Why Corrupt Governments May Receive More Foreign Aid

D. de la Croix and C. Delavallade

Discussion Paper 2009-33

Institut de Recherches Économiques et Sociales
de l'Université catholique de Louvain

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David de la Croix[1] Clara Delavallade[2]

October 19, 2009

Abstract

In this paper we argue that if the cross-country heterogeneity in productivity is more important than the heterogeneity in government quality, it can be optimal to give more foreign aid to more corrupt countries. We build a multi-country model of optimal aid in which we disentangle the correlation between aid and equilibrium corruption into two components: the first one reflects variations in the quality of institutions and the second encompasses variations in productivity levels. The data suggest that both components of the correlation are significant, however the effect of variations in productivity levels is stronger. This implies that most corrupt countries, since they are also the poorest, receive higher amounts of foreign aid.

Keywords: Corruption, Aid, Government spending, Institutions.
JEL Classification numbers: O19.

[1]IRES and CORE, Université catholique de Louvain.
[2]Abdul Latif Jameel Poverty Action Lab.

Acknowledgements: David de la Croix acknowledges the financial support from the Belgian French speaking community (grant ARC 09/14-018 on "sustainability") and the Belgian Federal Government (Grant PAI P6/07 "Economic Policy and Finance in the Global Economy: Equilibrium Analysis and Social Evaluation"). We thank Luc Bauwens, Frédéric Docquier, Michel Lubrano, Carine Staropoli, Aude Le Lannier and the participants at the ATOM seminar who contributed to improve this paper in one way or one another.

E-mail: david.delacroix@uclouvain.be, clara@ifmr.ac.in

More than ten years ago, international aid donors indicated their intention to base aid allocation more and more on good governance, and in particular on fighting against corruption. Had these announces been translated into action, the measured correlation between aid and corruption, *ceteris paribus*, should have become negative. However, despite official positions and pronouncements, Alesina and Weder (2002) show that more corrupt governments receive more aid from developed countries. In this paper, we argue that this finding can be in accordance with optimal behavior of donors.

Aid is allocated to countries with better institutions but also to countries with lower productivity, *i.e.* to poorer countries. Thus we decompose the correlation between aid and corruption into two components: an institutional one and a productivity one. An improvement in the quality of institutions induces a lower level of corruption and a higher level of aid reception. According to this effect, the correlation between aid and corruption should be negative. However this can be counterbalanced by what we call the productivity effect: lower levels of productivity are associated with higher levels of both corruption and optimal aid, leading to a positive correlation between aid and corruption. Therefore, if the heterogeneity in productivity is more important among developing countries than the heterogeneity in the quality of institutions, the effect of the productivity component is prevalent. Indeed, since most corrupt countries are also the poorest it is optimal to provide them with more aid. An illustration of this phenomenon is the case of Botswana and Uganda: these two Sub-Saharan countries display higher levels of productivity and "better institutions" than other countries in the region. They receive about the lowest levels of foreign aid among Sub-saharan countries because in this region countries differ more by productivity levels than by governance quality.

We show that corrupt governments can receive more foreign aid in a very streamlined framework. Section 1 proposes a coherent example where it can be optimal to give aid to the most corrupt countries. In this model, households allocate their time among three activities: private production, government production and diversion of government production (corruption)[1]. At equilibrium the returns on the three occupations should be equalized. Given this incentive constraint, a donor has to allocate scarce resources to provide aid to a set of countries. In Section 2, we estimate the effect of productivity and institutions quality on foreign aid and the level of corruption in 159 aid-recipient countries; we decompose the correlation between aid and corruption and show that it is tilted towards being positive because the variance of productivity across countries is high. Section 3 details the extent to which these findings are robust to the measurement of the variables, to the estimation method, and to the inclusion of additional variables. Section 4 concludes.

[1]Corruption is generally defined by economists as the misuse of public office for private gain. In our model, corruption is restricted to embezzlement.

