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Grants to needy countries? A study of aid composition between 1975 and 2005

Pernilla Johansson*

Abstract

This paper studies whether the poorest and most indebted countries receive aid in the form of grants rather than loans. By studying bilateral aid flows to low- and middle-income countries between 1975 and 2005, the paper provides evidence on the determinants of the grant component of aid flows. While the empirical analysis finds no evidence that more indebted countries receive a higher grant component, it shows that poorer countries receive a significantly higher grant component of aid, although the size of the effect is rather limited.

Keywords: Aid composition; Aid allocation; Indebtedness; Poverty

JEL Classification: F34; F35.

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1. Introduction

A central concern in foreign aid allocation is whether aid really reaches the neediest countries.¹ With respect to aid composition, the question is whether the poorest and most indebted countries actually receive grants rather than loans. First, the composition of foreign aid has important implications for debt sustainability in recipient countries as aid in the form of grants is debt-neutral, while aid loans add to the country's debt stock. Second, poorer countries are in need of more resources but less likely to generate the resources necessary to repay loans.

With the developing country debt crisis in the 1980s, bilateral donors shifted to more concessional aid. From 1975 to 2005, pure grants and the grant element of concessional aid loans increased from 72 percent to 97 percent as a share of total bilateral aid flows. Notwithstanding, the ratio varies greatly across recipient countries. In 2003, for example, the grant component of aid was 66 percent to the relatively rich but highly indebted Argentina, while it was 98 percent to the very poor, but not very indebted, Bangladesh.

It is not obvious that recipient need explains this variation across countries. As aid allocation generally depends on a host of distinct factors besides recipient needs, the influence of indebtedness and poverty on the grant-loan mix is all but certain. In particular, donor countries' strategic and political interests (e.g. Kilby, 2009; Dreher *et al.*, 2009; Berthélemy, 2006; Alesina and Dollar, 2000) and recipient characteristics, such as institutional quality, tend to influence the allocation (e.g. Berthélemy, 2006; Dollar and Levin, 2006; Alesina and Dollar, 2000). Given the host of different determinants, the actual

¹ See for example Easterly (2007), Berthélemy (2006), and Alesina and Dollar (2000) for recent studies of the issue.

influence of indebtedness and poverty on the grant–loan mix has yet to be empirically confirmed.

Knowledge of the actual allocation of the grant–loan mix among recipient countries is limited as previous studies exclusively explore aid composition from a donor perspective (Mascarenhas and Sandler, 2005; Odedokun, 2003) or limit their focus to a few recipient country characteristics (Collier, 2005). By exploring only recipient country income level and institutional quality in one particular year, Collier (2005) offers descriptive evidence suggesting that poor countries with low institutional quality receive a considerable share of loans, while slightly richer countries with better institutions receive a considerable share of grants. While the study raises doubts as to whether the grant–loan mix responds to recipient income, it overlooks the influence of factors such as country debt.

With a focus on recipient country need in terms of indebtedness and poverty, this paper provides evidence on the determinants of the grant component of aid flows by analyzing bilateral aid flows to low- and middle-income countries from 1975 to 2005. The observation period covers the debt crisis period as well as years before and after the crisis, making comparisons between different regimes possible. Alternative explanations such as developmental, political, and strategic motives are explicitly taken into account in order to isolate the influence of indebtedness and poverty. Depending on the specification, the analysis includes 63 to 116 recipient countries. While the analysis finds no evidence that indebtedness influences aid composition, it shows that the recipient country income level is a significant determinant. In all, poorer but not more indebted countries receive significantly more concessional aid, although the size of the effect is rather limited.

2. Aid composition

The debate on the appropriate grant–loan mix focuses on the different economic effects associated with grants and loans. Given the debt burden facing several developing countries, the different impact on the recipient country debt stock has received particular interest. From the recipient country perspective, resources provided by a loan are “transfers in cash or in kind for which the recipient incurs a legal debt” (DCD/DAC, 2007a). Concessional loans also add to the debt stock, although they are disbursed with substantially more generous terms than a market loan.² The level of the concessionality rate is determined by the gap between the actual interest rate and the market rate as well as the length of the repayment period and the period from loan disbursement to the first repayment (grace period).

