

Full Length Research Paper

Effect of budget deficit and corruption on private investment in developing countries: A panel data analysis

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The prime objective of this paper was to empirically quantify the effect of interaction between budget deficits and corruption on private investment in developing countries over the period 1984 to 2010. Using a panel data methodology, a large sample size of 70 developing countries and system-Generalized Method of Moments (GMM) estimation applied to dynamic panel data to address the problem of endogeneity, this study found that the interaction between budget deficits and corruption is associated with a lower level of private investment. In addition, controlling for other variables in the model budget deficit leads to lower level of private investment illustrating the crowding-out effect. Further, the results showed, a higher level of corruption is associated with a lower private investment. The average marginal effect of budget deficits on private investment indicates that the budget deficit is magnified in a corrupt environment and the impact is quantitatively large. The study therefore recommends the need for intensified efforts to strengthen government revenue to ensure less “leakage” due to corruption which could translate into more public resources and less pressure on the government budget. Further, there is need also for strengthening government revenue mobilization and savings by using fiscal consolidation programs with a view of reducing budget deficits. As regards to corruption, the government ought to vigorously pursue and enforce laws which are geared towards reducing corruption.

Key words: Private investment, budget deficits, corruption, developing countries, panel data.

INTRODUCTION

One of the less investigated subjects in the economic literature of developed and developing countries is the relationship between budget deficits and corruption and the resulting effect on private investment. The existing literature indicates that a substantial number of developing countries manifest relatively higher levels of budget deficits and corruption (Jalles, 2011; Anthony and Matthias, 2007). The prime objective of this study therefore is to empirically quantify the effect of interaction of budget deficits and corruption and the resulting impact on

private investment in 70 developing countries over the period 1984 to 2010. Previous studies have paid significant attention on the relationship between budget deficits and private investment using time series analysis of individual country (Kaakunga, 2003; Kiptui, 2005; Jahromi and Zayer, 2008; Traum and Yang, 2010). While some other studies use cross-sectional analysis (Bernheim, 1987; Bartolini and Lahiri, 2006). Studies that focus on the relationship between economic growth, investment and corruption include that of Mauro (1995,

1997) and Pellegrini and Gerlagh (2004).

This study makes contribution to the existing literature in three dimensions. First, it examines empirically the effect of

interaction between budget deficits and corruption and demonstrate that in a corrupt regime the budget deficits widens through reduction in tax revenues and increase in public expenditure and the resulting impact on private investment is quantitatively large. Secondly, this study depart from the previous studies by using interaction term between budget deficits and corruption using panel data methodology and a large sample size of 70 countries from developing countries. Thirdly, this study used a system-GMM estimation applied to dynamic panel data. This helps to address the problem of omitted variable bias as well as the econometrics limitations of the ordinary least squares (OLS) models previously used to address the problem of endogeneity of economic variables that may affect private investment. This also helps to obtain consistent estimates of private investment equation in the presence of dynamic and endogenous regressors. Hence, by using modern econometric techniques, new and larger data set coverage should provide a more accurate estimation of the linkages between budget deficits and corruption and other economic variables identified to influence private investment in empirical literature.

By estimating a private investment equation, the study, found that controlling for other variables in the model the interaction between budget deficits and corruption is associated with a lower level of private investment in developing countries. In addition, the result showed that government budget deficits have a negative and statistically significant effect on private investment illustrating a crowding out effect. Further, the result indicates among the key variables of interest, corruption is more detrimental to private investment as exhibited by the relatively larger estimated coefficient. The average marginal effect of budget deficits on private investment indicates that budget deficit is magnified in a corrupt environment with the resulting impact on private investment being quantitatively large. This is the main innovative feature of this study. These result suggest that if corruption is reduced may free more resources available for private sector. In addition, strengthened public revenues as a result of less "leakage" due to corruption could translate into more public resources and less pressure on the government budget. In turn, this will generate revenues that the government requires without incurring further debt to expand access to health, education and infrastructure services which will attract private investment.

The rest of the paper is organized as follows: existing empirical studies on budget deficits and investment, corruption and investment are reviewed. The section concludes with the link between corruption and budget deficits. Also, the methodology used in this study is presented while the next section presents the discussion

of empirical results, and finally the conclusion and policy recommendations.

LITERATURE REVIEW

Empirical studies on budget deficits and investment

Budget deficits received much of the blame for economic ills that beset developing countries in the 1980's and 1990s over indebtedness and the debt crisis, high inflation, and poor investment growth performance. Attempts to regain macroeconomic stability through fiscal adjustment achieved uneven success, raising questions about the macroeconomic consequences of public deficits and fiscal stabilization or fiscal deterioration (Easterly and Schmidt-Hebbel, 1993).

High and sustained budget deficits can have adverse effects on the economy and in particular private investment. Long-term budget deficits reduce national savings which is the sum of public and private savings. The reduction in national savings raises domestic real interest rates in financial markets, which may exert a negative significant effect on private investment through several channels. First, the increase in interest rate crowds out private investment. Secondly, may signal a high tax burden in the future particularly on external debt which can be an indication of debt overhang causing economic agents to anticipate future tax liabilities for it's servicing hence inducing capital flight and also discourage current aggregate expenditures and consequently private investment. Thirdly, high budget deficits may raise the debt-to-GDP ratio which may exert negative effect on a country's long run fiscal sustainability, thus can affect the welfare of future generations. Fourthly, high budget deficits can increase the level and volatility of inflation, in particular, when there is a lack of independence of the central bank (Agnello and Sousa, 2009). All these demonstrate the different channels through which budget deficits could affect private investment.

