with respect to time,

$$\Delta k_t = \alpha \Delta y_t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where the Δ is the difference operator. To obtain an equation for the relationship between investment and desired capital stock, the conventional capital accumulation identity is used to identify investment, I;

$$K_t = (I - \delta)\, k_{t-1} + I_t \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where δ refers to the depreciation of capital. From equation (3) we can obtain the following equation;

$$k_t - k_{t-1} = I_t - \delta k_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Rearranging the expression and assuming δ = 0, we can solve for I_t to yield the following equation;

$$\Delta k_t = I_t \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Equation (5) can be substituted in equation (2) to obtain;

$$I_t = \alpha \Delta y_t \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

This equation represents the basic investment function. But we need to account for the slow adjustment of the actual capital stock to the desired capital stock, lagged values of the dependent variable can be introduced into the expression to yield the following investment equation denoted by ;

$$I_t = \rho I_{t-1} + \beta 1 \Delta y_t + \beta 2 \Delta y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where the first two terms on the right-hand side are lagged investment and income growth rates respectively. β represents coefficients while Δy_{t-1} represents lagged growth rate of output. ε is the disturbance (error) term

which captures the effects of omitted variables, Mbaye (2014).

The final equation can thus be estimated;

$$I_t=\rho I_{t-1}+\beta_1\Delta y_t+ \beta_2\Delta y_{t-1}+X_t +\varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Where X_t represents some of the variables that are applicable in the developing countries such as financial factors, policy-related factors, neoclassical factors, open economy factors and general macroeconomic related variables. The variables are chosen based on the availability of data and existence of wide literature that support the variable.

Our model for private investments can now take the following form;

$$RPRI=f (RGDP, RPII, RSII, OPEN, RDBC, RGDS, CPI) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Therefore, to estimate the parameters β, the equation can take the following form;

$$RPRI= \beta0+\beta1RGDP+\beta2\ RPII+\beta3RGDS+\beta4OPEN+\beta5RDBC+\beta6RSII+\beta7CPI+\ \varepsilon_t \ldots. (10)$$

where RPRI is the dependent (endogenous) variable being real private Investments where as the independent variables are RGDP, RPII ,RGDS, RGDC, OPEN, and RSII are real gross domestic product , real physical infrastructure investment and real social infrastructure investment, real gross domestic credit ,real gross domestic saving , trade openness , and consumer price index respectively ε is white noise error term.

The VAR model can be established as follows

$$Yt = \Omega + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} \ldots\ldots\ldots\ldots + \beta_3 Y_{t-p} + \varepsilon_t$$

$$Y_t = \Omega + \sum_{i=1}^{p} \beta_i Y_{t-I} + \Psi D_t + \varepsilon_t$$

Where, Y_t is an (n χ 1) vector containing the n-variables (RGDP, RPII, RSII , RGDS, RDBC,CPI ,OPN) β_i; is (n χ n) matrix of coefficients; ψ is a vector of deterministic terms like trends, dummy or intercepts; and ε_t are iid (0, Σ) vector of error terms With Σ representing the contemporaneous covariance matrix, Taddesse (2012).

3. RESULT AND DISCUSSION

Time series property of the data

Stationarity Tests

The first important step in the estimation of vector auto regression model is to test the Stationarity of variables. Non-Stationarity of time series data has often been regarded as a problem in empirical analysis. Therefore working with non-stationary variables lead to spurious regression results, from which further inference is meaningless (misleading regression). The result of augmented dickey fuller test and Philips Pearson test is presented in the table below which indicates the Stationarity of the variables. All the variables are stationary at first differencing at 5 % significant level using ADF test and PP test.

