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Corruption and growth in African countries: Exploring the Investment Channel

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Abstract

Using the Arellano-Bond GMM technique, we study the impact of corruption on public and private investment in African countries as a way of exploring one channel through which corruption undermines growth. The empirical results indicate that corruption affects income growth directly and through its impact on investment. We find that corruption has a negative and significant effect on domestic investment and that corruption affects public and private investment differently. The results indicate that corruption has a positive effect on public investment while it has a negative effect on private investment. The negative association between public investment and corruption is consistent with the view that corrupt bureaucrats seek to increase capital expenditure (over maintenance expenditures) to maximize private gains. On the other hand the results confirm that corruption discourages private investment, consistent with the prediction that corruption increases the costs of doing business (corruption tax) while raising uncertainty over expected returns to capital. The findings of this paper are informative on the role of corruption in undermining growth and reinforce the call for institutional reforms as a prerequisite for an investment-led growth acceleration in Africa.

1. Introduction

Existing evidence shows that African countries exhibit relatively higher levels of corruption, which constitutes a major constraint to efforts aimed at accelerating growth in order to achieve internationally and nationally mandated development goals. The literature has advanced several explanations of the links between corruption and growth. This study focuses on one particular channel through which corruption undermines growth, namely domestic investment. The paper posits that corruption discourages private investment by raising indirect production costs (corruption acts as a tax on investment) and by increasing uncertainty over future returns to capital. Moreover, corruption adversely affects the quantity of productive public investment by displacing public funds from public investment towards unproductive activities. We also argue that corruption also has a negative effect on the efficiency of public investment as corrupt officials give priority to projects that generate higher private material and political gains over projects with higher social returns (higher impact on the economy). These efficiency effects are difficult to test empirically but they are nonetheless critical for the linkages between corruption and growth. This bias in the allocation of public funds in favor of large rent-generating projects implies that corruption may lead to higher, not lower, public investment.

In this paper we study the impact of corruption on public and private investment in African countries as a way of exploring one channel through which corruption undermines growth. We examine empirically these effects using a sample of 33 African countries for the period 1982-2001. We use various specifications to explore the robustness of the results. We especially carefully examine the time series characteristics of the data (in a panel-data setting) and control

for possible endogeneity biases due to the nature of some of the regressors. For this purpose, we use the GMM estimation technique.

The empirical results indicate that corruption affects income directly and through its impact on investment. However, we find that the effects of corruption on private investment are different from those on public investment. In the case of private investment, we find evidence of negative effects of corruption, while public investment is positively related to corruption, suggesting that a corrupt government tends to allocate resources to large public investment infrastructure where the opportunities for embezzlement are higher and more lucrative.

The remainder of the paper is organized as follows. In the next section, we review the literature on the links between corruption, growth, and investment. In Section 3, we describe the data and the estimation methodology. In Section 4, we discuss the empirical results. Finally, we conclude and provide comments on our findings in Section 5.

2. Corruption, growth, and investment: A literature review

Corruption is often understood as the abuse of public office for private gains, whether material or political. According to sociologists, corruption is a symptom of dysfunctionality of the relationship between the state and the people, characterized by bribery, extortion and nepotism (Alatas 1968: 11). As a result of corruption, the public at large loses confidence in the government's ability to manage the economy in the interest of the people.

Given that corruption not only brings benefits to those in control of power, but also allows the latter to manipulate the institutions to their advantages, the result is that corruption has a tendency to be self-perpetuating. Thus, once a system is corrupt, it is likely to remain corrupt and become even more corrupt unless drastic reforms are undertaken to eradicate the phenomenon.

The literature has identified several vehicles of corruption which should not be understood as causes of corruption. These include concentration of power, discretion in public spending, the structure of the tax system, low relative wages in the public sector, embezzlement of external borrowing and aid, and lack of transparency in international contracts in natural resource extraction. For the purpose of this study, we emphasize the role of discretion and distortion in public spending (see Ndikumana 2007).

As Acemoglu and Verdier (2000) point out, corruption is by and large a byproduct of government interventions. It is often made possible by the discretion that the policy makers enjoy in determining the type, size, composition and geographical location of projects and service delivery.[1] The level of discretion is generally higher for capital expenditures than recurrent expenditures (Mauro 1998). For example, while governments can manipulate, misinvoice, and embezzle funding for road construction projects (capital expenditures), it is more difficult to embezzle civil servant salaries (recurrent expenditures).