According to Keynesian hypothesis suggests that higher budget deficits lead to higher interest rates in the financial market. When the government runs a high budget deficit, the need for additional financing emerges and hence the increased supply of debt in the capital markets, prices of bonds fall, which implies an increase in the interest. The increase in the level of interest rates may crowd out private investment, since firms and households will tend to borrow smaller amounts in order to finance capital projects, thus impeding economic growth in the private sector. However, this depends on a country's degree of openness to capital mobility with the rest of the world. In countries that are relatively closed to capital flows, reduced domestic saving must be matched by decreased domestic investment, because residents cannot borrow from abroad to keep investment high. Hence, fiscal expansions "crowds out" private investment,

through increase in real interest rate. While if capital is perfectly mobile across countries, the higher interest rates caused by large deficits will tend to attract capital from abroad into the country, leading to an appreciation of the domestic currency. Consequently, an increase in budget deficits would crowd out exports rather than private investment.

In a study to examine whether additional government debt “crowds out” private investment through a higher real interest rate, Traum and Yang (2010) found limited systematic relationship among (government) debt, the real interest rate, and (business) private investment. However, their result revealed that in the short run the additional government debt may either “crowd in” or “crowd out” private investment depending on what caused government debt as a percentage of GDP to increase. The authors argued that if the higher government debt is due to a reduction in “distortionary taxes”, then higher government debt is associated with increase in private investment “crowding in.” On the other hand, if higher government debt as a percentage of GDP is due to an increase in government spending as a percentage of GDP particularly for higher government consumption and transfer payments to households and firms, then higher government debt is associated with a short run decrease in private investment. But in the long run higher government debt as a percentage of GDP reduces private investment since the government increase taxes so as to service the debt as a percentage of GDP thus leading to a reduction in private investment.

Alesina et al. (2002) used data for 18 OECD member countries from 1960 to 1986 to estimate how an increase in primary government spending and its major components: government employee compensation, transfer payments, and government consumption would affect private investment as a percent of GDP. The authors found that an increase in primary government spending equal to one percentage point of GDP would decrease private investment by 0.15% of GDP. They also found that an increase in government employee compensation equal to one percentage point of GDP would decrease investment by 0.48% of GDP. Further, the authors found that an increase in government transfer payments equal to one percentage point of GDP would decrease private investment by 0.21% of GDP.

Kiptui (2005) examined Kenya’s fiscal adjustment process and its effects on private investment by analysing the effects of budget deficits, government consumption expenditure, tax burden and public debt on private investment and growth. The econometric analysis showed that budget deficits have highly lagged effects on private investment, suggesting that the benefits of fiscal discipline are not immediately realised. The author concluded that the benefits of fiscal discipline are even larger considering that domestic and foreign debt service; total debt stock and the tax burden all have negative effects on private investment. Similar conclusion was

obtained by Jahromi and Zayer (2008) who analyzed the effects of budget deficits on private investment and private consumption in Iran for the period 1342 to 1384 using autoregressive distributed lag (ARDL) approach to estimate the long relationship between budget deficits and private investment.

According to a study by Aschauer (1989) empirically examined the short and long run effect of public investment on private investment. Using annual data for United States covering the period 1953 to 1986, the author found that an increase in public investment spending in the short run crowds out private investment almost one to one while in the long run it raises the profitability of private capital and thus induce further private investment. Since both channels seem to operate, the latter dominates, hence the overall effect of an increase in public investment exert a positive effect on private investment.

Ronge and Kimuyu (1997) applied an eclectic version of flexible accelerator model, in the traditional model of Martin and Wasow (1992). However, the model was modified to accommodate a greater emphasis on the effects of the resource constraints faced by private investors in developing countries. The findings of the study revealed that, volatility of credit and foreign exchange reserves, public investment exerts positive significant effects on the level of private investment while public debt has a negative impact on private investment suggesting both debt overhang hypothesis and macroeconomic instability.

Empirical studies of corruption and investment

Mauro (1995, 1997) investigated the relationship between corruption and economic growth and investment across countries. He used corruption index provided by Business International (BI). Using econometric analysis for 67 countries in the sample, he found that more corrupt countries experience both statistically significant lower investment rates for the period 1960 to 1985. He concluded that it is through investment that corruption reduces economic growth. The empirical results show that a one standard deviation improvement in corruption index causes investment to increase by 5% of GDP and the annual growth rate of GDP per capita to increase by 0.5% points. A similar conclusion was found by Rahman et al. (1999), Pelligrini and Gerlagh (2004) who investigated empirically the direct and indirect transmission channels through which corruption affects growth levels.

Gyimah-Brempong (2002) examined the effect of corruption on economic growth and income inequality in some selected African countries. Using panel data from African countries and a dynamic panel estimator, the findings of the study revealed that corruption decreases economic growth directly and indirectly through decreased investment in physical capital.

According to a study by Asiedu and Freeman (2009) used firm-level data to investigate the effects of corruption on investment growth in Latin America, Sub-Saharan Africa and Transition countries. The empirical result revealed that the effect of corruption on investment growth vary significantly across regions. As for transitional countries they found corruption has a negative and statistically significant effect on investment while it has no significant effect on firms in Latin America and Sub-Saharan Africa.

Das and Parry (2011) investigated the effect of corruption on investment in some selected 74 developing countries over the period 2000 to 2008. The overall (all countries) empirical results revealed that corruption has a negative effect on investment rate. Regional result indicates that corruption has a positive effect in Sub-Saharan Africa and Latin America and Caribbean. As for Asia region corruption was found to have no effect on investment.