Table 1 Stationarity test

Variables	**ADF test**			**Order of Intigrat.**
	With Intercept	Intercept & trend	None	
lnRPRI	0.627953	-2.468750	2.645970	
D(lnRPRI)	-4.470996*	-4.550032*	-3.958479*	I(1)
lnRGDP	4.306919	1.028333	5.368499	
D(lnRGP)	-1.967908*	-6.545504*	0.3907*	I(1)
lnOPN	-1.34601	-2.104574	-1.052708	
D(lnOPN)	-6.404535*	-6.316295*	-6.388806*	I(1)
lnRPII	0.761459	-2.023578	5.054065	
D(lnRPII)	-4.531162*	-4.578452*	-3.214647*	I(1)
Ln(RSII)	1.339825	-1.619488	5.368263	
D(lnRSII)	-4.779982*	-5.046573*	-3.309905*	I(1)
ln(CPI)	0.476286	-1.439497	5.57718	
D(lnCPI)	-4.202155*	-2.259797*	-1.276625*	I(1)
lnRDBC	-2.056454	-4.030074	2.886821	
D(lnRDBC)	-7.386843*	-7.205590*	-6.084147*	I(1)
lnRGDS	-0.085447	-3.328826	1.091212	
D(lnRGDS)	-8.504979*	-8.744557*	-8.410212*	I(1)

Variables	**Phillips Pearson Test for Stationarity**			Order of Intigrat.
	Intercept	Trend& intercept	None	
Ln (RPRI)	0.627953	-2.468750	2.645970	
LN(RPRII)	-5.070996*	-6.650032*	-3.058479*	I(1)
lnRGDP	4.528201	-0.231176	4.420046	
D(lnRGDP)	-4.604471*	-5.828687*	-3.324962*	I(1)
lnRPII	0.277565	-1.928220	4.420046	
D(lnRPII)	-4.466503*	-4.5521118*	-4.031302*	I(1)
lnRPSII	0.548370	-1.879821	4.136275	
D(lnRPSII)	-4.508626*	-4.5774328*	-3.187303*	I(1)
lnRGDS	-0.570479	-3.294569	0.725006	
D(lnRGDS)	-8.727787*	-9.937306*	-8.482322*	I(1)
lnRGDBC	0.303038	-2.712711	2.695243	
D(lnRDBC))	-6.966624*	-6.815196*	-5.914435*	I(1)
lnCPI	0.103618	-1.494792	4.065115	
D(lnCPI)	-4.183113*	-4.173716*	-2.858963*	I(1)
lnOPN	-1.379681	-2.141405	4.065115	
D(lnOPN)	-6.384704*	-6.319519*	-6.384704*	I(1)

Note: D shows the variable is differenced once. In addition * shows rejection of null hypothesis at 5 %.(Source: Own computation using Eviews.

Estimation of VAR Model

Lag Length Selection Criteria

Optimal lag length selection can be done by using different information criteria to select the number of parameters that minimize the value of the information. The model having the low value of given information criteria can be considered as best as compared to the model with the largest value of the information criteria. The optimal lag order determined by using sequential modified Likelihood Ratio test statistics [LR], final prediction

error (FPE), Akaike Information Criterion [AIC], Schwarz Information Criterion (SIC) and Hannan –Quinn information criteria (HQ).As shown in Table 2 below , the optimal lag length selected is two based on the result of various information criteria such as FPE, HQ, and AIC results suggestion. Here the rationale for choosing this lag length is that most of the information criteria verified the lag number two as optimal lag length for this analysis.

Table 2 Optimal Lag Order Selection Criteria

VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	43.69791	NA	2.11e-11	-1.878837	-1.534082	-1.756176
1	377.9636	510.1951	1.51e-17	-16.10335	-13.00056*	-14.99940*
2	459.1387	89.71980*	9.78e-18*	-17.00730*	-11.14647	-14.92206

Source: own computation using Eviews

As it can be seen from Table 5.2,1 three tests of information criteria out of six confirmed lag number two as optimal for each variable of interest. Since the lowest the value of the information criteria, it became the better. Thus the likelihood ratio, final prediction error and Akaike Information criteria.