1 The Model Economy

We consider a one-period model economy populated by a continuum of workers of unitary mass. The government of this economy receives some general financial assistance from abroad. Workers choose to allocate their time among three activities: private production l_c, government production l_g and diversion of government production l_x.[2] The time resource constraint is

$$1 = l_c + l_g + l_x. \tag{1}$$

There are three goods in this economy: a consumption good produced by the private sector (say rice), a government good (say education), and labor. The consumption good is produced from labor; each unit of labor produces $a > 1$ units of good; l_c is labor input in this sector and a is a parameter reflecting exogenous productivity factors, such as soil quality or technological level. Assuming that firms are operated by self-employed workers, per-capita income is equal to average productivity a. In order to compute the equilibrium explicitly we assume constant marginal productivity in the private sector, however it is not crucial for the results.

The government levies lump sum taxes in order to finance government spending. Each individual pays an amount t independently of the type of job she does. With this assumption taxes do not distort the choice of activity by workers. Total consumption c is given by: $c = al_c - t$.

The government resources include taxes t and aid z. Both are used to produce the government good g. The production function in the government sector is given by $\sqrt{l_g}$, where l_g is labor input in this sector. A part l_x/ν of the product is diverted from its purpose, with l_x representing the labor input devoted to corruption activities, and ν a parameter measuring the quality of institutions. Given the time spent in corruption activities l_x, if institutions are of high quality, the share of government spending diverted from its purpose is small (corruption is better controlled). The effective production of the government good is:

$$g = \sqrt{l_g}(1 - l_x/\nu).$$

The budget constraint of the government can be rewritten as:

$$\underbrace{t}_{\text{taxes}} + \underbrace{z}_{\text{aid}} = \underbrace{\sqrt{l_g}}_{\text{total spending}} = \underbrace{g}_{\text{effective output}} + \underbrace{\sqrt{l_g} l_x/\nu}_{\text{diverted spending}}. \tag{2}$$

Income per worker in the government sector is equal to average productivity: g/l_g. Bureaucrats' income is, like in Becker and Stigler (1974), Rose-Ackerman (1978), Acemoglu and Verdier (2000), an incentive payment increasing in the effectiveness of government

[2] This reflects that civil servants may also own a small shop and/or embezzle public resources.

spending. The per-capita income from corruption is: $\sqrt{l_g}/\nu$. At any interior equilibrium, the return from the three possible activities should be equal:

$$a = \frac{\sqrt{l_g}(1 - l_x/\nu)}{l_g} = \sqrt{l_g}/\nu. \tag{3}$$

This relation, which describes the choice of activity by households, acts as a constraint for the donor problem and makes the level of corruption endogenous. We label it the *incentive constraint*. Notice that this relationship pegs the level of government employment l_g. Taxes adjust endogenously to balance the budget. Let us now provide a definition of an equilibrium for a given economy and show that, if the quality of institutions is sufficiently poor relative to productivity, such an equilibrium with positive corruption exists.

Definition 1 *Given foreign aid z, productivity a and institutional quality ν, an equilibrium with corruption is represented by a level of tax $\{t\}$ and a vector of positive labor inputs $\{l_c, l_g, l_x\}$ such that the budget of the government is balanced (Equation (2)), the labor market clears (Equation (1)) and the incentive constraint holds (Equation (3)).*

Proposition 1 *If the quality of institutions satisfies $\nu < 1/a^2 < 1$, there exists a unique equilibrium with corruption where $t = a\nu - z$, and*

$$\begin{aligned} l_c &= 1 - \nu, \\ l_g &= a^2\nu^2, \\ l_x &= \nu(1 - a^2\nu). \end{aligned}$$

Alternatively, if institutions were good enough, i.e. $\nu \geq 1/a^2$, the economy would be in a corner regime with $l_x = 0$. However in our analysis we are only interested in the interior regime with a positive level of corruption.