Everhart et al. (2009) used panel data analysis to investigate the effect of corruption on private investment for 50 developing and emerging countries over the period 1984 to 1999. The study found that the impact of corruption on the accumulation of private capital is negative and statistically significant.

In a cross-national analysis of corruption and growth, Tanzi and Davoodi (1997) tested four hypothesis designed to explain four channels through which corruption reduces growth. Using regression analysis, results established that higher levels corruption was associated with lower economic growth since corruption reduces the quality of investment, as resources may be diverted from investment in infrastructure or human capital accumulation towards private consumption by corrupt public officials. Further the result show that corruption leads to increased public sector investment. However the expenditure on maintenance decreased since the corrupt public officials tend prefer new projects to maintenance of the existing assets. They also find that corruption decrease private investment.

Wei (2000) examined the effect of corruption on foreign direct investment (FDI). The sample covers bilateral investment from 12 sources countries to 45 host countries. The empirical result shows that an increase in either corruption index or tax rate on multinational firms in a host country reduces FDI. In a study to examine the impact of corruption and democracy on foreign direct investment in developing countries, Mathur and Singh (2011) found that corruption perception index plays a big role in investors' decision of where to invest. The countries which were ranked poorly on the index receive low FDI flows relative to those ranks above them after controlling for other variables in the model.

Hakkala et al. (2007) examined the effect of corruption on foreign direct investment (FDI). The study found that corruption can have different effects on horizontal investment, which are primarily aimed at sales to the local

market, compared to vertical investments, which are made to access lower factor costs for exports. The results further showed that corruption affects seriously affected by horizontal than vertical investment.

In a study to explore the link between private investment and perceived business obstacles in developing countries such as corruption, unpredictability of judiciary, tax and labour regulations and strict regulations to start a business Pfeffermann et al. (1999) found that the countries that were perceived to have fewer obstacles had higher levels of private investment.

By employing a panel data analysis Jalles (2011) examined the impact of democracy and corruption on debt growth relationship in developing countries over the period 1970 to 2005. The author found that countries with lower corruption tend to use their debt better. Further, the results showed that in countries with less levels of corruption both positive and negative effects of debt on growth, modeled with-non linear specification are significant. While countries with high levels of corruption only negative effect of debt on growth is significant, suggesting that poor institutional quality implies that a country is not capable of taking advantage of its borrowing opportunities.

Corruption and budget deficits

Budget deficits may be magnified in the face of high level of corruption. This is because corruption may influence both the revenue and expenditure sides of the government budget. On the revenue side, the government losses a significant amount of revenue through bribes by public officials in the form of reduced tax revenues, fees and custom duties as well as social amenities charges for electricity and water. In a corrupt environment, firms as well as activities are driven into informal sector by excessive rent taking and taxes are reduced in exchange for payoffs to tax officials. In addition large unofficial economies tend to reduce the tax base and may cause higher official tax rates, which in turn may feed into the vicious cycle of expanding shadow economies and statutory taxes which usually go uncollected (Kaufmann, 2010). Further, a large informal economy has adverse effects on economic growth, foreign direct investment, exports as well as overall productivity. The end result of all these leads to great losses of tax revenue to the government. Further, fraud embezzlement and misappropriation of public funds by corrupt public officials add to the losses since the public officials have generally high level of discretion for capital expenditure than recurrent expenditure (Acemoglu and Verdier, 2000; Mauro, 1998).

The consequences of corruption on the expenditure side, involves distorting the composition of the government expenditure. Corrupt public officials tend to favour investment projects which generate highest bribes and not necessarily the most efficient. This is because large

benefits can be realised from corrupt deals on expenditure on items that are very expensive whose costs cannot be determined easily from the market but with huge potential for kickbacks and economic rent are good candidates for corrupt deals and hence inclusion in the national budget (Myint, 2000). For instance in the purchase of military equipment and expenditure on large projects such road, railway line and air port construction among others. This means less funds will be allocated to other important sectors such as education and health and on other priority needs that would contribute towards improving the living standards of the poor and disadvantaged people in the society.

In light of the effects of corruption on the government budget it implies that in a corrupt regime the budget deficit may widen which might significantly discourage private investment. This therefore means, if corruption is reduced may translate into more resources available for private investment. In addition, strengthened public revenues as a result of less "leakage" due to corruption could translate into more public resources and less pressure on the government budget. In turn, this will generate revenues that the government requires to expand access to health, education and infrastructure services which will attract private investment.

METHODOLOGY

This section presents the methodology that was used in this study. It starts with data type and sources and concludes with model specification.

Data type and sources

This study utilised annual panel data for some selected 70 developing countries over the period 1984 to 2010 to empirically investigate the effects of budget deficits and corruption on private investment. The choice of the panel data is useful as it helps to control for unobserved country specific effects and thereby minimise biases in the estimated coefficients as well as potential of endogeneity of the regressors by using instrument variables based on lagged values of the regressors. The choice of the study period was mainly determined by the availability of corruption index obtained from the Political Risk Service's International Country Risk Guide (ICRG). Although this measure of corruption is based on subjective observation of the respondents and therefore may not capture adequately the real cost of corruption, however, this measure is preferred since it covers many countries from 1984 and relevant to the current study since it focuses corruption in the public sector.

The ICRG index attempts to measure corruption by investigating whether high ranking government officials are likely to demand special payments in the form of bribes related to import-export licenses, exchange controls, tax assessment and police protection. It provides a numerical, time-series measure of corruption ranging from 0 to 6, with higher values indicating low corruption and lower values denotes high corruption. Studies on corruption that have used this measure of corruption include: Knack (2002), Knack and Philip (1995), Tanzi and Davoodi (2002), Everhart et al. (2009). Without loss of generality, for exponential reasons the corruption index was rescaled by subtracting the ICRG value from 6 (the

maximum value), so that high values in our case indicate high level of corruption.