Table 3 Johnson co integration test using Trace and maximal Eigen value Static Test

Johnson co integrationtest

Null hypothesi s	Alternativ ehypothesi s	Eigen value	Trace static	0.05 critical value	Prob**
H0: r ≤ 0	HA:r>0	0.925720	328.0036*	52.36261	0.0000
H0:r ≤1	HA: r>1	0.862107	231.8069*	46.23142	0.0000
H0:r ≤2	HA: r>2	0.710622	158.4997*	40.07757	0.0000
H0: r ≤3	HA:r>3	0.675383	112.6189*	33.87687	0.0000
H0: r ≤4	HA: r>4	0.565559	70.98987*	27.58434	0.0001
H0: r ≤5	HA:r>5	0.473969	40.14317*	21.13162	0.0023
H0: r ≤6	HA:r>6	0.292468	16.73452*	14.26460	0.0368
H0: r ≤7	HA:r>7	0.092064	3.573521	3.841466	0.0587

Maximal Eigen static test

Null hypothesis	Alternative hypothesis	Eigen value	Max-Eigen static	0.05 critical value	Prob**
H0:r=0	HA:r=1	0.92572 0	96.19677*	52.36261	0.0000
H0:r=1	HA:r=2	0.86210 7	73.30721*	46.23142	0.0000
H0:r=2	HA:r=3	0.71062	45.88074*	40.07757	0.0100
H0:r=3	HA:r=4	0.67538 3	41.62904*	33.87687	0.0049
H0:r=4	HA:r=5	0.56555 0	30.84670*	27.58434	0.0184
H0: r=5	HA:r=6	0.47396 0	23.76865*	21.13162	0.0208
H0:r=6	HA: r=7	0.29246 8	12.80100	14.26460	0.0840
H0:r=7	HA:r=8	0.092064	3.573521	3.841466	0.0587

Source: own computation using eviews. The co integrating equations are significant at 5%

Both the trace and maximal Eigen value test statics indicate that the existence of co integrating relationships. This result is an indication of the existence of significant long- run relationship between the real private investment with real physical infrastructure investment, real gross domestic product, gross domestic saving, trade openness and real social infrastructure investment and consumer price index.

Vector Error Correction Model

VECM captures both the long run and the short run dynamics relationship. While the change in the given

variable from its short run effect represents a variation in the short run, the coefficient of the error correction term captures the speed of adjustment towards the long-run relationship of variables, Tadesse (2011)

Long Run Dynamics of Real Private Investment

As discussed in the co integration test, the Johansen trace and maximal statistics indicated that there are co-integrating vectors. Since the objective of this section is examining the impact of real public investment, real gross domestic credit, real gross domestic saving, trade openness, real effective exchange rate and economic growth on the real private investment long run equilibrium relation should be estimated

Table 3 Long run relationship when real private investment is a dependent variable

Variable	Coefficient	t-statics
LRPII	2.004179 *	**[1.765449]**
LOPN	0.126432*	**[-2.55123]**
LRGDS	0.058905	**[-1.82323]**
LRGDBC	0.069881*	**[-2.15562]**
LRGDP	1.455331*	**[14.2198]**
LRSII	0.420696*	**[-6.76843]**
LCPI	-0.372054*	**[-11.1179]**
C	**20.78778**	

Parenthesis refers to t-statics and * refers to significance at 5% Source: own computation based on Eviews

The result of the single long-run relationship after estimating the unrestricted co integrating vector with ad-hoc normalization on LRPIV is (with t-value in parenthesis)

$$LRPRI=20.78778+2.004179LRPII+0.126432LOPN+0.058905LGRDS+1.455331LRGDP+\ 0.420696LRSII\ -0.372054LCPI+\varepsilon$$

After following the Johnson normalization procedure, the estimated coefficient of the long run relationship for each determinant are explained as follows.