Proposition 1 says that there is a unique number of government employees which is compatible with labor market clearing and equality of remunerations across sectors. Any other level of public employment would violate at least one of these conditions and would not be an equilibrium outcome. Finally, in equilibrium, consumption of both goods is given by:

$$c = al_c - t = a + z - 2a\nu \tag{4}$$

$$g = \sqrt{l_g}(1 - \nu l_x) = a^3\nu^2. \tag{5}$$

We measure the corruption level x by the implicit "tax" rate on the production of the government good:

$$x = l_x/\nu = 1 - a^2\nu. \tag{6}$$

Proposition 2 *Equilibrium corruption x is decreasing in productivity a and decreasing in the quality of institutions ν.*

Higher productivity a makes private activity more rewarded, decreasing the amount of time spent on corruption activities. This makes government spending more productive (the increase in productivity spreads over the public sector *via* the incentive constraint) and it raises the labor input in the government sector. Better institutions ν make corruption less profitable and increase the productivity of the government sector.

Let us now consider the problem of the donor agency, who has to allocate aid across different countries i. Taking a utilitarist perspective, the donor maximizes

$$\sum_i u(z_i) \text{ subject to } \sum_i z_i = \bar{z},$$

where $\bar{z}$ is the total amount of aid available and $u_i(z_i)$ is the utility of country i associated to aid z_i.[3] It is optimal to equalize the marginal utility of aid across countries.[4] We assume that the utility function of each country is logarithmic and separable in c_i and g_i:

$$u_i = \ln(c_i) + \gamma \ln(g_i)$$

where c_i and g_i are given by (4) and (5) and where γ represents the relative weight of the government good. Therefore the marginal utility of aid is given by:

$$u_i'(z_i) = \frac{\partial(\ln(c_i) + \gamma \ln(g_i))}{\partial z} = \frac{1}{c} = \frac{1}{a_i + z_i - 2a_i\nu_i}$$

Optimal aid is obtained by equalizing this marginal utility across countries $u_i' = u_j' = \bar{u}$, $\forall i, j \in I$, where $\bar{u}$ is the marginal utility which can be achieved given the resource constraint. Aid in country i is indeed:

$$z_i = \frac{1}{\bar{u}} + a_i(2\nu_i - 1) \tag{7}$$

Proposition 3 *Optimal aid z is a positive function of the quality of institutions ν. Moreover for $\nu_i < 1/2$ optimal aid is a negative function of productivity a_i.*

The first statement of the proposition is in line with the new poverty reduction strategies, in which governance quality is a key conditionality. When institutions are of high quality, public spending and taxes are relatively more important than private consumption. Marginal utility of consumption is high and aid effective in raising utility. Good

[3] Alternatively we can have a formulation where the donor maximizes $\sum(u(z_i) - \rho z_i)$ where ρ is the cost of funds. This would lead to exactly the same results.

[4] In section 3, we show that our main results remain unchanged when substituting a "donor interests" model for this "recipient needs" model.

governments are helped by reducing the need for taxation in their country. The second statement gives a condition under which aid is allocated in priority to poor countries.[5] In this case, when productivity a is high, both productivity in the private sector and consumption are high, reducing the need for aid. The role of the condition $\nu_i < 1/2$ becomes clear when considering the equilibrium consumption given in Equation (4). The effect of productivity a on equilibrium consumption c is a priori ambiguous (hence the ambiguity on aid). Productivity has a direct "one to one" effect on consumption *via* the production of physical good. But it also has an indirect effect through the government budget constraint: more productivity also implies more taxes and less consumption. This indirect effect dominates the direct one if $\nu < 1/2$.

2 Empirical Strategy and Results

Consider now a set of countries I. Each country is characterized by productivity $a_i > 1$ and institution quality $\nu_i < 1/2$, with $i \in I$. In each country, the level of corruption is x_i satisfying equation (6) and aid is z_i satisfying equation (7). Taking a first order Taylor Expansion of equations (6) and (7) around the equilibrium, we obtain:

$$\mathrm{d}x_i = -\beta_{11}\mathrm{d}a_i - \beta_{12}\mathrm{d}\nu_i \tag{8}$$

$$\mathrm{d}z_i = -\beta_{21}\mathrm{d}a_i + \beta_{22}\mathrm{d}\nu_i \tag{9}$$

where $\mathrm{d}x$ represents the difference between variable x and its mean (taken over set I). The β coefficients are all positive. The correlation between corruption and aid can be computed as follows:

$$\mathrm{corr}(\mathrm{d}x_i, \mathrm{d}z_i) = s\left[\underbrace{-\beta_{12}\beta_{22}\mathrm{var}(\mathrm{d}\nu_i)}_{-}\ \underbrace{+\beta_{11}\beta_{21}\mathrm{var}(\mathrm{d}a_i)}_{+}\ \underbrace{+(\beta_{12}\beta_{21}-\beta_{11}\beta_{22})\mathrm{cov}(\mathrm{d}a_i,\mathrm{d}\nu_i)}_{?}\right]$$

with $s = 1/(\sigma_{\mathrm{d}x_i}\sigma_{\mathrm{d}z_i})$. The first term,

$$T_1 = s\beta_{12}\beta_{22}\mathrm{var}(\mathrm{d}\nu_i),$$

shows that when countries differ by institutions quality, more aid will be given to countries with better institutions, which are also characterized by lower corruption. Hence the correlation between aid and corruption is negative. The second term,

$$T_2 = s\beta_{11}\beta_{21}\mathrm{var}(\mathrm{d}a_i) + s(\beta_{12}\beta_{21}-\beta_{11}\beta_{22})\mathrm{cov}(\mathrm{d}a_i,\mathrm{d}\nu_i),$$

[5]Notice that the condition $\nu_i < 1/2$ is more restrictive than the one in Proposition 1 only if $a_i < \sqrt{2}$.

arises because productivity varies between countries. If productivity varies enough, it could counterbalance T_1 and reverse the sign of the correlation between aid and corruption. T_2 is the sum of two terms: $\beta_{11}\beta_{21}\text{var}(\text{d}a_i)$ is positive and reflects that more aid tend to be given to poor countries, which are also characterized by higher levels of corruption. $(\beta_{12}\beta_{21} - \beta_{11}\beta_{22})\text{cov}(\text{d}a_i, \text{d}\nu_i)$ has an ambiguous effect: it reflects the fact that productivity and quality of institutions are likely to be positively correlated. Hence, if developing countries differ mostly by productivity levels (high $\text{var}(\text{d}a_i)$), more than by governance quality ($\text{var}(\text{d}\nu_i)$), aid and level of corruption may well turn out to be positively correlated.

Notice that in the above decomposition we have neglected error terms which will be introduced in equations (8)-(9) when doing the estimations. These errors add additional components to the correlation between aid and corruption, which may or may not be negligible, given the highly stylized nature of our exercise.

We turn now to the estimation of equations (8)-(9), which will allow us to decompose the correlation between aid and corruption in the two terms detailed above.

We focus on 159 recipient countries over the period 1996-2005. Over this period, winning the Cold War is no longer a motive to provide aid to developing countries (Meernik, Krueger, and Poe 1998); on the contrary, it is during this period that aid started to be conditioned on improving governance in recipient countries (Tornell and Lane (1999), (Burnside and Dollar 2000)).

We first run a benchmark estimation of seemingly unrelated regressions (SURE). Aid is measured in real dollars per capita (from World Development Indicators, as in Alesina and Weder (2002)), it includes both multilateral and bilateral flows. As a proxy for the level of corruption x we use the "Control of Corruption" index provided by the World Bank and presented by Kaufmann, Kraay, and Mastruzzi (2003). This index is an aggregate of the results of several surveys including questions such as "How many government officials do you think are involved in corruption?". Contrary to Transparency International's corruption perceptions index, the World Bank one makes possible intertemporal, as well as cross-country, comparisons. Moreover this index has the advantage of measuring mainly public corruption, although it has the drawback to be based on perception surveys.[6] The quality of institutions is measured by the Political stability index available in the Governance Research Indicator Country Snapshot (GRICS). Productivity is measured by the level of GDP per capita from the Penn World Tables.[7]

[6]Other indices used to measure public corruption (e.g. from Business International (Ehrlich and Lui 1999) or Political Risk Services (Mauro 1997)) have the same disadvantages. But the World Bank index reduces each source-specific bias by combining them.

[7]Productivity is not corrected to deduce the effect of natural resources (see Hall and Jones (1999)). We do not want this correction here because natural resources are part of the country income and should be kept in a.