The data for economic variables was obtained from World Development Indicators (WDI), International Financial Statistics (IFS) and World Economic Outlook (WEO) from the International Monetary Fund (IMF). The level of private investment, budget deficit, savings, credit to private sector, public investment, openness to trade were all deflated using GDP price deflator to express them in real terms. The real exchange rate was computed by getting the product of nominal exchange rate with the ratio of the United States producer price indices to the respective countries consumer price index. The real interest was already computed in WDI by getting the difference between nominal lending interest rate and inflation rate.

Model specification and estimation method

Following the theoretical as well as empirical literature review we can model the private investment model as:

$$PI = f(BDC, BD, C, S, CRPS, RGDPPCG, GI, OP, RIR, INF, RER) \quad (1)$$

Where, PI =Gross private sector investment (percentage of GDP); BDC =Interaction term between budget deficit and corruption; BD =Ratio of Budget Deficit to GDP; C =Corruption index; S =Savings (percentage of GDP); $CRPS$ = Credit to the private sector (percent of GDP-Proxy for financial development); $RGDPPCG$ =Real GDP per capita growth rate; GI =Gross public Investment (percentage of GDP); OP =Openness (the sum of exports and imports as a percentage of GDP); RIR =Real interest rate; INF =Inflation rate; RER =Real exchange rate.

The empirical model that was used in this study to estimate the effect of budget deficits and corruption on private investment was dynamic panel data model. More specifically, we specify dynamic linear equation as:

$$PI_{i,t} = \alpha_0 + \alpha_1 PI_{i,t-1} + \alpha_2 BDC_{i,t} + \alpha_3 BD_{i,t} + \alpha_4 C_{i,t} + \alpha_5 S_{i,t} + \alpha_6 CRPS_{i,t} + \alpha_7 RGDPPCG_{i,t} + \alpha_8 GI_{i,t} + \alpha_9 OP_{i,t} + \alpha_{10} RIR_{i,t} + \alpha_{11} INF_{i,t} + \alpha_{12} RER_{i,t} + \nu_i + \varepsilon_{i,t} \quad (2)$$

We can express equation (2) in compact form as:

$$PI_{i,t} = \alpha_1 PI_{i,t-1} + X'_{i,t} \alpha_2 + \nu_i + \varepsilon_{i,t} \quad (3)$$

Where, $i = 1, \dots, N, t = 1, \dots, T_i$, using data set with large observations (N), where $PI_{i,t}$ stands for the private investment of country i at time t . In particular X_i denote a set of macroeconomic variables defined earlier including corruptin and α_1, α_2 are parameters to be estimated, ν_i is an unobserved country-specific effect and $\varepsilon_{i,t}$ is an independent identically distributed (i.i.d) error term.

In estimating model (3) GDP per capita growth, corruption, public investment and openness to trade were treated as endogenous variables in order to address the problem of endogeneity. By doing this we take care of any possible correlation between these variables with the dependent variable private investment and thus solves the problem of simultaneous equations bias.

Since the specification is dynamic panel and incorporates fixed

country-specific effects (U_i), the parameters are estimated by system GMM. When model (3) is estimated using OLS in both the fixed and random effects approach, the lagged dependent variable, $PI_{i,t-1}$, will be correlated with the error term, even if we assume that the disturbance term are not themselves autocorrelated (Arellano and Bond, 1991; Baltagi, 2001). Further, model (13) cannot be estimated by generalised least squares (GLS) estimator as it will yield inconsistent estimates in the presence of dynamics and endogenous regressors (Baltagi, 1995). Hence an instrumental variables (IV) estimator that produce consistent estimates in the presence of dynamics is therefore required.

Arellano and Bond (1991) developed a generalized method of moments (GMM) estimator that allows one to get rid of country-specific effects or any time invariant country-specific variable, and any endogeneity that may be due to the correlation of the country-specific effects and the regressors. When the first difference was taken in equation (3), the country specific effect, U_i is eliminated and yields equation (4) below which can be estimated by instrumental variables (IV). The IV helps to deal with the possibility of endogeneity of the explanatory variables and the correlation which arises due to construction of the new error term which is correlated with the lagged dependent variable.

$$\Delta PI_{i,t} = \Delta \alpha_1 PI_{i,t-1} + \Delta X'_{i,t} \alpha_2 + \Delta \varepsilon_{i,t} \quad (4)$$

Where $i = (1, \dots, N), t = (1, \dots, T_i)$; $\Delta =$ First difference

If the regressors are not purely exogenous, they become endogenous variables even after differencing since they will be correlated with error term. It is for this reason that, Arellano and Bond (1991) follow Holtz-Eakin et al. (1988) and formulated a Generalized Method of Moments (GMM) estimator for linear dynamic panel data models to address this problem by instrumenting the differenced predetermined and endogenous variables with their available lags in levels, that is the levels of the dependent and endogenous variables lagged two or more periods; and the levels of the pre-determined variables lagged one or more periods. This implies the independent variables can be used as their own instruments as well.

Blundell and Bond (1998) argued that the differenced GMM estimator has a limitation in that lagged levels are weak instruments for the first-differences especially when the series are very persistent. However, this limitation can be solved by adding the original equation in levels to the system so as to increase efficiency Arellano and Bover (1995). When the first differences of the explanatory variables are not correlated with the individual effects, lagged values of the first-differences can then be used as instruments for the equation in levels. The lagged differences of dependent variables can serve as valid instruments for the equation in levels form. The consistency of GMM estimator depends on the validity of the instruments. To address this issue we consider two specification tests as suggested by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) when estimating model (3). The first test is Sargan test of over identifying restrictions, which tests the overall validity of the instruments. The second test examines the hypothesis that the error term $\varepsilon_{i,t}$ is not serially correlated. In both the difference regression and the system difference level regression it was tested to see whether the differenced term is second order serially correlated.