[1] Discretion also increases possibilities of embezzlement, causing leakages in the transmission of resources from the central decision point to the ultimate users of public services (see Reinikka and Svensson 2005 for illustrations on the case of Uganda).

The foregoing analysis has important implications for the linkages between corruption and public investment. It suggests that corruption will be associated with higher public expenditure on infrastructure as decision makers seek to maximize their takings by giving preference to large new investment projects. This suggests that high public investment is not necessarily a desirable outcome in an environment characterized by corruption as it will result in wasteful allocation of public resources.

There is wide support in the literature for the view that corruption is bad for growth (Tanzi 2002; Svensson 2005; Gyimah-Brempong 2002). Empirical evidence shows that countries with higher levels of corruption tend to grow more slowly. This finding is particularly relevant for African countries for two reasons. First, African countries have worse governance outcomes that in other developing regions. Second sub-Saharan Africa also performs poorly in terms of growth relative to other regions. These two stylized facts suggest the possibility that governance in general and corruption in particular may be one of the reasons for the poor economic performance in the continent. In addition to reducing growth, corruption is also found to have substantial distributional effects as it affects the poor disproportionately. This is because corruption slows down the growth of the income of the poor, reduces pro-poor public expenditures, causes congestion in social services, and induces capital intensity in production, which reduces the employment the impact of investment and growth (Ndikumana 2007).

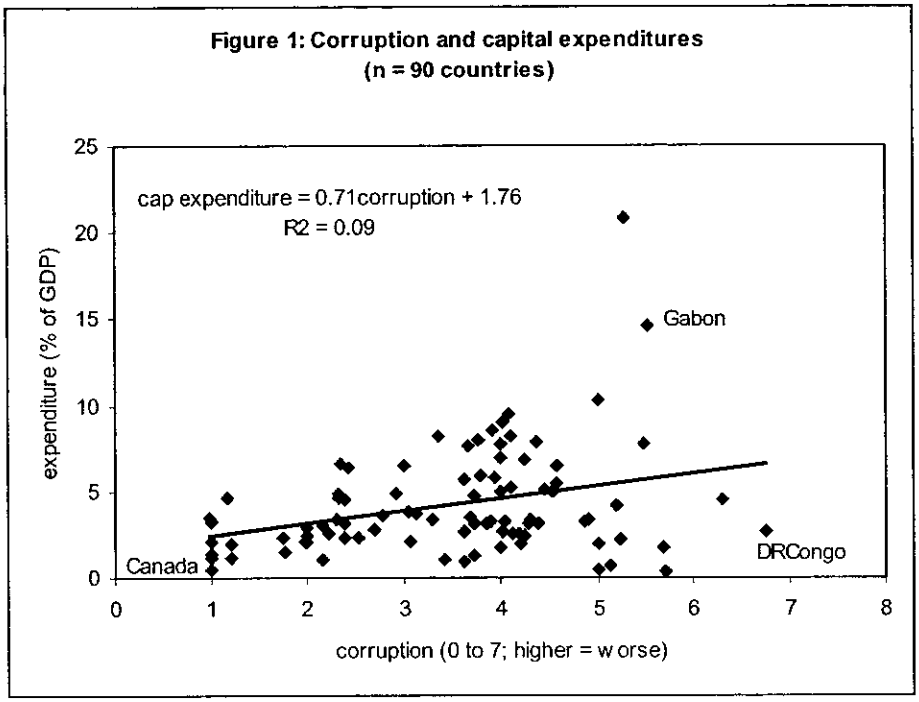
One important empirical question that remains unsettled is how exactly corruption reduces growth. In other words, what are the channels through which corruption undermines growth? The literature has identified a number of channels that appear to be empirically more prominent

in linking corruption to growth. These include investment (public and private), tax revenue, human capital accumulation and labor productivity, and political instability. Ndikumana (2007) provides a detailed discussion of these linkages and their implications for pro-poor growth. In this study we focus on the investment channels of the linkages between corruption and growth.

