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Modeling the Determinants of Domestic Private Investment in Ethiopia

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Abstract

The study examined the determinants of domestic private investment in Ethiopia using a time series data over the period 1992-2010. The study employed an Autoregressive Distributed Lag (ARDL) model and applied the bounds test approach in modeling the long run determinants of domestic private investment. The study found exchange rate, domestic saving and domestic credit as key factors having negative and significant impact on domestic private investment. External debt and government expenditure are found to have significant and positive effect on domestic private investment. The results imply that government expenditure stimulates domestic private investment while domestic credit and domestic saving have a constrained effect on the sector.

Key words

Domestic private investment, Ethiopia, bounds test approach, determinants, Autoregressive Distributed Lag Model.

Introduction

During the Dergue Regime (1974-1991), Ethiopia's private sector hardly existed. The socialist regime provided little rooms for the private sector to flourish until the period it vanished in 1991. Following the fall of the Dergue regime in 1991, a shift in policy from command economy to free market economy was introduced in the country. This shift has opened opportunities for the private sector to have an active role in various sectors of the country's economy. Since then, a lot of efforts have been exerted and various forms of incentive packages have been provided by the government to encourage domestic private investment in the country. Despite the incentives taken by the government, the sector's contribution towards the economy of the country has remained very poor by international standards, even when compared with Sub-Saharan countries (WB, 2004)

The trend of domestic private investment as a percentage of gross domestic products (GDP) is a good evidence of how low the sector's contribution to the economy is. For instance, from 1992-2000 and 2001-2010 domestic private investment as a percentage of GDP were 2.6 and 1.2 respectively. Particularly, in the last five years domestic investment has been reduced though the country's economy was growing continuously. For instance, from 2006-2010 the average domestic investment as percentage of GDP was only 0.5% while average economic growth for the same period was about 11%. Similarly while the country's domestic private investment to GDP is low, the resource gap between savings and domestic investment is very high. For instance, the resource gap between savings and investment in 2009/10 was 19.4 % which is very high in comparison to the international standard (FDRE, 2010; Gillis, Perkins, Roemer, & Snodgrass, 1987). Understanding this problem, the government has prepared a strategy document namely Growth and Transformation Plan (GTP) in 2010 that addresses many issues of the country including domestic investment and its constraints as one agenda(FDRE, 2010). Low per capita income of citizens, limited saving behavior, poor and limited financial institutions and lack of infrastructure are some of the factors identified by the government in its GTP as bottlenecks to the country's domestic private investment

Therefore, this is one factor that motivated us to identify the determinants that may help policy makers. Second, there is no uniformity on empirical

evidences on the determinants of domestic private investment across studies. i.e., there is variation on the empirical studies from country to country as well as from region to region. So the result of this study may contribute to the existing theory. Third, in estimating the investment function, we use the recent advance in time-series econometrics, that shows the co-integration relationship of the variables.

Hence, the objective of this study is modeling determinant factors of the domestic private investment in Ethiopia. To analyze the determinants, Auto-Regressive Distributed Lag (ARDL) model has been used. To model the long run determinants Pesaran, et al., (2001) bounds test approach has been employed.

Materials and Methods

Theoretical and empirical evidences of the variables

We use domestic private investment as dependent variable and nine explanatory variables. The explanatory variables that may affect to decision making of domestic private investment in the literatures are very wide and only variables having sound theoretical explanations and complete data are selected. In this section we attempt to describe the theoretical explanations and empirical evidences of the explanatory variables selected for this study.

Real GDP growth rate is one of the most commonly variable used as explanatory variable to measure its effect on domestic private investment. Some literatures such as Fielding (1997), Serven and Solimano (1992) and Greene and Villanueva (1991) explained that private investment is positively related with real GDP growth of one country. This is because countries with higher income level inclined to allocate more of their wealth to domestic savings which could be then used to help in financing private investment. Empirical results such as Ajide and Lawanson (2012) from Nigeria, Outtara (2004) from Senagal and Asante (2000) from Gahana have evidenced that real GDP growth rate helps domestic private investment. Ghura and Goodwin (2000) on their part revealed that real GDP growth has stimulating effect on private investment in Asia and Latin America though its effect in Sub Sahara Africa was found insignificant. But Ndikumana and Verick (2008) found the positive and significant relationship in Sub-Sahara Africa(SSA) which contradicts the findings of Ghura and Goodwin (2000).

Inflation is the second variable that we use in the study as a proxy to measure macroeconomic stability of the country. There is no uniformity on the theoretical explanation of the variable and its effect on domestic private investment. Some models such as the cash-in-advance models (e.g. Stockman, 1981) forwarded that inflation raises the cost of acquiring capital which then lowers capital accumulation. This model further states that the existence of high inflation may make it difficult and costly for economic agents to extort the right relative price which could then lead to misallocation and inefficient resources. However, other models like the Tobin-Mundell model argues that higher anticipated inflation lowers the real interest rate which then causes to be made portfolio adjustments away from real money balances to real capital which then expected higher inflation to raise real investment (Ghura & Goodwin, 2000). Empirical studies such as Bakare (2011), Ndikumana (2000), and Asante (2000) reported that inflation has a negative effect to private investment.