The long-run impact of real physical infrastructure investment on real private investment is found to be positive and statically significant that indicate crowding in effect in the long run on the real private investment and thus, have complementary than competitive role. This finding asserts that public investment in the form of physical infrastructures such as power sector, communication sector, airport activities, and electricity has a positive and significant impact on the growth of private investment in Ethiopia. For 1 percentage increase in real physical infrastructure investment will lead to 2.004 percentage increases in the real private investment in the long run.

The long-run impact of real social infrastructure investment on real private investment is found to be positive and statically significant .The value of real social infrastructure investment indicate that it has crowding in effect in the long run on the real private investment and thus have complementary than crowding out effect. This finding asserts that public investment in the form of social infrastructures such as education and health sector has a positive and significant impact on the growth of private investment in Ethiopia. For 1 percentage increase in real social infrastructure investment will lead to 0.4206 percentage increases in the real private investment in the long run..

The long-run impact of economic growth (real GDP) on private investment is found to be positive and statistically significant. Which means that a 1-percentage-point increases in real economic growth (real GDP) increase private investment by 0.73 percentage points in the long run? Theoretically, the result can be supported by accelerator model which assumes that investment as a linear proportion of changes in output. moreover the finding of Adugna (2013), Augustine (2014) ,Hailu and Debele (2015) , Jalloh (2002) ,Kaputo (2011) and Quattra (2004) shows the positive and significant impact of real gross domestic product (economic growth) in the growth of real private investment in the long run .Economic growth can serve as source of increase in aggregate and effective demand thus motivate firms to invest more due to higher sales volume and profitability .

The long run impacts of real gross domestic credit on the growth of real private investment is positive and significant implies that for 1 percentage increase in real domestic bank credit to the private investor will raise real private investment by 0.0698 percentage which implies that credit has a positive and significant role to play in the growth fortune of private investment. This finding is consistent with the finding of Kaputo (2011), Ogunbayo (2014), Mbaye (2014) and Ouattara (2004) which revealed the significant and positive impact of real gross domestic credit to promote the growth of real private investment in the long run. The long-run impact of trade openness on private investment is found to be positive and statistically significant, which means that a 1-percentage-point increase in trade openness increases private investment by 0.1264 percentage points in the long run. This finding is in line with the sound theoretical argument that trade openness promotes the growth of private investment by enhancing the efficiency of investments (either through the capacity to more fully employ an investment or by enriching the competitiveness of the market place), restraints on the potential capacity of an economy are relaxed so as to diversify export capacity and promote international competition by fostering

competition in the market for inputs (both in acquiring low-cost or more appropriate inputs from a broader market and by permitting international competition for the most efficient or most appropriate form of domestic governance structures), investments are freed to realize their greatest potential.

This result is consistent with the findings Sisay (2010), Taddesse (2011) and Aysan et al. (2006) in which it was found that trade openness affects private investment positively in the long run This finding indicates that international integration is a beneficial strategy for growth in the long- term. According to the World Bank (1993), the positive contribution of trade openness to growth stemmed from the notion that liberalization increases specialization and the division of labor, thus improving productivity and export capability, as well as economic performance. According to the World Bank (1993), the economies of countries with greater relative trade openness out performed those of less-opened countries. Narr- Idar et al (2012) which revealed the significant long- run impact of trade openness on the growth of real private investment.

The long run impact of inflation as measured by consumer price index has a negative and significant impact on the real private investment. A 1 percentage change in the inflation as measured by consumer price index will lead to 0.372 percentage reduction in the real private investment. This result indicate the negative role of macroeconomic instability in the growth endeavor of private investment sector .The existence of severe inflation leads to the instability of macroeconomic environment and thus reduces motivation to invest and leads to uncertainty in the investment decision by the firms. The findings of Getechew, (1997), Adugna (2013) and Alamenew (2015), Worke (2013) and Zerfu (2013) asserts the negative role of inflation in the private investment fortune.