Table 1: Estimation Results - benchmark

Obs.	Parameters Estimates				Correlation Decomposition		
	β_{11}	β_{12}	β_{21}	β_{22}	$\underset{(\mathrm{d}x_i, \mathrm{d}z_i)}{\mathrm{corr}}$	T_1	T_2
939	0.273	0.384	0.718	0.633	0.085	-0.200	0.443
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)

Notes: P-values in brackets. All countries have equal weights.

Table 1 presents the results. All the β coefficients have the expected sign and they are all significant at the 1%-level. We use them to decompose the correlation between aid and corruption. We compute the standard error of the terms T_1 and T_2 using the delta method (Oehlert 1992), considering that the variances and covariances of the variables are known.[8] We conclude that aid is significantly and positively correlated with the level of corruption: T_2, the positive correlation due to differences in productivity levels between recipient countries, is stronger than T_1, the negative correlation due to differences in governance quality.[9]

3 Robustness Analysis

In this section we analyze the extent to which the findings of the previous section are robust to the measurement of the variables, to the estimation method and to the inclusion of additional variables. In general we find that the size of coefficients and correlations can change substantially but their sign and significance remains unaltered by alternative specifications.

3.1 Alternative Measures and Sample

We consider alternative measures for institutions quality, aid and productivity. In Table 2, the first block reports the estimation results where the variable Regulatory quality is replaced by (a) Rule of Law, (b) Government effectiveness, (c) Political stability, and (d) Voice and accountability, respectively. Lines (i) and (ii) refer to specifications using total aid excluding debt relief and only multilateral aid. Line (I) reports the estimation results where the variable GDP per capita is replaced by GDP per worker. Finally, in the benchmark model we have pooled all the data available. However, there is little

[8] Notice that we do not report the residual component of the correlation since it is a combination of differences in productivity levels and differences in institutional qualities, which makes its interpretation vague. In most regressions, this residual component is not significant.

[9] If, in Rwanda, the quality of institutions and the level of productivity improved and were comparable to Honduras (the level of GDP per capita would double, from 1150 to 2300), the level of corruption would decrease but the level of total aid received as well (from 55 to 48 million dollars).

variation in the variables over time, so it might be that the significance of the coefficients is artificially inflated by a large number of similar observations. To address this issue, we run the regression for each year separately. The last block of Table 2 reports the results for years 1996 and 2004.

When using different measures of institutional quality, all coefficients have the expected sign and they are all significant at the 1%-level except when we measure the quality of institutions by the rule of law. In that case, rule of law and corruption are highly correlated and productivity has a smaller effect on corruption. This would plead for using instrumental variables methods in order to correct for the possible simultaneity bias in the coefficients. Then, when measuring productivity by GDP per worker instead of GDP per capita (line I), the estimation is very close to the benchmark. For all years, all coefficients have the same sign as in the benchmark and are significant. The correlation between corruption and aid as in Alesina and Weder (2002) is not significant. But we provide here a rational explanation for the absence of correlation: both the institutions part and the productivity part of the correlation decomposition, T_1 and T_2 respectively, are significant. Hence, the positive effect of differences in productivity on the correlation between aid and corruption compensates the negative effect of the gap in the quality of institutions.

Indeed, our results are robust to the restriction of the sample to specific years in the period 1996-2005. They are also robust to the inclusion of time dummies in the pooled estimation (they are not significant) and to the exclusion of countries with extremely high levels of aid per capita, because of their very small size, such as Micronesia, Marshall Islands, Tonga or Kiribati.

3.2 Instrumentation

Next, we estimate the two equations with an instrumented three-stage least squares method to account for possible endogeneity biases affecting the four coefficients estimates (Table 3). We use four standard instrumental variables correlated either with productivity or with the quality of institutions (see Burnside and Dollar (2000)): the 20-year lagged log of GDP per capita (or per worker), the 5-year lagged log of trade openness (sum of exports and imports as a percent of GDP), the 20-year lagged illiteracy rate and the log of the number of years after independence.