Real exchange rate, another explanatory variable, is also used as a proxy to measure macroeconomic stability. In most literatures the effect of real exchange rate, either devaluation or appreciation of local currency on domestic investment is ambiguous. Branson (1986) and Buffie (1986) discussed that a real depreciation of local currency increases the real cost of new capital goods relative to domestic goods which then depress the investment in non-tradable activities. Jongwanich & Kohpaiboon (2008) on their part described that depreciation of the exchange rate could lower the real income and wealth of citizens and then could reduce the aggregate demand which in turn reduce private investment. Jongwanich & Kohpaiboon (2008) from Thailand, Ndikumana & Verick (2008) from Sub-Sahara Africa (SSA) found a significant negative relationship though Asante (2000) from Gahana reported positive relationship.

To measure whether the country's domestic private investment is constrained by debt overhang or not, we use external debt stock as a percentage of GDP as one explanatory variable. It is almost agreed that a county that have large external debt have a strong discouraging impact on private investment (Borensztein, 1990; Faruqee, 1992). Borensztein (1990) described that the presence of high

debt ratios to GDP leads economic agents to anticipate future tax liabilities for its servicing which may have negative effect on domestic investment. Empirical evidences like Ghura and Goodwin (2000), and Ndikumana (2000) revealed the positive relationship between external debt stock and domestic private investment.

Gross domestic saving as a percentage of GDP is another important explanatory variable included to see its effect on domestic private investment. Saving behaviors of individuals are determined by different factors like income, growth of income, expectation of future income, interest rate, population (workforces and dependence), liquidity constraint, and inflation (Jongwanich 2010; Loayza, Schmidt-Hebbel, & Serve´n, 2000). Unlike its theoretical explanations, the empirical results of previous studies are not the same. For instance, Giannone and Lenza (2008) reported the existence of high correlation between saving and investment in members of Organisation for Economic Co-operation and Development (OECD) countries; while Vamvakidis and Wacziarg (1998) evidenced the insignificance of the variable in non OECD countries.

To examine the relationship between financial development and private investment, we used domestic credit to private sector as a percentage of GDP as a proxy. Theoretically, it seems plausible that the effect of giving more credit to the private sector encourages domestic investment. As Serven & Solimano (1992) described most private investors' source of income for investment in developing world is credit and thus, the existence of low financial services in such countries may affect the private sector negatively. Unlike the theoretical explanations, most empirical studies like Jongwanich and Kohpaiboon (2008), Ouattara (2004) and Ghura and Goodwin (2000) evidenced the negative relationship of the variable. Nevertheless, studies like Ajide and Lawanson (2012), and Asante (2000) confirmed the positive relationship of the variable with domestic private investment.

We also used government expenditure as a percentage of GDP to see whether it has a crowding-in or crowding-out effect on domestic investment of the country. Theoretically there is an ambiguous and divided argument on the effect of government expenditure on private investment. Literatures like that of Aschauer (1989), Blejer and Khan (1984), and Greene and Villanueva (1991) described that if government expenditure is spent in provision of infrastructures like communication, energy, transport, health, and educational services, it complements the private investment. But there is also a possibility of private investment to be crowd-out by government expenditure if the latter competes with the private sector, or if government expenditure is financed by a deficit (Rossiter, 2002). Like the theoretical arguments, empirical evidences on the topic also do not show uniformity. Some empirical studies like Ajide and Lawanson (2012) and Acosta and Loza (2005) revealed that government expenditure has a crowd-out effect in Nigeria and Argentina respectively. On the other hand empirical evidences such as Greene & Villanueva (1991) and Aschauer (1989) reported a complementary relationship.

Foreign direct investment as a percentage of GDP is also used as one explanatory variable to see whether it has positive impact in promoting domestic private investment of the country. Since the 1990s FDI inflow to Africa has been increasing (Ndikumana & Verick, 2008; UNCTAD, 2008). Similarly the FDI inflow to Ethiopia has been rising in the last decade though not consistent. In the literatures the impact of FDI on domestic private investment is still debatable whether it has crowds-in or crowds-out effect. For instance, the findings of Mutenyo, Asmah and Kalio (2010) from Sub-Sahara Africa and Misun & Tomsik (2002) from Poland showed FDI crowds-out domestic private investment. On the other hand studies like Ndikumana & Verick (2008) from Sub-Sahara Africa and Misun & Tomsik (2002) reported the positive effect of FDI on domestic investment. Lastly we used gross fixed capital formation a percentage of GDP to see the role of infrastructure on domestic investment of the country. Though there are not sufficient empirical evidences on the role of gross fixed capital formation, there is plausible theoretical explanation on the positive role of gross fixed capital formation in promoting domestic investment of developing countries.

Model specification

As we discuss in the above section, the theoretical and empirical evidences suggest that there is no one model that specify the determinants of domestic private investment. Models such as Keynesian, neoclassical and neo-liberal alone cannot determine the domestic private investment. Hence, we use an eclectic time series model that was adopted by Asante (2000) which is also applied by previous studies like Ajide and Lawanson (2012) and Acosta & Loza (2005).