Theoretical and a priori expectations

Budget deficit: The effect of large and sustained budget deficits

may be a signal that the government will increase taxes in the future in order to service the government debt. This may have adverse consequences on the economy both in the short run and long run since it might cause capital flight by potential private investors leading to a decline in private investment in the country and hence economic growth.

Corruption: A high level of corruption tend to create uncertainty and increase the cost of doing business which may lower the profit margin of private investors. Hence a higher corruption index is associated with a lower private investment. Thus a combination of higher budget deficit and corruption can significantly reduce the level private investment in a country. Overall we expect the interaction of budget deficits and corruption to have a negative and significant effect on private investment.

Credit to private sector: Increase in credit to the private sector can serve as an incentive to the private sector. Hence the potential private investors can increase their investment level all other factors being equal. Therefore we expect a positive effect of credit on private investment.

GDP per capita growth rate: The real GDP per capita growth is used to capture the aggregate demand conditions in the respective countries and we expect to have a positive effect on private investment through accelerator effect.

Public Investment: The effect of public investment on private investment cannot be determined on a priori condition since it may compete for certain scarce resources for example skilled labour force, raw materials, funds etc hence might reduce the level of private investment. However, public investment may complement private investment by providing important infrastructural facilities such as airports, railways, roads, irrigation projects, energy, communication etc all of which leads to an increase in private investment returns, hence enhancing the incentive to carry out such private investment. In addition, public investment can spur private output through increased demand for inputs and other services. It may also augment general resource availability by expanding aggregate output and savings. Therefore the effect of public investment on private investment is ambiguous.

Savings: Most private investors generally depend on savings to finance their investment projects as it is one of the relatively cheap source of financing their investment projects. Therefore, a higher level of personal savings as well as in financial institution implies that the private investors can easily acquire funds to finance and expand their enterprises. Thus we expect savings to have a positive effect on private investment.

Openness to trade: Reducing trade barriers through liberalisation creates an advantage to the export sector and thus improves the current account balance and increases investment incentives. In addition, with import opportunities, the available quality and quantity supply of inputs for production increases with increased competitiveness and productivity. Also the more open an economy is, the more likely it is that it would follow appropriate trade and exchange rate regimes and the more it would attract private investment. However, a sudden increase in exposure to external competition to infant domestic sectors, might drive them out of the market leading to decline in domestic private investment. Hence, on a priori and theoretical grounds, the effect of openness of the economy on private investment is ambiguous.

Real interest rate: The effect of real interest rate on private investment in developing countries is generally ambiguous. The neoclassical investment posits that, real interest rate is the main component of the user cost of capital and therefore affects private

Table 1. Overall regression result (Full sample results).

Variable name	Coeff.	Std. error	Z	Prob>Z
Lagged private investment	0.74285***	(0.04166)	17.83	0.000
Interaction term (Budget deficit and corruption)	-0.09766**	(0.04125)	-2.37	0.018
Budget deficit	-0.14706*	(0.07635)	-1.93	0.054
Corruption	-0.88699**	(0.43325)	-2.05	0.041
Savings	0.09514**	(0.04756)	2.00	0.045
Credit to private sector	0.07603***	(0.01712)	4.44	0.000
GDP per capita growth	0.13764***	(0.03255)	4.23	0.000
Public investment	-0.43681***	(0.07809)	-5.59	0.000
Openness to trade	0.11544***	(0.01030)	11.21	0.000
Inflation rate	-0.00696***	(0.00171)	-4.07	0.000
Real interest rate	0.02199*	(0.01228)	1.79	0.073
Real exchange rate	0.00017**	(0.00007)	2.50	0.012
Constant	3.01041***	(0.70828)	4.25	0.000

Note: The dependent variable is the ratio of private investment to GDP.

***, **, * denotes significance at the 1%, 5% and 10% levels respectively. Heteroscedasticity and serial correlation robust standard errors are in the parenthesis.

investment negatively. However, there is also the argument that a higher real interest rate increases the flow of bank credits, which complements the private sector savings and facilitates private capital formation and hence private investment. Thus, a negative coefficient of real interest rate will imply user cost of capital effect whereas a positive one would support the complementarity hypothesis.

Inflation rate: The effect of inflation rate on private investment may be negative since increase in inflation rate tend to increase the cost of doing business and it creates macroeconomic instability as well as increase uncertainty on the expected returns of investment. This may significantly reduce the level of private investment in the economy. Higher inflation rate also makes planning difficult for the private investors as they cannot predict about the future prices. Hence faced with this scenario they may be forced to engage in short term investment which do not have adequate forward or backward linkages.

Real exchange rate: The real exchange rate can influence the level of private investment since it is one of the factor that determine the real cost of imports. A currency devaluation tends to increase the real cost of purchasing imported goods, thereby reducing the profitability of the private sector causing private investment to decline particularly in import dependent production sectors. However, a real currency devaluation can have a positive effect on private investment that produces tradable goods in international market since it can increase competitiveness and export volumes thus may increase profitability in export oriented sectors and therefore promotes investment in these sectors. Hence the effect of real exchange rate on private investment is ambiguous.

