DEPARTMENT OF ECONOMICS

Working Paper

Corruption and Growth: Exploring the Investment Channel

by

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Working Paper 2008-08

UNIVERSITY OF MASSACHUSETTS AMHERST

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Abstract

This study investigates 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 economic 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 positive association between public investment and corruption supports the view that corrupt bureaucrats seek to increase capital expenditure (over maintenance expenditures) to maximize private gains (rent-seeking). In contrast, the results confirm that corruption discourages private investment, suggesting that corruption increases the costs of doing business while raising uncertainty over expected returns to capital. The results support the view that corruption hampers growth and call for institutional reforms to improve the quality of governance as a prerequisite for achieving investment-led growth.

May 21, 2008

* This paper was presented at the African Economic Conference organized by the African Development Bank and the United Nations Economic Commission for Africa in Addis Ababa, Ethiopia, November 15-17, 2007. The authors appreciate constructive comments from the discussant of the paper and the participants. Opinions expressed in this paper are responsibility of the authors and do not reflect the views of their institutions of affiliation.

1. Introduction

The empirical literature has provided substantial evidence of the negative impact of corruption on economic activity, both at the macroeconomic level as well as the microeconomic level. At the macroeconomic level, corruption has been shown to have negative effects on per capita GDP level and growth (Mauro 1995; Ades and Di Tella 1997; Lambsdorff 2003). At the microeconomic level, evidence shows that corruption is associated with lower efficiency in the allocation and use of production factors (Dal Bó and Rossi 2007).

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 is 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 further 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 with aggregated data, 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 (though inefficient), 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 (see Appendix A) over 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 regressorsusing the GMM estimation technique.

The empirical results indicate that corruption affects income directly and through its impact on investment. However, we find that corruption affects private investment and public investment differently. We find that corruption affects private investment negatively, while it is positively related to public investment, suggesting that a corrupt government tends to allocate resources to large public investment infrastructure to maximize opportunities for embezzlement of public resources. The results imply that the rent-seeking bias in the allocation of public expenditures results in higher, though inefficient, public investment in economies characterized by high levels of corruption.

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. Section 4 discusses the empirical results and Section 5 concludes with a summary of the findings.

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 advantage, the consequences 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, temptation for embezzlement of fungible external debt and development aid, and lack of transparency in international contracts especially in natural resource extraction (see Ndikumana 2007). In this study, we emphasize the role of discretion and distortion in public spending.

As Acemoglu and Verdier (2000) point out, corruption is by and large a byproduct of government interventions. It is especially 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).

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 private gains by giving preference to large new investment projects over maintenance expenditures. 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 detrimental to 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 developing countries in general, and African countries in particular for two reasons. First, governance standards are generally lower in developing countries compared to industrialized countries, and they are worse in African countries compared to countries in other

[1] Discretion also increases possibilities of embezzlement, causing leakages in the transmission of public 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).

developing regions (see Ndikumana 2007). Second, sub-Saharan Africa also performs poorly in terms of growth relative to other regions (UNECA, 2008). These two stylized facts suggest the possibility that bad governance in general and corruption in particular may be one of the reasons for the poor economic performance in African countries.

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 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. The present study focuses 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

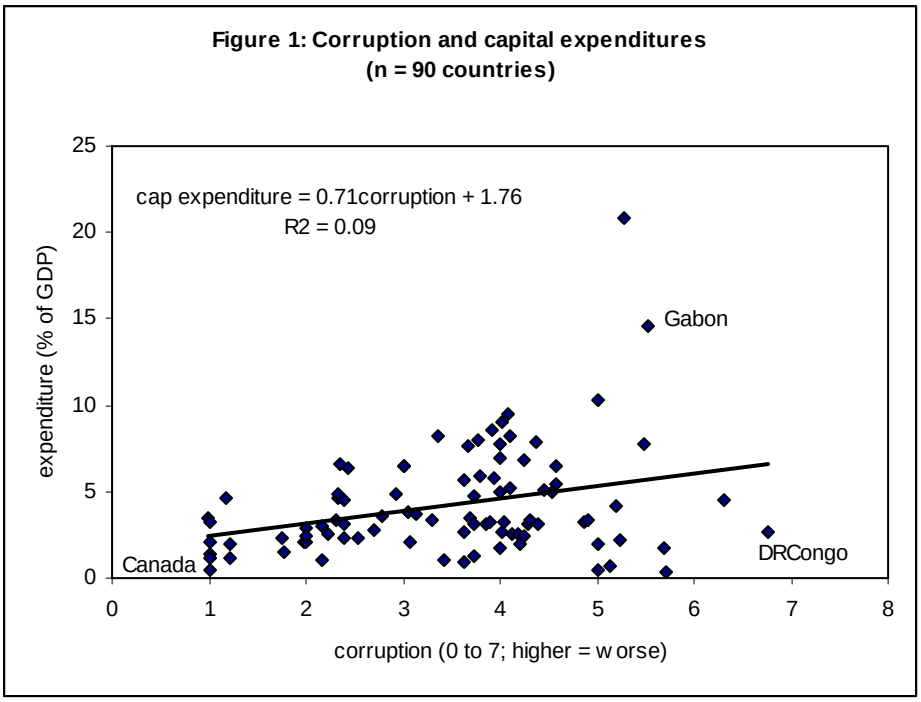
transactions costs due to corruption (delays, distortions, etc.) increase uncertainty over the returns to capital and raise the cost of production, which ultimately reduces profitability (Mauro 1995, Tanzi and Davoodi 2002a). Corruption acts as a tax on capital; but unlike official tax, it is uncertain and unpredictable, and therefore difficult to internalize. Given that corruption tends to perpetuate itself, this makes the option of delaying investment less attractive. This induces potential investors to prefer activities with shorter maturity such as trade and speculative ventures over long-term investment.