According to the literature, corruption discourages investment – both domestic investment and foreign direct investment – because the various forms of takings (bribes, kickbacks, etc.) and transactions costs due to corruption (delays, distortions, etc.) increase uncertainty over the returns to capital and raise the cost of production, which ultimately reduces profitability (Mauro 1995, Tanzi and Davoodi 2002a). Corruption acts as a tax on capital; but unlike official tax, it is uncertain and unpredictable, and therefore difficult to internalize. Given that corruption tends to perpetuate itself, the option of delaying investment is not viable. Hence, the only choice for the potential investor is to engage in activities with shorter term maturity such as trade and speculative ventures.

The empirical literature has documented that the effects of corruption on investment are quantitatively large. For example, according to Pelligrini and Gerlagh (2004), a one standard deviation decrease in the corruption index raises private investment by as much as 2.5 percentage points. This in turn leads to GDP growth by about 0.34 percentage points (see also Mauro 1995). Mauro (1998) argues that the bulk of the effects of corruption on growth operate through private investment, accounting for about one third of the total growth effects.

Corruption also reduces growth by adversely affecting both the quantity and the quality of public investment. Corruption erodes efficiency in decisions regarding public investment, especially by inducing preference for large projects with potential for large private gains for the policy makers. Indeed, data tends to support this prediction of a positive correlation between public expenditure and corruption (Figure 1; see also Ndikumana 2007). In addition, corruption causes a bias in favor of new projects to the detriment of maintenance expenditures (Mauro 1998; Tanzi and Davoodi 2002b). The preference for new projects is motivated by the pursuit of higher takings and is supported by the old "golden rule" that requires governments to finance recurrent expenditures by current revenue whereas capital expenditures can be financed by borrowing. These rent-seeking and golden-rule incentives generate a positive correlation between corruption and the quantity of public investment and a negative correlation between corruption and the quality of public investment. These relationships have important implications for the linkages between growth and public investment. As more resources are allocated to wasteful public investment, it is perfectly possible for higher public investment to be associated with lower growth. This is an empirical question that deserves further investigation.



Source: The corruption index is from *International Country Risk;* capital expenditure/gdp ratios are from *World Development Indicators*.

This study aims at exploring these investment channels of the effects of corruption on growth in the context of African countries. In addition to the strong empirical evidence on the linkages between growth and investment on the one hand and investment and corruption and investment on the other, the paper is motivated by the evidence of higher corruption and lower growth in African countries relative to other regions. The analysis in the paper may shed light on policies aimed at promoting growth through acceleration of domestic investment in African countries.

3. Data and methodology

3.1 Data

We use unbalanced panel data from 33 African countries for the period 1982-2001. The countries are selected based on data availability and data are not available for the same period of time for all countries. The main endogenous variables included in the estimation are income per-capita (in log form), domestic investment as a percentage of GDP, openness (the sum of exports and imports as a percentage of GDP, in log), a measure of financial development, proxied by the level credit to the private sector as a percentage of GDP (in log), and adult literacy rates (in log) as a measure of human capital. Data on these variables are from the World Bank's *World Development Indicators* and the *World Bank Africa Database.*

Our measure of corruption is the corruption index from the International Country Risk Guide (ICRG) database. This variable measures corruption in government and is measured on a scale of 0-6 with lower scores indicating that "high government officials are likely to demand special payments" and that "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans" (excerpts from ICRG variable description). In our empirical analysis, we have rescaled the corruption index by subtracting the ICRG value from 6 (the maximum value), so that high values indicate high corruption.

In addition, we control for other determinants of investment including total reserves and real exchange rate variability (defined as the absolute value of the annual deviation in the real

exchange rate index from a time trend) to proxy for economic instability. The effect of exchange rate instability on economic growth has been stressed in other studies (Bleaney and Greenaway, 2001; Baliamoune-Lutz and Ndikumana, 2007), and is of particular relevance to Africa. For example, Baliamoune-Lutz and Ndikumana (2007) argue that " [t]he narrow export base has exposed African countries to the vagaries of international markets, resulting in high volatility of export proceeds and exchange rate instability."

3.2 The empirical model

First, we examine the direct effects of corruption on growth by estimating the following model:

$$Y_{it} = \alpha Y_{i,t-1} + \beta X_{it} + \gamma Z_{it} + \nu_i + \varepsilon_{it} \quad (1)$$

where for a country i at time t, Y is the natural logarithm of per-capita real income, X is a vector of predetermined and endogenous variables (including corruption, investment, openness to trade, and others), Z is a vector of exogenous variables, and α, β, and γ are parameters to be estimated. The estimation results are reported in Table 1.