ESTIMATION AND DISCUSSIONS OF EMPIRICAL RESULTS

Full sample regression results

Table 1 reports the empirical results for the estimation of private investment equation on the interaction term of

budget deficits and corruption using the first step estimates. The private investment equation fits well the data as shown by the regression statistics. The result reveal that there is no evidence of second-order serial correlation as attested by Arellano-Bond test for zero autocorrelation in the first differenced errors reported in Table 1. The sargan test statistic indicate that private investment equation is well specified and that the instrument vector is appropriate as reported also in Table 1.

The results indicate that the parameters of the model have the expected sign and that the coefficient of lagged private investment variable is statistically significant. This supports the use of a dynamic panel estimation. The result shows that if previous private investment were to increase by 1% then current private investment will increase by 0.74286 units ceteris paribus. The interaction term of budget deficit and corruption index has a negative sign as expected and it is statistically significant at 5% level. Specially, the results indicate that if interaction term between budget deficit and corruption increase by 1 unit, private investment will decrease by 0.09766 units all other factors being equal. The estimated coefficient of budget deficit is negative and statistically significant at 10% level. The result shows that if budget deficits is increased by 1 unit, private investment will decrease by 0.14706 units ceteris paribus. The negative effect would imply that private investors foresee an increase in the government debt stock as a percentage of GDP as a signal of either increased macroeconomic uncertainty or the possibility of future increase in taxation by the government in order to service the government debt and thus induce capital flight leading to decline in private investment. This means that the higher the level of debt stock the lower the level of private investment.

Consistent with the theoretical expectation the estimated coefficient of corruption index is negative and statistically significant at 1% level. Specifically, the result reveals that an increase in corruption index by 1 unit will lead to a decrease in private investment by 0.88699 units. The negative and statistically significant implies that corruption increase uncertainty and the cost of production which significantly reduces the expected profits of private sector. This result is consistent with those of Pellegrini and Gerlagh (2004), Das and Parry (2011).

To establish whether the budget deficits widens in a corrupt environment or regime we find the average marginal effect of budget deficits on private investment equation taking into account the influence of corruption. Our result reveals evidence of widening of budget deficits in the face of high corruption and the impact is quantitatively large on private investment. Specifically, the result indicates that a 1 unit increase in the budget deficits taking into account the influence of corruption leads to 0.24472 units decrease in private investment. This result suggest if corruption is reduced may free more resources available for private sector. In addition, strengthened public revenues as a result of less "leakage" due to corruption could translate into more public resources and less pressure on the government budget. In turn, this will generate revenues that the government requires without incurring further debt to expand access to health, education and infrastructure services which will attract private investment.

Consistent with economic theory the coefficient of savings has the expected positive sign and it is statistically significant at 5%. Specifically, the result shows that a 1 unit increase in savings leads to 0.09514 unit increase in private investment all other factors being equal. The positive sign would imply the higher the the level of savings the higher the level of private investment all other factors being equal.

The coefficient of credit to private sector has a positive sign as expected by economic theory and statistically significant at 1% level illustrating that credit acts as a booster to private investment. The result shows that when credit is increased by 1 unit then, private investment will increase by 0.07603 units all other factors being equal. This result is consistent with those of Kiptui (2005) who found credit to private investment to influence positively. This therefore implies the higher the level of credit to private sector the higher the level of private investment in developing countries.

Consistent with theoretical expectation the coefficient of real GDP per capita income has a positive sign and statistically significant at 1%. This confirms the acceleration principle in developing countries. Specifically, the result indicates that if output or aggregate demand increase by 1 unit then private investment increases by 0.13764 units. This implies that increase in aggregate demand conditions has the potential of stimulating private

investment in developing countries. The result confirms the existing empirical literature including Frimpong and Marbuah (2010).

The coefficient of public investment has a negative sign and statistically significant at 1%. This confirms the crowding-out effect of government investment. The result shows that a 1 unit increase in government investment leads to 0.43681 units decrease in private investment. This result is consistent with the findings of Nazmi and Ramirez (1997) of Mexico.

The coefficient for openness has a positive sign and statistically significant at 1%. The results shows that if the degree of openness is increased by 1 unit, private investment will increase by 0.11544 units. This shows that openness to trade in the sampled developing countries has boosted private investment as it makes it easier to import factor inputs and export finished products. This implies also that the reduction of trade barriers through liberalisation has led to increased import opportunities of better quality and supply of inputs for production increases with increased competitiveness and productivity.

Consistent with the theoretical expectation the estimated coefficient of inflation has a negative sign and statistically significant at 1% although the estimated coefficient is quantitatively small. Specifically, a 1 unit increase in inflation rate leads to 0.00696 units decrease in private investment all other factors being equal. The negative sign implies that inflation rate has been one of the constraints facing private investment in developing countries by generating higher cost of production to private firms as well as creating uncertain investment climate which impinge on private sector.

The estimated coefficient of real interest rate is positive and statistically significant at 10%. The result indicates that a 1 unit increase in real interest rate leads to 0.02199 unit decrease in private investment. The positive sign confirms the McKinnon and Shaw (1973) "Complementary hypothesis" contrary to the neoclassical theory of user cost of capital. A possible explanation for the positive sign is that prior to financial liberalization, interest rates were controlled with resultant low lending rates. This means higher interest rates after financial liberalisation have stimulated private investment through higher domestic savings resulting in increased investment funds for the private sector.

The coefficient of real exchange rate has a positive sign and statistically significant at 5% although the impact is quantitatively small. Specifically, the result reveal that a 1 unit increase in real exchange rate leads to 0.00017 units increase in private investment. This implies that the depreciation of the domestic currencies of the sampled countries has benefited the export industries as well as import substitution industries. Further, the result implies that currency devaluation may not have increased significantly the real cost of purchasing imported capital goods, thereby increasing the profitability of the private

sector and possibly causing private investment to increase.