The theoretical explanations and previous empirical evidences suggest that past performance of the independent variable (DMPI) affects the current or past performance of the explanatory variables. Hence, the nature of the model that we use is an Autoregressive Distributive Lag Model (ARDL). To regress the determinants we have used Stata 12 and to identify the long-run determinates we apply Pesaran, et al. (2001) bounds testing approach since this approach has some econometric advantages over other approaches. Some of the advantages of this approach are: first, tests can be conducted whether they are purely co-integrated at (I(0)), (I(1)) or mutually co-integrated (Pesaran, et al., 2001, p. 290). Second, it reduces serial correlation and endogeneity problems. Third, in small sample properties (like our study), using ARDL bound test has the ability to minimize deficiencies related with a mixture of different integration levels. Fourth, ARDL bound test approach estimate the long and short-run parameters of the model simultaneously and empirical results can be estimated using Ordinary Least Squared (OLS). Therefore, we specify the general ARDL model as follows:

$$Y_t = \alpha + \sum_{i=0}^{p} B_i\, Y_{t-1-i} + \sum_{i=0}^{p} B_j\, X_{i,t-i} + \mu_t \qquad (1)$$

Where, α is a constant, Y_t is endogenous variable, $X_{i,t}$ is the i th explanatory variables, p is the maximum lag number to be used, B_i and B_j are parameters, and μ_t is the white noise error. So when we apply the variables in to equation (1), the function becomes in the form of:

$$\begin{aligned} \ln DMPI_t = {} & \alpha_0 + \sum_{i=0}^{p} \beta_1 \ln DMPI_{t-1-i} + \sum_{i=0}^{p} \beta_2 GDP_{t-i} + \sum_{i=0}^{p} \beta_3 INFL_{t-i} \\ & + \sum_{i=0}^{p} \beta_4 \ln ERT_{t-i} + \sum_{i=0}^{p} \beta_5 \ln EDBT_{t-i} + \sum_{i=0}^{p} \beta_6 \ln GDSG_{t-i} \\ & + \sum_{i=0}^{p} \beta_7 \ln GFCF_{t-i} + \sum_{i=0}^{p} \beta_8 \ln DCPR_{t-i} + \sum_{i=0}^{p} \beta_9 \ln GOE_{t-i} \\ & + \sum_{i=0}^{p} \beta_{10} \ln FDI_{t-i} + \mu_t \end{aligned} \qquad (2)$$

Where:

ln is a natural logarithm that we include to reduce hetroskedacity. DMPI is domestic private investment as a percentage of GDP. GDP is real GDP growth rate annual in (%). INFL represents annual inflation rate in %, GDP deflator. ERT is real exchange rate, local currency unit per US Dollar, period average. EDBT is external debt stock as a percentage of GDP. GDSG is gross domestic saving as a percentage of GDP. GFCF is gross fixed capital formation as a percentage of GDP. DCPR is domestic credit to private sector as a percentage of GDP. GOE is general government total expenditure as a percentage of GDP, and FDI is net foreign direct investment as a percentage of GDP.

According to Pesaran, et al. (2001) the dependent variable must be (I(1)) , but the explanatory variables can be either (I(0)) or (I(1)). Hence, equation (2) can be reformulated in terms of differences and lagged levels. In addition, to separate the short-run and long-run multipliers of the model, we add vector error correction model (VECM). Therefore, the error correction version of the ARDL model is.

$$\begin{aligned} \Delta \ln DMPI_t = {} & \alpha + \sum_{i=1}^{p} \beta_1\, \Delta \ln DMPI_{t-i} + \sum_{i=0}^{p} \beta_2\, \Delta GDP_{t-i} + \sum_{i=0}^{p} \beta_3\, \Delta INFL_{t-i} \\ & + \sum_{i=0}^{p} \beta_4\, \Delta \ln ERT_{t-i} + \sum_{i=0}^{p} \beta_5\, \Delta \ln EDBT_{t-i} + \sum_{i=0}^{p} \beta_6\, \Delta \ln GDSG_{t-i} \\ & + \sum_{i=0}^{p} \beta_7\, \Delta \ln GFCF_{t-i} + \sum_{i=0}^{p} \beta_8\, \Delta \ln DCPR_{t-i} + \sum_{i=0}^{p} \beta_9\, \Delta \ln GOE_{t-i} \\ & + \sum_{i=0}^{p} \beta_{10}\, \Delta \ln FDI_{t-i} + \lambda_1 \ln DMPI_{t-1} + \lambda_2 GDP_{t-1} + \lambda_3 INFL_{t-1} \\ & + \lambda_4 \ln ERT_{t-1} + \lambda_5 \ln EDBT_{t-1} + \lambda_6 \ln GDSG_{t-1} + \lambda_7 \ln GFCF_{t-1} \\ & + \lambda_8 \ln DCPR_{t-1} + \lambda_9 \ln GOE_{t-1} + \lambda_{10} \ln FDI_{t-1} + \gamma ECM_{t-1} + \mu_t \end{aligned} \qquad (3)$$

Where:

Δ is the first difference of a variable; $\beta_1 \ldots \beta_9$ represent the short-run coefficients; $\lambda_1 \ldots \lambda_9$, represent to the long-run coefficients; ECM correspond to error correction model, and γ represents the speed of adjustment process of the ECM. The coefficient of the lagged error correction model is expected to be negative and statistically significant to support further the existence of a co-integrating relationship.