Second, we explore the effects of corruption on investment by estimating three sets of investment equations using alternatively domestic investment, private investment, and public investment as the dependent variable. We specify the following investment equation:

$$Inv_{it} = \partial Inv_{i,t-1} + \rho X_{it} + \lambda Z_{it} + \nu_i + \varepsilon_{it} \quad (2)$$

where Inv is investment, X is a vector of predetermined and endogenous variables (including per-capita real income, corruption, institutional quality, openness to trade, and others), and Z is a vector of exogenous variables. The estimation results are reported in Tables 2-4.

In all estimations, we assume that ν_i and ϵ_{it} are independent over all time periods and for each country i. The term ν_i represents country-specific effects that are assumed to be independent and identically distributed over the countries, and ϵ_{it} is also independent and identically distributed. We estimate the model using Arellano-Bond Generalized Method of Moments (GMM) estimator (Arellano and Bond, 1991). We report relevant statistics for the tests for autocorrelation and the validity of instruments (Sargan test) along with the coefficient estimates in Tables 1-4.

4. Discussion of empirical results

In Table 1 we report the estimation results for growth equations. Columns (1) and (2) show the results when we include total investment as a percentage of GDP. In both equations, investment has a positive and statistically significant coefficient, and macroeconomic instability (proxied by real exchange rate variability) has, as expected, a negative and statistically significant coefficient. The results indicate that openness to trade, corruption, and human capital (proxied by literacy rates) are statistically insignificant. In addition, the indicator of financial development is statistically significant but has a negative coefficient. This result is consistent with the findings in Baliamoune-Lutz and Ndikumana (2007) and, as the authors point out, this could be purely a correlation result (not a causality result), as many high-growth countries (mostly resource-rich countries and few non-resource rich countries like Ethiopia) have low level of financial development.

In column (2) of Table 1 we explore the joint effect of corruption and openness by including the interaction between corruption and openness and between corruption and the square of openness. The results indicate that the there is an inverted-U shape effect, implying that corruption is more harmful to growth at high levels of openness to trade. This suggests that high-trade African countries, consisting mostly of resource-rich countries, may be more prone to corruption.

In column (3) of Table 1 we distinguish between the effect of private investment and the effect of public investment. The results indicate that private investment has a negative coefficient but it is statistically insignificant.[2] On the other hand, the coefficient on public investment is positive and significant. Thus, the results point to different effects from private and public investment on income, which motivates the need to explore whether corruption affects public and private investment differently.

In Table 2 we report estimation results for total domestic investment. In all four columns income has a robust positive effect, implying that richer countries have higher investment ratios. Openness to international trade has, in general, a positive effect on investment. Corruption is shown to have negative effects on investment but only once we control for the joint effect of openness to trade and corruption. This joint effect has an inverted-U shape. As pointed out earlier, perhaps this result suggests that high-trade African countries, most of which are resource-rich, may be more prone to corruption. Exchange rate volatility has a negative and

[2] Including public investment and private investment in separate equations produced similar results. (The results that are not reported here can be obtained from the authors upon request).

significant effect on investment, consistent with our prediction that macroeconomic instability discourages investment.

Table 3 shows the regression results for the private investment equation. Corruption has a negative and significant effect on private investment while openness has a positive and statistically significant effect. These effects seem to be consistent with the theory on the links between trade and private investment and the negative effects of corruption on private investment. As expected, the proxy for economic instability (exchange rate variability) has negative and significant coefficient. In column 2 we also include a proxy for institutional quality, namely the polity 2 index from the Polity IV project. This variable is measured on a –10 to 10 scale, with higher values indicating better institutions. The coefficient on polity is statistically insignificant.

We do not find a positive coefficient on income as predicted by theory. In contrast, the coefficient on income is negative and significant. This result suggests that increases in income in this sample of countries have not been translated into higher private investment. This may illustrate the fact that growth in many SSA has been volatile and driven by the resource sector (oil and minerals) and that governments have failed to establish mechanism to allocate export revenues to expand new activities in the non-resource sectors. This interpretation is consistent with the results showing a negative association between foreign exchange reserves and total investment (see Elhiraika and Ndikumana 2007).