The results of instrumented estimations are presented in Table 3. On the whole, sign and significance of coefficients and correlations do not change. However, the size of β_{21} and β_{22} is higher compared to the benchmark.[10] As a consequence, both partial

[10]The omission of a war component for example in the regression of aid may lead to a negative bias in the estimation of the marginal effects of both productivity and institutional quality on the level of aid received: a war dummy may be negatively correlated with both productivity and institutional quality but positively with the level of aid. Instrumenting enables to reduce this negative bias.

correlations are increased too.

To test the relevance of the instruments, we look at the Fisher-statistics corresponding to the first stage of the instrumentation regression of productivity and quality of institutions. We also run a Sargan overidentification test of the null hypothesis that instrumental variables are not correlated with the error terms of the equation of interest. The results of these tests are reported in the right columns of Table 3 in Appendix. The high values of the F-statistics, all except two superior to 10, indicate that the instruments are not weak: the coefficients are well identified and the inference is robust (Staiger and Stock 1997). Whether our instruments are correlated with the error terms or not is less clear cut. The results of the Sargan test suggest that they are not as far as the first three measures of ν are instrumented (political stability, rule of law, and government effectiveness).[11]

3.3 Missing Variables

The equations estimated above were deliberately simple, and included only two variables: productivity and institutions. These two should be of first-order importance as far as aid and corruption are concerned, as indicated by our theoretical model. In this subsection we generalize our approach assuming that the donor puts weights θ_i on the countries i, in accordance with its political agenda. These weights may for example represent closer tights, due to a colonial past, political or strategic alliances (Alesina and Dollar 2000).[12] Thus, the donor maximizes:

$$\sum_i \theta_i u(z_i) \text{ subject to } \sum_i z_i = \bar{z}.$$

Optimal aid is obtained by equalizing this marginal utility across countries $\theta_i u_i' = \theta_j u_j' = \bar{u}$, $\forall i, j \in I$. $\bar{u}$ is the weighted marginal utility which can be achieved given the resource constraint. Aid in country i will be:

$$z_i = \frac{\theta_i}{\bar{u}} + a_i(2\nu_i - 1).$$

and is positively related to the weight given to the country.

So as to take into account the donors' political agenda, we include variables identical to those used in Alesina and Weder (2002) and Alesina and Dollar (2000): two dummies

[11]The instruments are less relevant when measuring the quality of institutions by voice and accountability or regulatory quality.

[12]Different weights given to countries may also result from socio-political instability (Chauvet 2003). But this is captured in our benchmark estimation.

with value 1 respectively if the recipient country is $Israel$ and $Egypt$ because of their geostrategic position, $FrdJapan$ and $FrdUSA$ which give the percentage of times in which the recipient has voted in the UN as Japan or as the USA.[13] The β-coefficients are not affected by the introduction of these control dummies, assessing the robustness of the previous estimations: the level of aid is affected by donors' strategic interests but this effect does not overcome the 'selectivity' effect according to which more aid is given to poorer countries with better institutions.

4 Conclusion

Despite the official claim of multilateral organizations to be conditioning foreign aid on institutional reforms of the recipient country, aid is not negatively correlated with corruption across countries. This correlation is, if anything, positive. In this note we provide a rationale for this fact, which can *a priori* be viewed as irrational.

The rationality for giving more aid to more corrupt countries arises because corruption is itself endogenous, and negatively related to productivity. Since it is optimal for donors to give more aid to countries with low productivity, it turns out that aid and corruption are positively correlated at equilibrium, at least as long as productivity is the main source of differences across countries.

We have evaluated this prediction by estimating the effect of productivity and quality of institutions on both corruption and foreign aid. The positive correlation between aid and corruption due to differences in productivity levels is significant and stronger than the negative correlation arising from differences in governance quality. This result is highly robust to changes in time period, in the way institution quality is measured and in the use of alternate model specifications.