In time series data, trends in the data can lead to spurious (false) regressions due to the stationarity problem of the data. i.e., time series data have a time varying mean or a time varying variance of the residuals (Wooldridge, 2011). The null hypothesis to test the stationarity is, the time series data have a unit root and the alternative hypothesis is it has no unit roots or has less than one, i.e. if the critical statistic in absolute value is greater than the t value, we reject the null hypothesis and if it is less than one we accept the null hypothesis. Since the model we specify is

an Autoregressive Distributive Lag Model (ARDL), we apply Augmented Dickey– Fuller (ADF) test to test stationarity of the time series data.

After conducting the stationarity test, we use Pesaran, et al. (2001) bounds testing approach, in modeling the long run determinants of domestic private investment between the dependent variable and the explanatory variables, According to Pesaran, et al. (2001), the bound test assumes that if the F-statistic lies above the upper-bound of critical value for a given significance level, we conclude that there is a non-spurious long-run level relationship of the explanatory variables with the dependent variable. On the other side, if the F-statistic lies below the critical value of the lower bound, we can conclude that there is no long-run level relationship between the explanatory variables with the dependent variable. Nevertheless, if it lies in-between the lower and the upper limits, there is inconclusive result. To compute the Wald test (F-statistics), we restrict the long-run coefficient and apply the OLS. The computed F-statistic is evaluated with the critical values tabulated in Table CI (iii) of Pesaran, et al. (2001, p. 300). The general hypothesis of the co-integration is as follows:

$$H_0: \lambda_{GDP} = \lambda_{INFL} = \lambda_{ERT} = \lambda_{EDB} = \lambda_{GDSG} = \lambda_{GFCF} = \lambda_{DCPR} = \lambda_{GOE} = \lambda_{FDI} = 0$$

Against

$$H_a: \lambda_{GDP} \neq \lambda_{INFL} \neq \lambda_{ERT} \neq \lambda_{EDBT} \neq \lambda_{GDSG} \neq \lambda_{GFCF} \neq \lambda_{DCPR} \neq \lambda_{GOE} \neq \lambda_{FDI} \neq 0$$

After we indentify the co-integration level between variables from the above bound test, we conduct the long-run as well as short-run relationship between the variables. To estimate the long run elasticity we divided the coefficient of one lagged explanatory variable (multiplied by a negative sign) to the coefficient of one lagged dependent variable (Bardsen, 1989).

Data source

For analyzing the data we used secondary data from National Bank of Ethiopia (NBE) and World Bank's, World Development Indicators (WDI) data sets. The time period of the data covers from 1992-2010. The data for domestic investment is taken from National Bank of Ethiopia since there is no data about this in the World Bank development indicators. Since the data about domestic investment is stated in Birr (the local currency), we have converted in to US Dollar using year 2000 average exchange rate (1US Dollar = 8.3Eth Birr) approximately.

Results and discussions

Results of the ADF unit roots are reported in Table 2. As we can see results of unit root tests from Table 2, domestic private investment(DMPI), real GDP growth(GDP), inflation (INFLN), exchange rate (ERT), gross fixed capital formation (GFCF), and domestic credit given to private sector (DCPR) are co-integrated at (I(0)). Domestic credit given to private sector (DCPR) is integrated at (I(1)). The remaining variables; gross domestic saving (GDSG), government expenditure (GOE), and foreign direct investment (FDI) co-integrated

Variables	Obs	Mean	Std.Dev.	Min	Max
100*(DMPI /GDP)	19	1.879427	1.61105	0.11298	7.42115
GDP(%)	19	6.42	6.20571	-8.67	13.57
INFL(%)	19	8.456679	9.335458	-5.75464	30.3125
ERT	19	8.007406	2.49576	2.8025	14.4096
100*(EDBT/GDP)	19	73.91147	44.54272	10.7981	148.295
100*(GDSG/GDP)	19	7.332305	4.066607	0.408	13.5138
100*(GFCF/GDP)	19	21.31984	3.25714	14.3586	28.1283
100*(DCPR/GDP)	19	17.79081	5.474746	6.1546	24.5599
100*(GOE/GDP)	19	20.44879	4.015596	13.472	27.018
100*(FDI/GDP)	19	1.95343	1.833744	0.0012058	5.434666

Note: These are raw data before transformations
Source: own processing

Table 1: Descriptive Statistics of Main Regression Variables (1992-2010).