The estimation results for public investment equations are reported in Table 4. Income seems to have a positive effect on public investment. Interestingly, the coefficient on corruption is positive, suggesting that corrupt governments tend to allocate resources to large public investment infrastructure projects where the opportunities for embezzlement are higher and more lucrative. This results in wasteful investments in unproductive poorly designed projects, which will not be maintained. Recall that the results in Table 1 showed that public investment has a positive effect on income. These two sets of results are not inconsistent in the case of African countries. The results suggest that high income countries tend to have large public sectors, as a result of large infrastructure investments. To the extent that these infrastructure investments are motivated by corruption (as implied by the results in Table 3) it will be difficult for countries to sustain the projects, leading to a decay of the infrastructure. This in turn will make growth unsustainable. Indeed, a perennial feature of African economies has been the high volatility of growth over the past decades (UNECA 2006).

Given that recently many African countries have accumulated massive amounts of reserves due to high export revenues from the resource sector (oil and minerals), it is worth exploring the effects of reserves on public investment. The empirical results indicate that reserves are negatively related to public investment, suggesting that governments have not allocated these revenues to public investment (see also Elhiraika and Ndikumana 2007). This has interesting policy implications: the growth effects of the resource boom will be minimal unless countries take advantage of higher revenues to increase domestic investment.

4. Conclusion

Consistent with the empirical literature, the analysis in this paper has established a statistically significant effect of investment on growth in a sample of 33 African countries. The evidence confirms that investment constitutes a key driver for growth. In addition, the analysis provides evidence of a negative effect of corruption on domestic investment, suggesting that one of the channels through which corruption affects growth is through investment. One interesting result is that the effects of corruption on investment are different for private investment than for public investment. While corruption is shown to have a negative impact on private investment, the results indicate a positive relationship between public investment and corruption. The negative effect of corruption on private investment is due to the uncertainty as well as production and transactions costs arising from corruption. Thus, in this sample of African countries, the results do not support the view that corruption serves as a grease for the wheel of private economic activity, but rather as a tax that private investors are unable to internalize.

The positive association of public investment and corruption is indicative of rent-seeking and golden-rule effects. However, it is puzzling that at the same time, public investment is positively related to income. One possible interpretation is that countries with high income also have large public sectors, or that the public sector expands as income increases. However, even if this were the case, to the extent that the negative efficiency effects of corruption on public investment are substantial, then public investment would generate minimal gains in terms of long-term growth. Thus to achieve and sustain high growth it is necessary to increase not only the quantity of public investment but also its quality.

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Table 1. Arellano-Bond GMM Estimation: Income equation

	(1)	(2)	(3)
Income (lagged)	0.7887***	0.7842***	0.7421***
	(0.030)	(0.033)	(0.037)
Endogenous variables			
Investment (total)	0.0349**	0.0475***	
	(0.014)	(0.014)	
Private investment			-0.0016
			(0.001)
Public investment			0.0028**
			(0.001)
Openness	0.0114	-0.0629	0.0101
	(0.017)	(0.043)	(0.018)
Corruption	0.0045	-0.1866	-0.0015
	(0.005)	(0.083)	(0.005)
Financial Development	-0.0169*	-0.0173*	-0.0194**
	(0.008)	(0.009)	(0.009)
Corruption x Openness		0.0867**	
		(0.014)	
Corruption x Openness squared		-0.0094*	
		(0.005)	
Literacy	-0.0414		
	(0.063)		
Exogenous variables			
Exchange rate instability	-0.0151***	-0.0157***	-0.0119***
	(0.004)	(0.004)	(0.004)
Constant	0.0079***	0.0101***	0.0086***
	(0.002)	(0.002)	(0.002)
Number of obs.	417	378	383
Sargan test[a], chi2 [prob>chi2]	611.12 [0.99]	485.56 [0.99]	544.07 [0.99]
M2[b], z ; [pr > z]	1.31 [0.19]	-0.35 [0.73]	1.35 [0.18]

Notes: The dependent variable is log of per-capita income.
[a] Sargan test of over-identifying restrictions (Null: Instruments are valid)
[b] Arellano-Bond test that average autocovariance in residuals of order 2 is 0.