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A Tables for the Robustness Analysis

Table 2: Robustness analysis - variable definitions and samples

	Obs.	β_{11}	β_{12}	β_{21}	β_{22}	corr $(\mathrm{d}x_i, \mathrm{d}z_i)$	T_1	T_2
(a)	986	0.026	0.834	0.666	0.493	0.085	-0.228	0.314
		(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
(b)	986	0.055	0.809	0.564	0.307	0.085	-0.134	0.273
		(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
(c)	986	0.344	0.312	0.671	0.731	0.085	-0.167	0.412
		(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
(d)	986	0.199	0.508	0.575	0.323	0.085	-0.113	0.305
		(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
(i)	790	0.260	0.369	0.536	0.694	-0.085	-0.245	0.325
		(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
(ii)	791	0.229	0.383	0.769	0.795	0.00	-0.268	0.376
		(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)
(I)	901	0.245	0.401	0.573	0.419	0.100	-0.142	0.334
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
1996	116	0.305	0.303	0.491	0.406	0.024	-0.106	0.307
		(0.00)	(0.00)	(0.00)	(0.00)	(0.80)	(0.02)	(0.00)
2004	150	0.275	0.423	0.767	0.729	0.056	-0.233	0.468
		(0.00)	(0.00)	(0.00)	(0.00)	(0.50)	(0.00)	(0.00)

Notes: Alternative measures of ν: (a) Rule of Law, (b) Government effectiveness, (c) Voice and accountability, (d) Regulatory. Alternative measures of aid: (i) Total aid excluding debt relief, (ii) Multilateral aid only. Alternative measure of productivity: (I) GDP per worker. quality. P-values in brackets. All countries have equal weights.

Table 3: Robustness analysis - - Instrumentation

	Obs.	β_{11}	β_{12}	β_{21}	β_{22}	corr $(\mathrm{d}x_i, \mathrm{d}z_i)$	T_1	T_2	Sargan stat. Eq.(8)	Sargan stat. Eq.(9)	F-stat. (dep. var: a)	F-stat. (dep. var: ν)
bench.	607	0.342	0.317	1.123	1.454	0.165	-0.339	0.756	5.720	1.689	1226.12	81.31
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.43)	(0.00)	(0.00)
(a)	615	0.137	0.666	1.822	2.576	0.169	-0.913	1.095	6.037	2.396	1291.37	148.76
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.30)	(0.00)	(0.00)
(b)	615	0.113	0.762	2.074	3.284	0.169	-1.336	1.275	20.771	2.730	1291.37	115.39
		(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.26)	(0.00)	(0.00)
(c)	615	0.479	0.025	0.596	0.268	0.169	0.004	0.344	27.224	72.103	1291.37	53.96
		(0.00)	(0.73)	(0.00)	(0.11)	(0.00)	(0.74)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(d)	615	0.305	0.383	1.373	1.944	0.169	-0.410	0.969	28.305	20.040	1291.37	93.78
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(i)	553	0.355	0.217	0.847	1.551	0.00	-0.296	0.615	11.371	20.227	874.13	53.50
		(0.00)	(0.00)	(0.00)	(0.00)	(0.95)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(ii)	552	0.312	0.257	1.214	1.493	0.13	-0.321	0.676	8.575	40.163	841.20	54.28
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
(I)	602	0.305	0.362	0.947	1.220	0.157	-0.327	0.619	3.451	3.440	1296.40	79.02
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.18)	(0.18)	(0.00)	(0.00)
1996	77	0.233	0.703	0.855	1.710	0.001	-0.695	0.521	1.529	0.535	138.33	6.72
		(0.01)	(0.00)	(0.00)	(0.00)	(1.00)	(0.07)	(0.00)	(0.47)	(0.77)	(0.00)	(0.00)
2004	92	0.395	0.255	0.899	1.189	0.119	-0.204	0.620	2.083	3.380	164.87	11.70
		(0.00)	(0.06)	(0.00)	(0.00)	(0.26)	(0.09)	(0.00)	(0.35)	(0.18)	(0.00)	(0.00)

Notes: Alternative measures of ν: (a) Rule of Law, (b) Government effectiveness, (c) Voice and accountability, (d) Regulatory quality. Alternative measures of aid: (i) Total aid excluding debt relief, (ii) Multilateral aid only. Alternative measure of productivity: (I) GDP per worker. P-values in brackets. All countries have equal weights.

Institut de Recherches Économiques et Sociales
Université catholique de Louvain

Place Montesquieu, 3
1348 Louvain-la-Neuve, Belgique

ISSN 1379-244X D/2009/3082/033