Variables	t-statistics for level without time trend	t-statistics for level with time trend	t-statistics for first differnce
DMPI	-3.218 **I(0)	-5.469 ***I(0)	-8.556 *** I(0)
GDP	-4.895 ***I(0)	-5.062 *** I(0)	-7.123*** I(0)
INFL	-3.604**I(0)	-4.065** I(0)	-6.643 *** I(0)
ERT	-3.276 **I(0)	-5.650*** I(0)	-7.435***I(0)
EDBT	-0.798 I(0)	-4.258**I(0)	-3.794*** I(0)
GDSG	-0.390 I(1)	-2.648 I(1)	-5.560*** I(0)
GFCF	-2.708 *I(0)	-4.558 *** I(0)	-6.934*** I(0)
DCPR	2.968*(1)	-1.990 I(1)	-3.757*** I(0)
GOE	-2.22 I(1)	-1.381(1)	-3.699***I(0)
FDI	-1.859 (1)	-1.484 (1)	-4.914***(0)

Notes: ***, **, and * denote the rejection of the null Hypothesis for unit root at 1%, 5% and 10% level of significance, respectively. Numbers in parentheses are lagged differences.
Source: own processing

Table 2: Augmented Dickey–Fuller test for unit roots (1992–2010).

neither at (I(0)) nor at (I(1)) even including the time trend. After we differenced, all variables have become stationary at the same order of integration, (I(0)).

We described the result of the co-integration test in Table 3. First we find the value of Johansen tests for co-integration rank. The computed F-statistic is 3.54 which show above the upper bound critical value at 10% significant level. So we have enough evidence to reject the null hypothesis. This implies that there exists a long-run equilibrium relationship between domestic private investment and the explanatory variables.

Critical values	Lower bound (K=5)	Upper bound (K=5)
10%	2.26	3.35*
5%	2.62	3.79
1%	3.41	4.68

Notes: Computed F-statistic = 3.54 (significance level at 5% critical value).The critical values are obtained from Pesaran et al., (2001, p.300), Table CI (iii). Case III: unrestricted intercept and no trend.
Source: own processing

Table 3: Bound test result for co-integration analysis.

Regression result of short run error correction model is described in Table (4). Out of the nine explanatory variables, five of them are statistically significant. Exchange rate (EXR) has a negative and significant (at 5%) relationship with domestic private investment both in the short and long run. Gross domestic saving (GDSG) also has as a negative sign and significant (at 10%) relationship both in the short and long-run. Domestic credit given to private sector is found statistically significant at 10% with negative sign only in the long run. Government expenditure has a positive and significant relationship with domestic investment. This variable is statistically significant at 10% in the short run and at 5% in the long-run. External debt is the other variable found significant at 10% with positive sign only in the long run.

Real GDP growth (GDP), inflation (INFL), gross fixed capital formation (GFCF) and foreign direct investment (FDI) are variables that we find statistically insignificant at any conventional level. The one year lagged domestic private investment with positive sign is insignificant which shows past performance of domestic investment is not significant to the current performance of the explanatory variable. Statistically insignificant variables in the short-run like external debt stock (EDBT) and domestic credit to private sector (DCPR) turned to statistically significant in the long run. This may indicate the existence of time lagged effects. The positive sign of gross domestic saving (GDSG) in the short-run turned to negative sign in the long-run. This may indicate the role of error correction model (ECM). The significance of the ECM becomes at 15% which is in line with our expectations. The study finds the coefficient of ECM negative to be 0.3643 and shows that the model predicts 36.43% of the gap to be adjusted in one year. This means it takes longer period if some corrections are to be made by policy makers.

As we see from Table (4), the coefficient attached to the exchange rate (EXR) is negative and significant. This implies that exchange rate is

Variables	Coefficients	Std.Error	T-Ratio	P-value
$\Delta DMPI_{t-1}$	0.2701511	0.3969646	0.68	0.526
ΔGDP_{t-1}	0.0419961	0.0287309	1.46	0.204
ΔINFLt-1	-0.0179319	0.0188029	-0.95	0.384
ΔERT_{t-1}	-5.935117**	1.699632	-3.49	0.017
$\Delta EDBT_{t-1}$	0.5965486	0.5962197	1	0.363
$\Delta GDSG_{t-0}$	.36058*	0.1683251	2.14	0.085
$\Delta GFCF_{t-1}$	2.427484	1.677713	1.45	0.208
$\Delta DCPR_{t-1}$	-1.197818	0.7867628	-1.52	0.188
ΔGOE_{t-1}	2.267804*	1.105005	2.05	0.095
ΔFDI_{t-1}	0.0115136	0.1401598	0.08	0.938
ECM_{t-1}	-0.3642532	0.2003448	-1.82	0.129
Constant	0.2912735	0.1752835	1.66	0.157

Specification Tests

$R^2 = 0.8862$	Adjusted R2 = 0.6360
HETTEST, χ^2 (1) = 0.83 (p-value= 0.3630)	RESET, F (3, 2) = 7.45 (p-value= 0.1206)
VIF (Mean) = 4.06	LM, χ2 (1) = 0.306 (p-value= 0.5800)
B.Godfrey, χ^2 (1) =0.342 (p-value= 0.5584)	D, χ2 (1) =0.082(p-value= 0.7743)

Long run model

lnDMPI = 6.22+0.017(GDP) - 0.018(INFL) - 2.34(lnERT)**+ 0.64(lnEDBT)* - 0.34(lnGDSG)*+ 1.144(lnGFCF) - 0.773(lnDCPR)*+ 2.08(lnGOE)** +0.057(lnFDI)