Short-Run Dynamics of Real Private Investment Model

Once the existence of long-run relationship was checked and the appropriate parameters are determined, the next step is estimating the coefficients of the short- term dynamics of the private investment model. In order to capture the short-run dynamics of the model, error correction mechanism was applied. The estimated VECM provides the correction terms that reflect influences of deviation of the relationship among the variables from long-run equilibrium and short-run parameters. The coefficients of the two periods lagged differences in the table can be interpreted as the short- run parameters representing the short-run impact of the explanatory variable upon the dependent variable

Table 6: Short run coefficient when dependent variable is RPRI

SHORT RUN DYANMICS OF THE VARIABLES			
Variable	**Coefficient**		**t-static**
ECMI(-1)	-0.534885*		[-2.05316]*
D(RSII) (-1)	0.420696*		[-6.76843]*
D(RSII) (-2)	-0.234521		[-0.743330]
D(RPII) (-2)	2.004179 *		[1.765449]
D(RPII)(-2)	-0.014716		[-0.053153]
D(OPN(-1)	0.126432*		[-2.55123]*
D(OPN(-2)	0.082461		[0.696728]
D(CPI(-1)	0.372054*		[-11.1179]*
D(CPI(-2)	0.036115		[0.144992]
D(RGDS(-1)	0.058905		[-1.82323]
D(RGDS(-2)	0.629369		[0.577471]
D(RDBC(-1)	0.069881*		[-2.15562]*
D(RDBC(-2)	0.027364		[0.492313]
D(RGDP(-1)	-1.455331*		[14.2198]*
D(RGDP(-2)	0.730958		[-2.3271941*
R-squared (R^2)	0.750125	Mean dependent variable	0.045257
Adjusted R-squared	0.526553	S.D. dependent variable	0.104339
S.E. of regression	0.071793	Akaike info criterion	-2.123557
Sum squared residual	0.097931	Schwarz criterion	-1.339867
Log likelihood	57.28581	Hannan-Quinn	-1.847270
F-statistic	3.355183	Durbin-Watson stat	2.063517
Prob (F-statistic)	0.006339		
Serial correlation LM test	Prob.F(2,17)= 0.3718	Heteroskedasticity Test:	Prob.F(24,12)=0.937 5

* refers to significance at 5% Source: own computation using Eviews

The coefficient of the error correcting term of the real private investment has the expected negative sign and magnitude implying it is error correcting. The result indicates that 53 % of adjustment will take place at each period to the long-run equilibrium, which requires a period of 1.5 years to have full adjustment towards long-run equilibrium. The error correction term is also significant at 10 % level.

The short-run coefficient of the real gross domestic product is positive and significant at 5% implying that economic growth has the significant role in promoting real private investment in the short run in Ethiopia. For 1 percentage increase in economic growth, real private investment will raise by 0.739 percentages in the short run .Finally, the short-run coefficient of real gross domestic credit as positive sign implies that real domestic bank credith as the positive effect.

The coefficient of determination (R-squared) is high explaining that about 75.125 % of variation in the real private investment is attributed to variations in the explanatory variables in the model. In addition, the DW statistic does not suggest autocorrelation and the F-statistic is quite robust.

In the study, different post-estimation diagnostic tests were performed to guarantee that the residuals from the model are Gaussian that the assumptions are not violated and the estimation results and inferences are trustworthy.

Residual vector normality test

Normality is checked mainly by using the Jarque-Bera test. The result shows that the residual vector of the model is found to be individually and jointly normal. This may suggest that the results from this regression have strong power. The null hypothesis for normality of the residual states that the residual of the model is normally distributed and the alternative hypothesis is the residual is not normally distributed.