Regional regression results

Table 2 present regional results, most of the estimated coefficients have their theoretical expected signs thus supporting the hypothesis being tested. Specifically, the results in all the regions reveal that the interaction term of budget deficits and corruption has a negative sign and statistically significant at the conventional levels as in the full sample result although they differ in magnitude. In addition, the results reveals mixed effect of budget deficit on private investment in the regions under analysis. For example, we find statistically significant crowding in effect of budget deficits on private investment in ASIA and Europe and Central Asia (ECA) regions while a crowding out effect of budget deficits evidence is found in Sub-Saharan Africa (SSAFR), Latin America and Caribbean Countries (LAC) and Middle East and North Africa (MENA) regions. Among these three regions the estimated coefficient of budget deficits is statistically significant in LAC region. As for the estimated coefficient of corruption index has the expected negative sign in all the regions and it is statistically significant with the exception of LAC region. The results further show that SSAFR region has a largest estimated coefficient of corruption followed by MENA, ECA, ASIA and LAC. The large negative estimated coefficient of corruption index in SSAFR confirms the perception that Sub-Saharan African and generally in African countries have higher level of corruption.

The estimated coefficient of savings and credit to the private sector have the expected positive sign and statistically significant as predicted by economic theory in all the regions under study. The result implies that most of the private sector depends largely on savings and credit to finance their investment projects in developing countries. Hence the results indicates that the higher the level of savings and credit to private sector available, the higher the level of private investment is likely to be.

Consistent with the full sample result the coefficient of GDP per capita income has a positive sign and statistically significant at conventional levels in all the regions under study. This confirms a significant accelerator theory effect on private investment in developing countries. This implies that increases in output demand conditions has the capacity of stimulating private investment in developing countries all other factors being equal.

The estimated coefficient of public investment is negative and statistically significant in all the regions under the study. This empirical finding suggests that public investment has not been complementary to private investment. The result suggest that there is need for the respective governments to invest in infrastructure and

human capital as well as in other activities that have the potential of increasing productivity of private capital. When this is done effectively then private investment would increase significantly.

Consistent with full sample regression result, the estimated coefficient for openness to trade is positive and statistically significant at conventional levels in all the regions. This implies the reduction of trade barriers through liberalisation in most of the developing countries has benefited the exporting firms or sectors and thus improves the current account balance and increases investment incentives. Moreover, with import opportunities, the available quality and supply of inputs for production increases with increased competitiveness and productivity.

The estimated coefficient of real interest rate reveal mixed results across the regions under analysis. For example, we find a positive effect of real interest rate in ASIA, LAC and MENA regions. Among these three region the study found statistically significant effect of real interest rate in MENA region only. This confirms McKinnon (1973) "complementary hypothesis". On the other hand the study found a negative effect and statistically significant effect of real interest rate in SSAFR and ECA regions. This result confirms the neoclassical theory of user cost of capital.

The effect of inflation rate on private investment displays mixed result like real interest rate. The estimated coefficient of inflation rate is negative in SSAFR, ASIA, ECA and LAC while it is positive in MENA region. The result indicates that the estimated coefficient is statistically significant in four region namely SSAFR, ASIA, ECA and MENA while it is not in LAC region. The positive and statistically significant coefficient implies that economic agents respond to higher prices of goods and services by increasing output with other potential investors entering the market to take advantage of escalating prices and earn abnormal profits. This result concurs with Acosta and Loza (2005) for Argentina. While the negative coefficient implies that higher inflation rates tend to create an environment of macroeconomic instability and therefore discourages private investment in an economy. This result reveals that inflation is one of the main constraints facing private investors in some developing countries.

Consistent with the regression of the full sample the estimated coefficient of real exchange rate is statistically significant in all the regions under study although it has contrasting signs and quantitatively small. This study found a positive estimated coefficient in SSAFR, ECA and MENA regions while a negative is reported in ASIA and LAC. The positive estimated coefficient may suggest that the countries in the respective regions, following the currency depreciation of the domestic currency has boosted private investment especially, those in the export and import substitution industries. As for the regions we reported a negative estimated coefficient may indicate

Table 2. Regional regression results.

Variable name	SSAFR	ASIA	ECA	LAC	MENA
Lagged PI	0.73152*** (0.05825)	0.84411*** (0.04349)	0.69252*** (0.06278)	0.76543*** (0.05997)	0.81151*** (0.03170)
BDC	-0.10012** (0.04552)	-0.14637*** (0.06615)	-0.28733*** (0.08719)	-0.10266* (0.09694)	-0.12419*** (0.04121)
BD	-0.12419 (0.16652)	0.74889*** (0.15721)	1.05014*** (0.39538)	-1.14701*** (0.39839)	-0.23325 (0.18855)
C	-1.72987** (0.74959)	-0.83160** (0.36855)	-1.09383** (0.43617)	-0.05016 (0.25527)	-1.16596*** (0.39526)
S	0.18158*** (0.03178)	0.17039** (0.06689)	0.22792*** (0.05017)	0.25624*** (0.05551)	0.15912* (0.11904)
CRPS	0.093039*** (0.03267)	0.03121** (0.01548)	0.18975*** (0.03654)	0.07334*** (0.02653)	0.08120*** (0.03125)
GDPPCG	0.08152** (0.03284)	0.15569*** (0.05397)	0.26399*** (0.04841)	0.26722*** (0.03460)	0.17777*** (0.06687)
GI	-0.52066*** (0.08674)	-0.52191*** (0.09033)	-0.87053*** (0.06445)	-0.11408* (0.06254)	-0.37543*** (0.05551)
OP	0.12427*** (0.00961)	0.09603*** (0.01952)	0.03784*** (0.01016)	0.09225*** (0.02863)	0.14925*** (0.01904)
RIR	-0.03380*** (0.00734)	0.03521 (0.02348)	-0.06912*** (0.01765)	0.01317 (0.01884)	0.08302** (0.04036)
INF	-0.02248*** (0.00758)	-0.07432** (0.03397)	-0.00264* (0.00896)	-0.00409 (0.00666)	0.09045*** (0.03053)
RER	0.00015*** (0.00004)	-0.00269*** (0.00084)	0.00063*** (.00188)	-0.02053*** (0.00411)	0.00035** (0.00016)
CONS	2.91142*** (0.83712)	3.26648** (1.36817)	7.22117*** (1.87143)	0.760916 (1.4996)	5.86539*** (1.03498)
Number of Obs.	450	127	114	151	108
Sargan test, Chi2; (Pr >Z)	585.23(0.9806)	146.13(0.9981)	145.53(0.9492)	168.76(0.9896)	149.06(0.9500)
Arellano-Bond test Z; (Pr>Z)	1.32(0.1859)	0.27(0.7853)	-1.015(0.3099)	-0.64(0.5202)	1.17(0.2427)