The empirical literature has documented that the effects of corruption on investment are quantitatively large. For example, according to Pellegrini 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 an increase in 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 total growth effects.

Corruption also reduces growth by adversely affecting the quantity as well as 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 tend to support this prediction of a positive correlation between public expenditure and corruption (Figure 1; see also Ndikumana 2007). Firm-level data show that corruption is associated with lower efficiency. Dal Bó and Rossi (2007) find that public

electricity distribution companies are less efficient – use more labor for a given level of output – in countries with high level of corruption. Thus, corruption is likely to be associated with higher but less efficient public investment.

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 also 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 Guide;* 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 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 by encouraging domestic investment in African countries.

3. Data and methodology

3.1 Data

This study uses unbalanced panel data from 33 African countries for the period 1982-2001. The countries are selected on the basis of data availability. The main endogenous variables included in the estimation are income per-capita (in log form), domestic investment (public, private, total) as a percentage of GDP, openness (the sum of exports and imports as a percentage of GDP, in log), total reserves (in log), a measure of financial development, proxied by 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 higher corruption, where "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). In the empirical analysis, the corruption index is rescaled by subtracting the ICRG value from 6 (the maximum value), so that high values indicate high corruption for ease of interpretation of the regression results.

In addition, the analysis controls 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 macroeconomic 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 African countries. 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: domestic investment, private investment, and public investment. 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 v_i and ε_{it} are independent over all time periods and for each country *i.* The term v_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

Table 1 reports 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 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. Baliamoune-Lutz and Ndikumana (2007) also find a similar counterintuitive result, which is most likely a correlation result rather than indicating any causality, 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 private investment and public investment. The results indicate that contrary to our expectations, 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.

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

[2] Including public investment and private investment in separate equations produced similar results. The results are not reported here but they may be obtained from the authors upon request.

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. 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, measured on a –10 to +10 scale, with higher values indicating better institutions. This variable has a statistically insignificant coefficient.

Contrary to expectation, income has a negative and significant effect on private investment. 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 countries has been volatile and driven by the resource sector (oil and minerals) and that governments have failed to establish mechanisms to channel export revenues to expand new activities in non-resource sectors. This interpretation is consistent with the findings in other studies that document a negative association between foreign exchange reserves and total investment (see, among others, 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 with more opportunities for private gains. This results in

wasteful investments in unproductive and 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 early decay of the infrastructure. This in turn will make growth unsustainable. Indeed, a perennial feature of African economies has been high volatility of growth over the past decades (UNECA 2008).

Given that recently many African countries have accumulated massive amounts of reserves due to high exports of oil and minerals, it is worth exploring the effects of reserves on public investment. The empirical results indicate that accumulation of reserves is negatively related to public investment, suggesting that governments have not used these revenues to increase public investment (see also Elhiraika and Ndikumana 2007). This result implies that the growth effects of the resource boom will not be sustained if African countries fail to take advantage of higher revenues to increase domestic investment.

4. Conclusion

Consistent with the evidence in 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 corruption affects private investment and public investment differently. While corruption has 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 cannot fully internalize.

The observed positive relation between 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 rates it is necessary to increase not only the quantity of public investment but also its quality, which in turn will require aggressive measures to reduce corruption.

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Appendix A

List of countries

Algeria	Ethiopia	Mali	Sierra Leone
Angola	Gabon	Malawi	Sudan
Burkina Faso	Gambia	Morocco	Tanzania
Botswana	Ghana	Namibia	Togo
Cameroon	Guinea Bissau	Niger	Tunisia
Democratic Rep. of Congo	Guinea	Nigeria	Uganda
Cote d'Ivoire	Kenya	South Africa	Zambia
Congo, Rep.	Madagascar	Senegal	Zimbabwe
Egypt			

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**	-0.5310**
	(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.