Loans do not threaten future debt sustainability as long as investments generate enough resources through economic growth to service the loan. Otherwise, loan disbursements could easily contribute to the build-up of a debt overhang with subsequent negative effects on growth (Krugman, 1988; Sachs, 1989). In case of debt overhang, a country is unable to service its debt, to obtain new loans and to invest efficiently. Therefore, high debt is commonly associated with reduced public and private investment and lower growth. Various empirical studies confirm that excessive debt constrains growth in developing countries (e.g. Imbs and Ranciere, 2005; Clements *et al.*, 2003; Pattillo *et al.*, 2002).

In contrast, “grant transfers in cash or in kind do not incur legal debt by the recipient” (DCD/DAC, 2007a). To avoid a further increase of the debt burden, advocates argue that grants should replace loans in already heavily indebted countries (e.g. Meltzer, 2000; Bulow

² More specifically, loans are concessional if the concessionality rate is at least 25 percent. To calculate the concessionality rate, DAC (and the World Bank) applies a 10 percent market rate of interest.

and Rogoff, 2005). In addition, poorer countries in need of more aid are less likely to grow fast enough to generate the resources to repay loans (e.g. Collier, 2005; Radelet, 2005; Radelet and Chiang, 2003). On the basis of recipient need, poorer and more indebted countries are therefore expected to enjoy relatively high grant–loan ratios.

Given the developmental goal of foreign aid, the optimal grant–loan mix is, however, not obvious. Various empirical studies show that grants tend to weaken fiscal discipline in the recipient countries, while loans are associated with higher revenue (Gupta *et al.*, 2003; Odedokun, 2004; Djankov *et al.*, 2004). By developing a formal model, Cordella and Ulku (2007) make propositions on the optimal–grant loan mix in relation to the growth impact of aid. The simple model suggests that a higher grant component of aid maximizes the growth potential in countries that already have high debt ratios, are poor, and have weak policies and institutions. They are, however, unable to empirically confirm that more concessional aid to high debt countries enhance the growth impact of aid.³

In line with the theoretical propositions of Cordella and Ulku (2007), various studies suggest that the grant–loan mix should be tailored to individual country characteristics (Daseking and Joshi, 2006; Collier, 2005; Nunnenkamp *et al.*, 2005; Radelet and Chiang, 2003). In addition to allocating a higher share of grants to more indebted and poorer countries, the studies suggest that the grant–loan mix should be tailored to a country’s growth prospects. For instance, countries with high quality institutions and good policies face better growth prospects and are expected to be able to absorb more loans than countries with low quality institutions and poor polices. .

³ The outlined distinctions of grants and loans prelude, however, that the recipient views grants and loans differently. If a recipient does not expect to pay debt service due to, for example, debt relief, a loan is equivalent to grants. Thus, if the introduction of debt relief on a large scale (e.g. the HIPC initiative and the Multilateral Debt Relief Initiative) implies that countries do not expect to pay future debt service, it weakens the distinct implications of grants and loans.

The actual allocation of the distinct grant–loan mix in recipient countries is, however, uncertain. Besides the descriptive analysis in Collier (2005), prior research has studied determinants of grants and loans separately. With a focus on the influence of recipient country debt, studies on bilateral aid flows provide ambiguous results. While new loan disbursements tend to decrease to countries facing a higher debt stock (Marchesi and Missale, 2007), loans instead increase to countries that pay higher debt service (Cohen *et al.*, 2007). Grant flows are explored briefly in Berthélemy (2006) and in more detail in Marchesi and Missale (2007). The studies show that more indebted countries tend to receive more grants. However, while the former study finds that poorer countries also tend to receive significantly more grants, the latter finds no evidence that recipient income influences total grant flows. Despite their findings, however, all of these studies neglect the interdependence of grants and loans.

