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The effect of foreign aid on corruption: A quantile regression approach

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ABSTRACT

This paper investigates the effect of foreign aid on corruption using a quantile regression method. We show that foreign aid generally reduces corruption, and its reduction effect is greater in less corrupt countries. Moreover, this effect is different by different donor countries.

1. Introduction

Poverty reduction in developing countries is a theme that has been addressed in many international arenas. Although fighting poverty requires various policy prescriptions, foreign aid in both multilateral and bilateral forms is considered an important element of poverty alleviation (e.g., Agénor et al., 2008; Chong et al., 2009; Masud and Yontcheva, 2005).

Foreign aid may also impact the quality of governance, particularly corruption, in recipient countries.[1] Since corruption impedes economic growth, as pointed out by researchers such as Mauro (1995) and Mo (2001), investigating the impact of foreign aid on corruption is important. Previous research (e.g., Alesina and Weder, 2002; Knack, 2001; Svensson, 2000; Tavares, 2003) has primarily been based on ordinary least squares (OLS), instrumental variables, and panel estimation. These approaches have disadvantages, as they only estimate the parameters of interest at the mean evaluation by a conditional distribution of the dependent variable (Billger and Goel, 2009).[2] Unlike previous studies, this paper investigates the effect of foreign aid on corruption in recipient countries using the quantile regression (QR) methodology developed by Koenker and Bassett (1978). This method enables us to examine this effect at different intervals throughout the corruption distribution. Furthermore, we examine the effect of multilateral and bilateral foreign aid in addition to total foreign aid, because Alesina and Dollar (2000) demonstrate that the amount of aid is more related to cultural and historic proximity between countries than to economic performance in recipient countries; thus, the characteristics and impact of bilateral and multilateral aid may differ.

2. Estimation methodology and data

This paper employs the QR approach to examine the effect of foreign aid on corruption. The OLS results are also reported for comparison purposes. The quantile estimator is obtained by solving the following optimization problem:

$$\min_{\beta\in R^k}\left[\sum_{i\in\{i:y_i\geq x_i'\beta\}}\theta\left|y_i-x_i'\beta\right|+\sum_{i\in\{i:y_i<x_i'\beta\}}(1-\theta)\left|y_i-x_i'\beta\right|\right], \quad (1)$$

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[1] The examination of the effect of foreign aid on social and political elements besides corruption can be found in previous studies such as Djankov et al. (2008), who examine democracy, and Gomanee et al. (2005a,b), who examine the human development index and infant mortality.

[2] On the basis of the quantile regression method, Billger and Goel (2009) examine the determinants of corruption but do not consider foreign aid.

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Table 1
Data description.

Variables	Description and source	Mean	Standard deviation	Maximum	Minimum
Corruption	Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. It is rescaled so that a larger value indicates more corruption. Note that the WGI provides data for 1996, 1998, 2000, and each year from 2002 to 2008. Source: WGI	3.5057	0.6383	0.8529	5.1949
Aid (Total)	Aggregate net ODA disbursement divided by GDP in current US dollars. ODA includes grants and loans undertaken by the official sector at concessional financial terms with the main objective of promotion of economic development and welfare, where loans have a grant element of at least 25%. Sources: OECD DAC and World Development Indicators (WDI)	0.0691	0.0911	0.00008246	0.6782
Aid (Multilateral)	Aid from international organizations such as the World Bank and regional development banks divided by GDP. Source: OECD DAC and WDI	0.0282	0.0410	0.00000314	0.2906
Aid (France)	Aid from France divided by GDP. Sources: OECD DAC and WDI	0.0057	0.0118	0.00000166	0.0853
Aid (Japan)	Aid from Japan divided by GDP. Sources: OECD DAC and WDI	0.0056	0.0095	0.00000146	0.0888
Aid (UK)	Aid from the UK divided by GDP. Sources: OECD DAC and WDI	0.0036	0.0086	0.00000015	0.0680
Aid (US)	Aid from the US divided by GDP. Sources: OECD DAC and WDI	0.0089	0.0167	0.00000046	0.1937
GDP per capita (log)	The natural logarithm of real GDP per capita at the purchasing power parity in 2005 international dollars. Source: WDI	7.9139	1.0894	5.2220	10.7350
Democracy	Democracy index reflecting the competitiveness of political participation, the openness and competitiveness of executive recruitment, and the constraints on the chief executive. Source: Polity IV Project	1.7447	6.0681	−10	10
English legal origin	Dummy variable for legal systems whose origin is Anglo-Saxon Common Law. The others are categorized into French Civil Law, German Civil Law, Scandinavian Law, and Socialist Law. Source: La Porta et al. (1999)	0.2943	0.4564	0	1