Note: The level of statistical significance is denoted as *** = at 1%, ** = 5%, * = 10%.
Test Statistics:
HETTEST = Breusch-Pagan test for heteroskedasticity.
RESET = Ramsey regression specification-error test for omitted variables.
VIF = Variance inflation factors for the independent variables.
LM = LM test for autoregressive conditional heteroskedasticity in the residuals.
B.Godfrey = Breusch-Godfrey LM test for autocorrelation.
D= Durbin's alternative test for autocorrelation
Source: own processing

Table 4: OLS regression results of the short run model (ECM) for the years (1992-2010) using ΔlnDMPI as dependent variable.

playing a negative role in promoting domestic investment in the country. The coefficient of the variable tells that appreciating the exchange rate of the local currency (Ethiopian birrr) with America's dollar by 1%, leads to the reduction of domestic private investment in the country by 5.94% and 2.34% in the long and short-run, respectively. The magnitude of the variable reduces in the long run and this may indicate that domestic investment could be encouraged in the long run by depreciating the local currency. This result suggests that high value of the local currency with US Dollar has negative relationship with domestic investment. The finding supports the government's decision that devalues the value of Birr in 2010 by 17 %.

It is theoretically agreed that large external debt discourages domestic private investment (Borensztein, 1990). The positive and significant relationship of the findings seems inconsistent with the theoretical explanations. The magnitude tells that domestic private investment increases by 0.64% when external debt increases by 1%. Previous empirical evidences of Ghura and Goodwin (2000) from Malasia supports our findings.

Gross domestic saving as a percentage of GDP is statistically significant with negative sign. This implies that domestic saving has negative role in encouraging domestic investment of the country. The magnitude of this variable shows that when gross domestic saving increases by 1%, domestic private investment reduces by 0.36% and 0.34% in the short and the long-run respectively. Theoretically higher domestic saving means there is sufficient source of finance for the investors which then lead to higher domestic investment. Contrary to the theory, the findings negative relationship may be related

with the low level of domestic saving. Since gross domestic saving as a percentage has been reducing particularly after 2005.

In the literatures there are different variable (e.g. income, interest rate, population, inflation, etc) that affect domestic saving (Jongwanich 2010; Loayza, et al., 2000). We expect that inflation and large number of dependent population may affect the reduction of saving in the country. After 2005 the rate of inflation in the country has been rising and this may contribute to the reduction of domestic saving though it needs further study (Jongwanich, 2010). According to Jongwanich (2010) large numbers of dependent population also may have a negative effect on saving. According to CSA (2007) Ethiopia's dependency ratio is 0.91 (which mean for every 100 working persons, there are 91 who are nonworking or age group younger than 15 and older than 64 years). We expect this may also add to the reduction of domestic saving. In general the finding suggests that the government has to work more on understanding or realizing why saving is reducing particularly at times of the country's continuous economic growth.

Domestic credit given to private sector is the other variable that we find having a strong negative impact with domestic private investment of the country. Thus, it implies that increasing credit to the private sector does not boost private investment as the theory suggests. Theoretically it is argued that giving more credit to the private sector affects domestic private investment positively (e.g.,Serven & Solimano, 1992). Nevertheless, the negative sign of this variable seems against the theoretical explanations. Surprisingly, most of previous empirical evidences like Jongwanich & Kohpaiboon (2008), Ouattara (2004), Ghura and Goodwin (2000)confirmed our findings. This result may suggest that the credit taken is used more for non-productive what policy makers need to address the overall banking provision and other related issues.

Government expenditure as a percentage of GDP is the other variable that has significant and positive relationship with domestic private investment. The finding is confirmed with previous studies like Jongwanich & Kohpaiboon (2008), Ouattara (2004), and Asnate (2000) who reported that government expenditure has a crowd-in effect. The significance of this variable could be due to the fact that in the last decade the country has invested heavily in infrastructure (e.g. energy, transport, health, and educational services). The coefficients of the variable tells that as government expenditure increases by 1%, domestic private investment increases by 2.27% and 2.08% in the short and long-run respectively. The result suggests that the government has to invest more on infrastructure to boost investment of the private sector.

Unlike most empirical evidences from Africa, our findings reveal that growth of real GDP has insignificant and positive relationship with domestic private investment which is inline with neoclassical investment theory (Fielding, 1997; Greene & Villanueva, 1991; Serven & Solimano, 1992). Most empirical studies like Ajide and Lawanson (2012) from Nigeria, Ouattara (2004) from Senegal, and Asante (2000) from Gahana revealed the significant positive relationship with domestic investment. Inflation is the second variable that we find insignificant with negative sign. The negative sign of inflation is an indication of unstable economic environment though it has no significant impact. Foreign direct investment (FDI) and gross fixed capital formation (GFCF) are the other variables that we find insignificant with positive sign at any conventional levels.

Conclusion

To identify the potential determinants of domestic private investment in Ethiopia, we perform Ordinary Least Squares (OLS) estimations using an autoregressive distributed lag models (ARDL) for the period 1992-2010. We use Pesaran, et al. (2001) bounds test approach to test the co-integration relationship of the dependent variable and the explanatory variables.