Table 7 Residual Normality Test

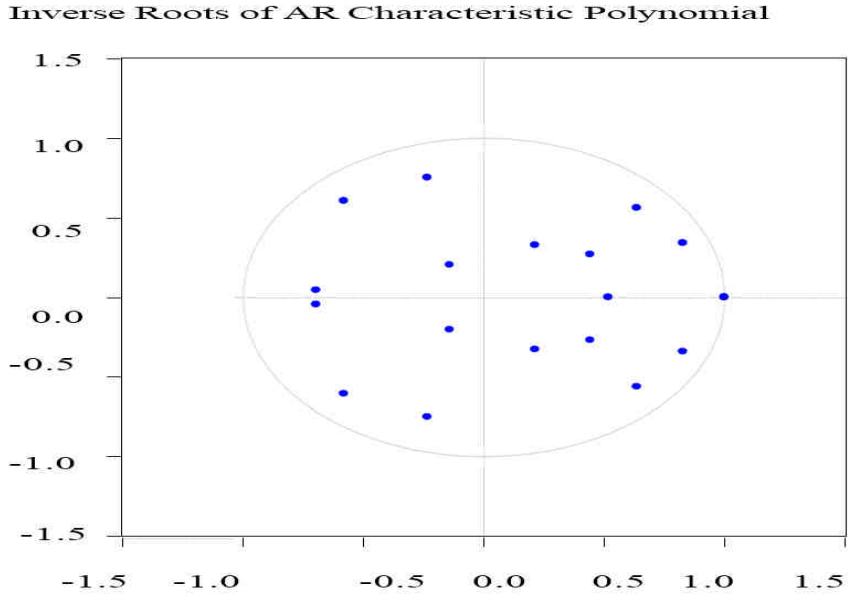
Component	Jarque-Bera	df	Prob.
1	2.112582	2	**0.3477**
2	0.159925	2	**0.9232**
3	1.122516	2	**0.5705**
4	0.327649	2	**0.8489**
5	0.974533	2	**0.6143**
6	1.095272	2	**0.5783**
7	0.420914	2	**0.8102**
Joint	**6.213390**	**14**	**0.9608**

Source: own computation based on eviews the p-value became significant at 10 %

As the result of the Jarque- Bera test statics indicate that there is no reason to reject the null hypothesis which says that the residuals are normally distributed for the reason that the p-value associated with the Jarque – Bera normality test is larger than the standard significance level i.e. 0.9608 > 0.05.

Model Stability Test

Since all the value of the roots of characteristic polynomial lie inside the unit circle and the characteristic root for entire model is less than one, it confirmed the stability of the model.



Source: own computation using Eviews

Residual Vector Serial Correlation LM Test

Table 8 shows that there is no evidence that reveals the presence of autocorrelation from the first through the second lags. The large p-values imply that the chi-squared statistics at all lags are not large enough to help reject the null of no autocorrelation at any of the usual critical values. Thus, the study could not find any evidence of autocorrelation problem in the residual since the p- value of the residual is greater than 0.05 i.e. (0.3718 >0.05)

Table 8 Breusch-Godfrey Serial Correlation LM Test:

F-statistic	**1.049379**	**Prob. F(2,17)**	**0.3718**
Obs*R-squared	**4.065921**	**Prob. Chi-Square(2)**	**0.1309**

Residual Heteroskedasticity Test

The test for residual heteroskedasticity involves testing whether the residual variance is homosedastic or not according to the result of the test statics there is no enough evidence to help reject the null of no heteroskedasticity. Since the p-value of the residual is greater than the 5% (0.9375 > 0.05) we accept the null hypothesis which state the homoscedasticity, Therefore, the residuals of the model are found to be homosedastic. This, together with the results of the other pre and post estimation diagnostic tests, suggests the validity and robustness of the estimated results.

Table 9 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	**0.483159**	**Prob. F(24,12)**	**0.9375**
Obs*R-squared	18.18310	Prob. Chi-Square(24)	**0.7940**
Scaled explained SS	**5.533718**	**Prob. Chi-Square(24)**	**1.0000**

Source: own computation using Eviews software.

As the above table indicate that he p–value of the residual is greater than 5 % implies the residual of the model is homoscedastic.Since the p-value associated with the test statics is greater than the significance level i.e. 0.7940>0.05.