3. Data and descriptive analysis

In order to accurately analyze the allocation of the grant–loan mix, the constructed dataset covers official development assistance (ODA) flows from the 22 DAC donors to 147 recipient countries between 1975 and 2005.⁴ The analysis focuses on bilateral aid flows as bilateral donors disburse aid as a mix of pure grants and concessional loans. In contrast, multilaterals typically provide either grants or loans. While, for example, the United Nation organizations provide grants only, the World Bank and IMF almost exclusively provide

⁴ The donor countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States. Recipient countries are the Part I countries in the DAC database. Countries categorised as transition economies and relatively rich countries (previously known as part II countries) are excluded since data are available only from 1993 for the majority of these countries.

loans. The data refers to commitments rather than disbursements, thus covering intended aid flows.⁵

In the analysis, the grant component of aid flows is the sum of grants and the grant equivalent of loans registered in the OECD Development Assistance Committee's (DAC) Creditor Reporting System. The grant equivalent of a loan, moreover, is the amount that is not expected to be repaid, i.e., the amount subsidized through below-market terms. Thus, by summarizing grant flows and the grant equivalent, the measure covers not only pure grants but also the concessionality rate of aid loans (cf. Cordella and Ulku, 2007; Mascarenhas and Sandler, 2005). Pure grants and the grant equivalent of loans are expressed as a ratio of total aid flows, implying that the grant component ranges from 0 to 1.⁶ Summary statistics in Appendix A show that the average grant component was 0.77 from 1975 to 1985, compared to 0.83 from 1985 to 1995 and 0.94 in 1995 to 2005.

Descriptive statistics on aid flows across country groups suggest that more indebted and poorer countries receive a slightly higher grant component of bilateral aid flows.⁷ Between 1975 and 2005, the average grant component of aid in the high debt group was 86 percent, while it was 82 percent in the low debt group. Similarly, low-income countries receive a higher grant component of aid than middle-income countries. While the grant component of aid amounted to 86 percent in the low-income group, it amounted to 79 percent in the middle-income group over the same period.⁸

⁵ See DCD/DAC (2007b) for definitions of commitments and disbursements. In the database, grant data refers to disbursements for Belgium, Ireland, Portugal, and Spain.

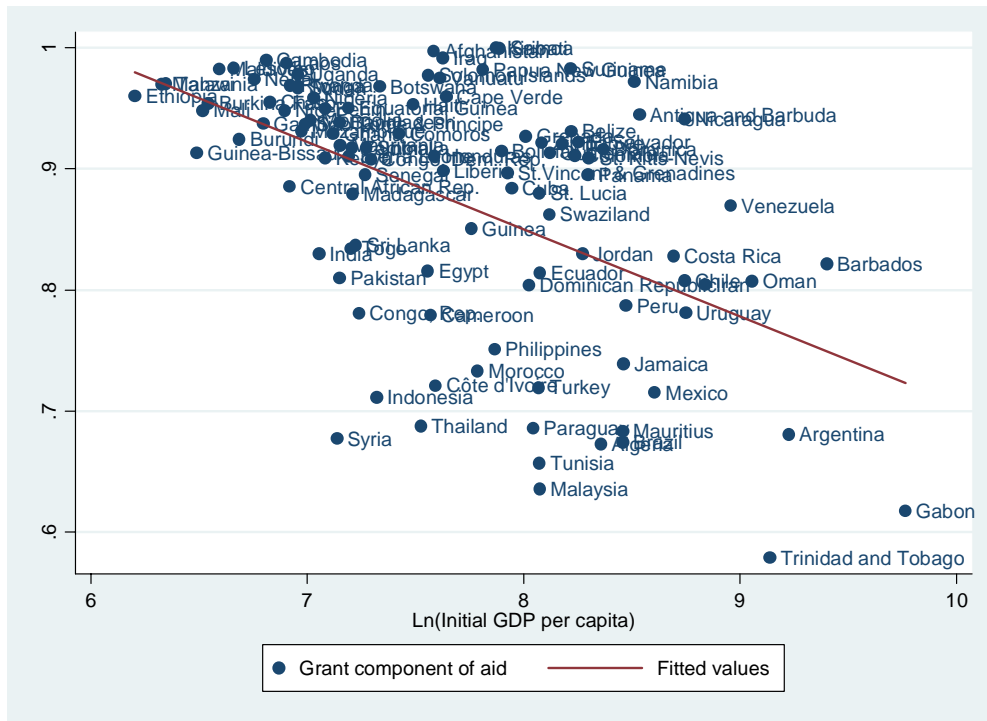
⁶ More specifically, the grant component ranges from 0.25 to 1 as the grant element has to exceed 25 percent for the flow to be calculated as ODA.