When we summarize the regression results: external debt and government expenditure have significant and positive relationship with domestic private investment while exchange rate, domestic credit and domestic saving have significant and negative relationship with domestic private investment.

These empirical findings have key policy implications for Ethiopia. First, high value of local currency constrained domestic investment. The negative relation of exchange rate and domestic private investment suggests that appreciation of the real exchange rate discourages domestic private investment or vice versa. So this finding may support the government's decision that devalues the local currency in 2010 by 17%. From this it may be possible to conclude that depreciation of the local currency attracts domestic private

investment in the country.

Second, domestic credit given to private sector reduces domestic private investment and this may suggest the credit is diverted to non-productive activity. Third, domestic investment is constrained by gross domestic saving. This result is in line with the descriptive statistics that shows saving has been reducing drastically for a long period of time particularly after 2005. The finding suggests to policy makers to address why saving is reducing. Fourth, the significant positive relationship between government expenditure and domestic private investment indicates crowding-in effect of government expenditures to domestic private investment. This suggests the government has been investing more on infrastructures of the country and has to be increased to stimulate the low rate of private domestic investment-GDP ratio.

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References

[1] Acosta, P., Loza, A. Short and long run determinants of private investment in Argentina. Journal of Applied Economics.2005, VIII(2), 389-406, Print ISSN 1514-0326, Online ISSN 1667-6726.

[2] Ajide, K. B., Lawanson, O. Modelling the Long Run Determinants of Domestic Private Investment in Nigeria, Asian Social Science, 2012, 8(13), ISSN 1911-2017.

[3] Aschauer, D. A. Does Public Capital Crowd out Private Capital? Journal of Monetary Economic, 1989, 24(2), 171-188, ISSN: 0304-3932.

[4] Asnate, Y. Determinanats of Private Investment Behavior. African Economic Research Consortium. 2000, Nairobi.

[5] Bakare, A. S. The Determinants of Private Domestic Investment in Nigeria. Far East Journal of Psychology and Business, 2011, 4(2), 27-37, Print ISSN 2219-5440, Online ISSN 2221-8017.

[6] Bardsen, G. Estimation of long-run coefficients in error correction models. Oxford Bulletin of Economics and Statistics, 1989, 51, 345-350, Online ISSN: 1468-0084.

[7] Borensztein, E. Debt overhang, credit rationing and investment. Journal of Development Economics, 1990, 32(2), 315-335, ISSN: 0304-3878.

[8] CSA. Population and housing census. Central Statistical Agency, 2007, Addis Ababa, Ethiopia.

[9] FDRE. Growth and Transformation Plan (2010/11-2014/15). Federal Democratic Republic of Ethiopia, 2010, Addis Ababa, Ministry of Finance and Economic Development.

[10] Fielding, D. Adjustment, Trade Policy and Investment Slumps: Evidence from Africa. Journal of Development Economics, 1997, 52(1), 121-137, ISSN 0304-3878.

[11] Ghura, D., Goodwin, B. Determinants of private investment: a cross-regional empirical investigation. Applied Economics, 2000, 32(14), 1819-1829, ISSN 0003-6846.

[12] Giannone, D., Lenza, M. The Feldstwin-Horioka Fact. Working paper series, 2008, No 873.

[13] Gillis, M., Perkins, D. W., Roemer, M., Snodgrass, D. R. Economics of Development (second ed.), New York: W.W. Norton & Co., 1987.

[14] Greene, J., Villanueva, D. Private Investment in Developing Countries: An Empirical Analysis. IMF Staff Papers, 1991, 38(1), 33-58, ISSN 1020-7635.

[15] Jongwanich, J. The determinants of household and private savings in Thailand, Applied Economics, 2010, 42 (8), 965-976, ISSN 0003-6846.

[16] Jongwanich, J., Kohpaiboon, A. Private Investment: Trends and Determinants in Thailand, World Development, 2008, 36 (10), 1709-1724, ISSN 1873-5991.

[17] Loayza, N., Schmidt-Hebbel, K., Serve´n, L. What drives private saving across the world? The Review of Economics and Statistics, 2000, MIT Press, vol. 82(2), pages 165-181, E-ISSN: 1530-9142, ISSN: 0034-6535.

[18] Misun, J., Tomsik, V. Does foreign direct investment crowd-in or crowd-out domestic investment? Eastern European Economics, 2002, 40(2), 38-56, ISSN 0012-8775.

[19] Mutenyo, J., Asmah, E., Kalio, A. Does Foreign Direct Investment Crowd-Out Domestic Private Investment in Sub-Saharan Africa? The African Finance Journal, 2010, 12 (1), 27-52, ISSN 16059786.

[20] Ndikumana, L. Financial Determinants of Domestic Investment in Sub-Saharan Africa: Evidence from Panel Data, World Development, 2000, 28(2), 381-400, ISSN 1873-5991.

[21] Ndikumana , L., Verick, S. The linkages between FDI and domestic Investment: Unravelling the developmental impact of foreign investment in Sub-Saharan Africa, Development Policy Review. 2008, 26(6), 731-726, DOI: 10.1111/j.1467-7679.2008.00430.x.