Notes: The values for each variable are based on five-year averaged data for the period 1995–2009.

for the θth quantile ($0 < \theta < 1$), where y_i is the dependent variable and x_i is a k by 1 vector of the explanatory variables. The QR estimation approach is more robust than the OLS approach with a presence of outliers and when the distribution of the dependent variable is a highly non-normal pattern.[3]

The data for corruption are from the Worldwide Governance Indicators (WGI). This variable captures perceptions of how much public power is exercised for private gain, including both petty and grand forms of corruption. The explanatory variable of most concern is foreign aid, defined as net disbursements of official development assistance (ODA) divided by gross domestic product (GDP).[4] ODA is based on the OECD's standard definition of aid, and includes grants and loans undertaken by the official sector at concessional financial terms with the main objective of promoting economic development and welfare.

Other control variables include economic, political, and cultural factors, following Serra (2006), who examines the determinants of corruption based on extreme-bounds analysis. Specifically, the natural logarithm of real GDP per capita, democracy, and English legal origin are incorporated into our estimation model (Adserà et al., 2003; La Porta et al., 1999; Treisman, 2000). A more detailed explanation of the data and descriptive statistics is given in Table 1. Annual data from 120 developing countries from 1995 to 2009 are employed for estimation. We use five-year averages (1995–1999, 2000–2004, and 2005–2009) for each variable to mitigate short-term economic fluctuations.

3. Empirical results

Table 2 presents the estimation results using a share of aggregate net disbursements of ODA to GDP as an aid variable. Robust standard errors for the OLS estimates and the QR results from the 10,000 bootstrapping repetitions are reported to obtain heteroskedasticity-robust estimates. The QR results in columns (2)–(6) illustrate that foreign aid generally has a reduction impact on corruption. In particular, its effect is greater in countries with lower levels of corruption. A possible explanation is that, in less corrupt countries, public officials are less likely to embezzle public funds, and foreign aid may be used more efficiently, thereby improving the quality of institution. Consequently, the effective use of foreign aid may improve (perceived) corruption.[5] Explanatory variables other than foreign aid have the expected signs. An interesting finding is that, while economic development diminishes corruption at all quantile levels and its impacts dwindle with the corruption level, democracy significantly reduces corruption in more corrupt countries and its reduction impact increases with the corruption level.

Next, it is noteworthy that, compared to bilateral aid, which is often related to strategic purposes and to historical relationships, such as former colonies, aid from international institutions tends to focus more on altruistic purposes. Given these different natures, we conduct the analysis by replacing aggregate aid with multilateral and bilateral aid from four major donor countries: France, Japan, the United Kingdom (UK), and the United States (US). Table 3 indicates the estimation results. The specification is the same as in Table 2. We only report the estimated coefficients of aid to save space. In Panel A, where multilateral aid from institutions such as the World Bank, the International Monetary Fund, and regional development banks is used, the reduction impact is found to be larger than that of total foreign aid. This may be because donor institutions normally require recipients to commit to corruption reduction as a condition of providing

[3] Although the figure of kernel density estimate of corruption conditional on foreign aid is not greatly different from the normal distribution, it does not reduce the need to use the QR methodology because this methodology provides us with better and more detailed information. The figure can be provided upon request.

[4] Since net disbursements of ODA are used, we delete observations with negative values. However, even if we include these observations, we obtain similar results.

[5] It is important to note that this result does not necessarily suggest the restriction of foreign aid to highly corrupt countries, because they are relatively poor and in need of foreign aid for various development goals. However, this paper can offer a guideline for a desirable aid policy.

Table 2
Corruption and foreign aid.