Table 2. Arellano-Bond GMM Estimation: Total domestic investment equation

	(1)	(2)	(3)	(4)
Investment (lagged)	0.3155***	0.3224***	0.3145***	0.3197***
	(0.036)	(0.036)	(0.036)	(0.037)
Endogenous variables				
Income	0.2277***	0.2769***	0.2304***	0.1928**
	(0.0799)	(0.088)	(0.080)	(0.083)
Openness	0.4385***	0.4346***	0.3538***	0.1553
	(0.047)	(0.048)	(0.0123)	(0.112)
Corruption	-0.0018	-0.0017	-0.5171**	-0.855***
	(0.014)	(0.014)	(0.249)	(0.234)
Financial development			-0.0096	
			(0.025))	
Corruption x Openness			0.2360**	0.3596***
			(0.118)	(0.114)
Corruption x Openness squared			-0.0266*	-0.0360**
			(0.015)	(0.015)
Exogenous variables				
Exchange rate instability	-0.0148	-0.0173	-0.0136	-0.0254**
	(0.011)	(0.011)	(0.012)	(0.011)
Financial development	-0.0048*	-0.0031		
	(0.003)	(0.003)		
Total Reserves		-0.0019		-0.0028**
		(0.001)		(0.001)
Landlocked		-0.0006		
		(0.005)		
Constant	0.0088***	0.0154***	0.0056	0.0194
	(0.010)	(0.012)	(0.007)	(0.009)
Number of obs.	420	418	414	448
Sargan test[a], chi2 [prob>chi2]	517.83 [0.99]	513.30 [0.99]	528.12 [0.99]	560.26 [0.99]
M2[b], z ; [pr > z]	1.30 [0.19]	1.15 [0.25]	1.08 [0.28]	0.77 [0.44]

Notes: The dependent variable is the ratio of total investment to GDP, in log.
[a] Sargan test of over-identifying restrictions (Null: Instruments are valid)
[b] Arellano-Bond test that average autocovariance in residuals of order 2 is 0.

Table 3. Arellano-Bond GMM Estimation: Private investment equation

	(1)	(2)
Private investment (lagged)	0.5214***	0.5157***
	(0.045)	(0.045)
Endogenous variables		
Income	-4.2127***	-3.9617***
	(1.449)	(1.527)
Openness	3.7830***	3.7199***
	(0.860)	(0.949)
Corruption	-0.5060**	-0.531**
	(0.251)	(0.219)
Polity		0.0524
		(0.0539)
Exogenous variables		
Exchange rate instability	-0.4019**	-0.5287**
	(0.107)	(0.219)
Constant	0.3429***	0.3652***
	(0.115)	(0.115)
Number of obs.	412	412
Sargan test[a], chi2 [prob>chi2]	403.62 [0.52]	376.86 [0.17]
M2[b], z ; [pr > z]	0.88 [0.38]	0.85 [0.39]

Notes: The dependent variable is the ratio of private investment to GDP, in log.
[a] Sargan test of over-identifying restrictions (Null: Instruments are valid)
[b] Arellano-Bond test that average autocovariance in residuals of order 2 is 0.

Table 4. Arellano-Bond GMM Estimation: **Public investment equation**

	(1)	(2)	(3)
public investment (lagged)	0.5868***	0.5858***	0.5851***
	(0.034)	(0.034)	(0.035)
Endogenous variables			
Income	2.7846***	2.8079***	2.7816***
	(1.040)	(1.050)	(1.015)
Openness	2.7463***	2.0877***	2.8925***
	(0.568)	(0.564)	(0.579)
Corruption	0.3599**	0.3609**	0.3427**
	(0.167)	(0.167)	(0.169)
Exogenous variables			
Reserves	-0.0264*	-0.0272*	-0.0275*
	(0.013)	(0.014)	(0.014)
Exchange rate instability		-0.0270	-0.0339
		(0.119)	(0.119)
Constant	-0.0260	-0.0104	-0.0017
	(0.076)	(0.109)	(0.110)
Number of obs.	387	387	387
Sargan test[a], chi2 [prob>chi2]	438.62 [0.13]	438.42 [0.13]	437.75 [0.81]
M2[b], z ; [pr > z]	-0.34 [0.73]	-0.34 [0.73]	-0.38 [0.71]

Notes: The dependent variable is the ratio of public investment to GDP, in log.
[a] Sargan test of over-identifying restrictions (Null: Instruments are valid)
[b] Arellano-Bond test that average autocovariance in residuals of order 2 is 0.