[22] Ouattara, B. Modelling the Long Run Determinants of Private Investment in Senegal. Centre for Research in Economic Development and International Trade. 2004, University of Nottingham.

[23] Pesaran, M. H., Shiny, O., Smith, R. J. Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 2001, 16, 289-326. ISSN:0883-7252, E-ISSN:1099-1255.

[24] Rossiter, R. Strutural Cointegration Analysis of Private and Public Investment, International Journal of Business and Economics, 2002, 1(1), 59-67.

[25] Serven, L., & Solimano, A. Private Investment and Macroeconomic Adjustment: A Survey. The World Bank Research Observer, 1992, 7(1), 95-114, Online ISSN 1564-6971, Print ISSN 0257-3032.

[26] Stockman, A. C. Anticipated inflation and the capital stock in a cash in-advance economy. Journal of Monetary Economics, 1981, 8(3), 387-393, ISSN 0304-3932.

[27] UNCTAD. Foreign Direct Investment in Landlocked Developing Countries: Trends, Policies and the Way Forward. Issues Paper prepared by the UNCTAD secretariat. 2008, United Nations Conference on Trade and Development.

[28] Vamvakidis, A., Wacziarg, R. Developing Countries and the Feldstein-Horioka Puzzle. IMF Working Paper. 1998, WP/98/2.

[29] WB. Determinants of Private Sector Growth in Ethiopia's Urban Industry.The Role of Investment Climate. Investment Climate Assessment Report.2004, Washington, D.C. The World Bank.

[30] Wooldridge, J. M. Econometrics (3rd ed.), 2011, New Delhi.

Appendix

Variables	Coefficients	Std.Error	T-Ratio	P-value
DMPI(-1)	-1.387388***	0.2395799	-5.79	0.001
GDP(-1)	0.0231068	0.0270838	0.85	0.422
INFL(-1)	-0.0251491	0.0212098	-1.19	0.274
ERT(-1)	-3.239737**	1.181213	-2.74	0.029
EDBT(-1)	.8832317*	0.4029112	2.19	0.064
GDSG(-1)	-.4705232*	0.2415594	-1.95	0.092
GFCF(-1)	1.587626	1.828933	0.87	0.414
DCPR(-1)	-1.072372*	0.566782	-1.89	0.1
GOE(-1)	2.888846**	1.009828	2.86	0.024
FDI(-1)	0.0795453	0.124875	0.64	0.544
Constant	-6.223297	6.767448	-0.92	0.388

Note: The level of statistical significance is denoted as *** = at 1%, ** = 5%, and * = at 10%. All dependent variables are lagged by one period. Except GDP and INFLN are in logarithm form.
Source: own processing

Table 5: OLS regression results of the long-run model (ECM) for the years (1992-2010) using ΔlnDMPI as dependent variable.

Year	DMPI as a % of GDP	GDP growth (%)	Inflation rate (%)	Exchange rate (%)	EDBT as a % of GDP	GDSG as a % of GDP	GFCF as a % GDP	DCPR as a % of GDP	GOE as a % of GDP	FDI a % of GDP
1992	1.59	-8.67	15.53	2.8	66.77	6.31	14.36	11.4	13.92	0
1993	4	13.14	13.38	5	112.12	7.91	15.87	6.15	13.47	0.04
1994	2.05	3.19	2.93	5.47	148.3	9.4	19.28	8.03	17.24	0.25
1995	7.42	6.13	12.71	6.16	136.8	11.92	19.47	9.27	17.01	0.19
1996	1.88	12.43	0.24	6.35	119.58	9.59	16.87	14.22	18.38	0.26
1997	1.75	3.13	4.52	6.71	114.75	13.25	21.73	16.93	17.43	3.24
1998	1.7	-3.46	-0.44	7.12	129.45	13.51	22.78	20.11	20.5	3.23
1999	1.68	5.16	0.66	7.94	71.47	9.6	22.51	24.56	26.03	0.89
2000	1.44	6.07	6.88	8.22	67.68	8.34	20.28	23.07	25.78	1.65
2001	1.56	8.3	-5.75	8.46	70.69	9.73	20.73	21.45	22.61	4.28
2002	2.43	1.51	-3.62	8.57	84.44	9.93	22.99	21.18	25.06	3.27
2003	1.63	-2.16	12.77	8.6	85.87	7.75	21.25	20.31	27.02	5.43
2004	1.5	13.57	3.91	8.64	66.69	8.79	23.18	19.35	23.35	5.42
2005	2.58	11.82	9.88	8.67	50.59	2.61	21.04	22.99	23.08	2.15
2006	1.1	10.83	11.55	8.7	15.05	1.52	22.47	23.84	22.24	3.6
2007	0.47	11.46	17.22	8.97	13.39	4.16	25.49	18.67	20.68	1.14
2008	0.37	10.79	30.31	9.6	10.8	0.44	22.63	17.85	18.89	0.41
2009	0.46	8.8	24.15	11.78	15.76	4.14	28.13	-	17.23	0.69
2010	0.11	9.94	3.86	14.41	24.13	0.41	23.99	-	18.61	0.97

Source: National bank of Ethiopia and World development indicators

Table 6: List of economic indicators of the study.