	(1) OLS	(2) Q 0.1	(3) Q 0.25	(4) Q 0.5	(5) Q 0.75	(6) Q 0.9
Aid (Total)	−1.2738***	−3.2700***	−2.1376**	−0.4729	−0.7568*	−0.9903*
	(0.4850)	(1.0535)	(1.0394)	(0.5902)	(0.4152)	(0.5655)
GDP per capita (log)	−0.3595***	−0.5829***	−0.4438***	−0.2894***	−0.2538***	−0.2629***
	(0.0434)	(0.0711)	(0.0641)	(0.0487)	(0.0470)	(0.0589)
Democracy	−0.0187***	−0.0034	−0.0138	−0.0190***	−0.0254***	−0.0309***
	(0.0054)	(0.0105)	(0.0093)	(0.0067)	(0.0060)	(0.0061)
English legal origin	−0.2567***	−0.1995*	−0.2221**	−0.2855***	−0.2104***	−0.1685**
	(0.0621)	(0.1175)	(0.1031)	(0.0833)	(0.0729)	(0.0737)
Constant	6.5467***	7.6936***	6.9014***	6.0373***	6.0691***	6.3280***
	(0.3583)	(0.5940)	(0.5314)	(0.4083)	(0.3840)	(0.4986)
Countries	120	120	120	120	120	120
Observations	333	333	333	333	333	333

Notes: Dependent variable is corruption. The asterisks ***, **, and * are 1%, 5%, and 10% of significance levels, respectively. The numbers in parentheses are heteroskedasticity-robust standard errors. Quantile regression results are based on 10,000 bootstrapping repetitions.

Table 3
Corruption and foreign aid by donors.

	(1) OLS	(2) Q 0.1	(3) Q 0.25	(4) Q 0.5	(5) Q 0.75	(6) Q 0.9
Panel A						
Aid (Multilateral)	−2.7721**	−7.4934***	−5.8832***	−1.8937	−1.7069*	−2.3729*
	(1.1063)	(2.4579)	(2.1855)	(1.4144)	(0.9440)	(1.2758)
Countries	120	120	120	120	120	120
Observations	334	334	334	334	334	334
Panel B						
Aid (France)	−5.5808**	−8.1767	−8.9816	−5.4291	−6.5979**	−2.8715
	(2.6697)	(6.1325)	(7.7073)	(4.5842)	(2.7478)	(3.0540)
Countries	121	121	121	121	121	121
Observations	318	318	318	318	318	318
Panel C						
Aid (Japan)	−10.2452***	−12.2498	−8.8271	−8.0802**	−10.5882***	−11.9499***
	(2.4751)	(8.8953)	(6.2596)	(3.3199)	(2.2032)	(2.2649)
Countries	119	119	119	119	119	119
Observations	313	313	313	313	313	313
Panel D						
Aid (UK)	0.1812	4.0243	−0.6823	2.2479	−1.2418	−2.6240
	(2.8212)	(6.7583)	(6.1481)	(3.4527)	(4.3712)	(3.9863)
Countries	117	117	117	117	117	117
Observations	297	297	297	297	297	297
Panel E						
Aid (US)	−0.5652	−9.8700*	−2.9726	1.6077	3.4041	1.2663
	(1.9316)	(5.8145)	(7.0495)	(3.2097)	(2.1076)	(2.6011)
Countries	112	112	112	112	112	112
Observations	298	298	298	298	298	298

Notes: Dependent variable is corruption. The asterisks ***, **, and * are 1%, 5%, and 10% of significance levels, respectively. The numbers in parentheses are heteroskedasticity-robust standard errors. Quantile regression results are based on 10,000 bootstrapping repetitions. Although, as in Table 2, the natural logarithm of GDP per capita, democracy, English legal origin, and a constant term are included as explanatory variables, the results are not reported.

financial assistance. In Panels B–E, bilateral aid from France, Japan, the UK, and the US are employed. Except for Japan, bilateral aid from these countries generally has no significant impact on corruption. This suggests that, in the case of bilateral aid, donor countries may not care much about institutional quality. Bilateral aid from Japan has a significant reduction effect on corruption, and its reduction impact is larger in highly corrupt countries, partly because relationships with former colony countries are not as close as those in the other three countries in this study.