4. CONCLUSION AND POLICY IMPLICATION

4.1. Conclusion

The findings indicate that public investment made in real physical infrastructure investment such as road , railway , telecommunication and electricity and investment in social infrastructure such as health and education is found have positive significant impact in the long run implying the crowding in effect and it is found to have crowding out effect in the short run.

According to the regression analysis Trade openness is found to have the positive and significant contribution in the growth endeavor of private investment in the long run. However it is found to have negative effect the short run due to the existence of infant industries that couldn't withstand competition from the foreign developed industries. The impacts of economic growth in the private investment are found to be positive and significant in the short run as well as in the long run which implies that economic growth is crucial to the growth of private investment which addresses the need to enhance further the growth of the economy. The result confirm the validity of the accelerator principle that suggest the quantity of domestic output should be expanded as it will increase the profitability of firms, especially those that produce tradable goods. Inflation as measured by consumer price index has a negative role in promoting private investment in the short run as well as in the long run; which implies that macroeconomic instability is not conducive for the growth of private investment.

4.2. Policy implication

It is possible to provide the following relevant policy recommendation to enhance the growth of private investment in Ethiopia .Given the significant role of real physical infrastructure investment and real social infrastructure in promoting the private investment in Ethiopia in the long run the government should promote the well-functioning and distribution of public sector investment in a manner that maintains complementarily than the competition.

There should be the need to design and implement informed trade policies that encourage the growth of domestic industry. Thus to realize the long -run positive effect of real private investment, the government of Ethiopia should take supplementary reforms that will improve the country's poor investment climate such as poor infrastructure, particularly, power shortage; poor transport; poor telecom connectivity of business locations and lack of efficient tax administration. Thus, the study calls for the government intervention in improving the investment climate in a way that promotes private sector development, in supportive of entrepreneurial endeavor and with a bias towards exportable products and the expansion of business activities.

REFERENCE

Alemnesh Tadesse (2012). The Nexuses between Public Investment, Private Investment, Trade Openness, and Economic Growth in Ethiopian: Co-integrated VAR Approach. Addis Ababa University, School of

Graduate Studies.
Asante, Y. (2000). "Determinants of Private Investment Behavior." AERC Research Paper No. 100, Nairobi: AERC.
Aschauer, D. (2000). "Public Capital and Economic Growth: Issues of Quantity, Finance and Efficiency." Economic Development and Cultural Change 48(2): 391–406.
Badawi, A. (2005). Private Capital Formation and Macroeconomic Policies in Sudan: An Application of a Simple Co-integrated Vector Auto-Regressive Model. Institute for Development Policy and Management (IDPM), University of Manchester.
Daniel Zerfu (2006). Determinants of private investment in Ethiopia‖ A paper prepared for the Conference on Development Policy in Africa: Public and Private Perspectives Oxford University, Center for the Study of African Economies, 29-31
Ghura, Dhaneshwar (1997). Private investment and Endogenous Growth: Evidence from Cameroon, IMF working paper 97/165 (Washington: International Monetary Fund).
Greene, Joshua, and Delano Villanueva. (1991). Private investment in developing countries: An empirical analysis IMF Staff Paper 38 (1): 33-58.
Hall, R.E., and Jones, C.I., (1999). "Why Do Some Countries Produce So Much Output per Worker than others?" Quarterly Journal of Economics 114 (1): 83-116.
Hashim (2012) Why Do Some Countries Produce So Much Output per Worker than others?" Quarterly Journal of Economics114 (1): 83-116.
Khan, M. (1996).Government Investment and Economic Growth in the Developing World, Pakistan Development Review, 35, 4, 419-39.
Quattara, B., (2005). "Modeling the Long Run Determinants of Private Investment in Senegal." Research Paper, Centre for Research in Economic Development and International Trade, University of Nottingham, No. 04