Note: The dependent variable is ratio of private investment to GDP

***, **, * denotes significance at the 1%, 5% and 10% levels respectively. Heteroscedasticity and serial correlation robust standard errors are in the parenthesis.

BDC = Interaction term of budget deficit and corruption, BD = Budget Deficit, C = Corruption, S = Savings, CRPS = Credit to private Sector, GDPPCG = GDP per capita growth, GI = Public Investment, OP = Openness to trade, RIR = Real interest rate, INF = Inflation rate, RER = Real exchange rate, SSAFR = Sub-Saharan Africa, ECA = Europe and Central Asia, MENA = Middle East and North Africa.

that in the respective countries the currency depreciation increases the real cost of purchasing imported capital

goods, thus reducing significantly the profitability of the private sector leading to a reduction in private investment.

CONCLUSION AND POLICY RECOMMENDATIONS

The prime objective of this paper was to investigate the effect of interaction between budget deficits and corruption on private investment in developing countries so as to get robust models that can provide important information for policy formulation and implementation with a view of raising the level of private investment in developing countries. Using a system-GMM estimator for dynamic panel data models on a sample of 70 countries from developing countries over the period 1984 to 2010, the results show that the interaction term between these two factors has a negative and statistically significant effect on private investment. In addition, the result reveals that controlling for other variables in the model budget deficit has a negative and statistically significant effect on private investment. Further, corruption is shown to have a negative and statistically significant effect on private investment due to the uncertainty as well as increased transaction costs caused by corruption. These results therefore, suggests if budget deficit is reduced through government spending cuts as well as strengthening public revenues as a result of less "leakage" due to corruption may translate to more resources available for the private sector in the form of finance, skilled labour as well as physical structures such as equipments and buildings among others.

From policy perspective, there is need for intensified efforts to strengthen government revenue mobilization and government savings so as to finance the needed expansion in economic and social infrastructure, while at the same time ensuring reduction in the budget deficits. There is need also for more effort from the government to improve on the budgeting process and financial planning as well as management practices to bring about a significant reduction in the level of budget deficits and reallocate public expenditure from wasteful consumption to productive human and physical infrastructure investment. To achieve this it will require openness in budgetary process. Further, there is need for the government to align fiscal policies towards the objectives of macro-economic stability, promotion of domestic savings and investment and market-oriented structural reforms in order to promote private investment. When this is done and implemented effectively, private sector can contribute significantly to the much desired higher rates of economic growth.

As regards corruption, there is need for the executive to set a good example with respect to honesty, integrity and encourage the culture for hard work where individuals earn genuinely what they have worked for. Further, the leadership must also demonstrate firmness, political will and commitment to carry out the required reforms in the public sector that brings about sound institutions and human resource changes so as to achieve the desired positive results. In addition, the government needs to give powers to organizations that are mandated to oversee on corruption cases in the respective countries to prosecute

both offenders on the demand (public officials) and supply side (private) who are found to engage in corruption activities. There is need also to establish a rule of law and the means to enforce it. This means implementing new laws, strengthening public agencies, building an effective and efficient judiciary system. Further, there is need also for the government to work very closely with the media to inform and educate the public so as to raise awareness concerning the adverse effects of corruption on the community and economy at large.

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Appendix. List of countries.

Sub-Saharan Africa	MENA	Asia
Angola	Algeria	Bangladesh
Botswana	Egypt	China
Burkina Faso	Jordan	India
Cameroon	Lebanon	Indonesia
Congo Republic	Morocco	Malaysia
Cote d'Ivoire	Oman	Mongolia
Democratic Rep. Congo	Syria	Pakistan
Ethiopia		Philippines
Gabon	Latin America and Caribbean	Sri Lanka
Gambia	Argentina	Thailand
Ghana	Bolivia	
Guinea Bissau	Brazil	Europe and Central Asia
Guinea	Ecuador	Albania
Kenya	El Salvador	Belarus
Madagascar	Guatemala	Bulgaria
Malawi	Guyana	Croatia
Mali	Mexico	Estonia
Mozambique	Nicaragua	Kazakhstan
Namibia	Panama	Latvia
Niger	Peru	Moldova
Senegal	Suriname	Poland
Sierra Leone	Trinidad	Russian Federation
South Africa	Uruguay	Ukraine
Tanzania		
Togo		
Uganda		
Zambia		
Zimbabwe		