In Table 4, we simultaneously consider the five types of aid used in Table 3 as determinants of corruption. Panel A indicates that, while multilateral aid and Japanese aid reduce corruption, aid from the UK and the US increases corruption. Although a few cases show insignificant results in Panel A, when using aid commitments in Panel B, the results approximately confirm the robustness of the results in Table 3.

Finally, we further check the robustness of our results in two ways. First, we employ the alternative corruption perception index released by Transparency International, following Billger and Goel (2009). Second, as an alternative aid index, we utilize aid commitments, as in Chong et al. (2009). We obtain similar results, proving the robustness of our main results.[6]

[6] The detailed results are not reported, but they can be provided upon request.

Table 4
Corruption and foreign aid by donors: Robustness check.

	(1) OLS	(2) Q 0.1	(3) Q 0.25	(4) Q 0.5	(5) Q 0.75	(6) Q 0.9
Panel A						
Aid (Multilateral)	−2.5918*	−6.4455	−4.6699	−3.7269*	−1.5957	−0.5806
	(1.4157)	(4.1378)	(3.0681)	(2.0354)	(1.6162)	(1.3524)
Aid (France)	−4.9513	−10.0629	−12.7899	−2.8500	−3.6908	0.4745
	(3.8586)	(6.6194)	(8.6207)	(6.5136)	(4.7091)	(3.3957)
Aid (Japan)	−6.8160***	1.4590	−3.9837	−6.4490*	−5.4087	−9.4765***
	(2.3325)	(5.1814)	(4.4472)	(3.3877)	(3.4387)	(2.9549)
Aid (UK)	4.8003	18.4615*	9.6822	2.7082	−0.7849	0.2081
	(3.7521)	(9.9566)	(7.8189)	(4.8638)	(5.4557)	(5.6124)
Aid (US)	2.4975	−2.7679	6.4602	7.2430**	3.9588*	2.4020
	(2.1042)	(7.9486)	(8.6090)	(2.9930)	(2.2700)	(2.4682)
Countries	101	101	101	101	101	101
Observations	232	232	232	232	232	232
Panel B						
Aid commitments (Multilateral)	−3.8347***	−5.2444*	−4.5343*	−4.2889**	−3.0948**	−1.9747
	(1.1369)	(2.8958)	(2.3508)	(1.7947)	(1.3564)	(1.3093)
Aid commitments (France)	−4.3221	−5.4127	−8.6056	−3.9494	−5.0977	−2.1434
	(2.9699)	(6.5669)	(7.2374)	(5.6184)	(3.1938)	(3.5246)
Aid commitments (Japan)	−4.4713**	2.6738	−2.5386	−5.7770**	−7.7827***	−9.3731***
	(1.9160)	(4.2129)	(3.3831)	(2.8176)	(2.9124)	(2.7015)
Aid commitments (UK)	3.2579	5.9508	6.2075	4.8637	0.9767	1.8682
	(3.2589)	(7.8531)	(7.6772)	(4.9132)	(4.2523)	(4.5285)
Aid commitments (US)	3.0762***	2.4316	4.4724	3.7482**	2.8369*	1.2897
	(1.0267)	(4.4076)	(4.1570)	(1.5795)	(1.5568)	(1.6769)
Countries	116	116	116	116	116	116
Observations	312	312	312	312	312	312

Notes: Dependent variable is corruption. The asterisks ***, **, and * are 1%, 5%, and 10% of significance levels, respectively. The numbers in parentheses are heteroskedasticity-robust standard errors. Quantile regression results are based on 10,000 bootstrapping repetitions. Although, as in Table 2, the natural logarithm of GDP per capita, democracy, English legal origin, and a constant term are included as explanatory variables, the results are not reported.

4. Conclusion

This paper examines the effect of foreign aid on corruption using a quantile regression analysis. The results show that foreign aid generally decreases corruption level and that its reduction effect is greater in less corrupt countries. In addition, while multilateral aid has a reduction impact on corruption, bilateral aid from the world's leading donor countries, except Japan, but including France, the UK, and the US, has no significant effect. Our results are robust even with different indicators of corruption and foreign aid.

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