⁷ A country is considered as a low (or a high) debt country if the period average of the country's debt to GDP ratio is below (or above) the median debt to GDP ratio of the whole sample (28 per cent). Similarly, a country is considered as a low (or a high) income country if the period average of the country's real GDP per capita is below (or above) the median GDP per capita of the whole sample (\$2593).

⁸ A t-test comparing the means in the different groups shows that the differences are significant.

However, an analysis of bivariate scatter plots suggests that poorer countries, but not more indebted countries, receive a higher grant component of aid. Figure 1a shows a distinct negative association between the average income level from 1970 to 1974 and the average grant component of aid from 1975 to 2005.⁹ In contrast, a scatter plot on indebtedness and the grant component over the same time periods suggests that a higher initial debt is correlated with a *lower* grant component.¹⁰ Although not very steep, Figure 1b shows a negative slope of the fitted regression line.

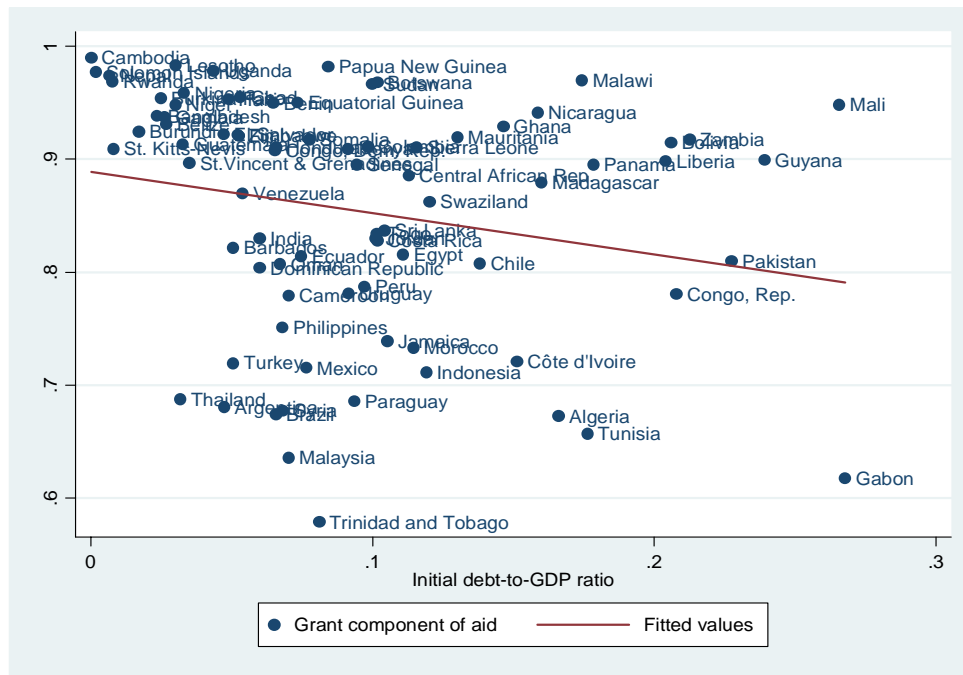
Fig 1 (a). Grant component of aid and log of initial GDP per capita, 1975–2005.



⁹ Income is measured as real GDP per capita.

¹⁰ Indebtedness is measured as the present value of debt-to-GDP ratio.

Fig 1 (b). Grant component of aid and initial debt-to-GDP ratio, 1975–2005.



Correlation coefficients for the periods 1975–1985, 1985–1995, and 1995–2005 reveal, however, substantial changes over time as regards indebtedness (see Appendix B). While a high initial debt is significantly associated with a lower grant component in the first period (-0.29*), it is, although not significantly, associated with a higher grant component of aid after 1995 (0.15). In line with the policy focus on developing country debt following the debt crisis, the coefficients suggest that donors have allocated relatively more grants to more indebted countries in recent years. The changes over time illustrate the importance of exploring distinct sub-periods. The correlation coefficient between initial income level and the grant component of aid is, however, negative and significant over all periods (although it is lower in the most recent period).

To sum up, an initial review of the data suggests that poorer countries receive a higher grant component of aid while raising doubts whether more indebted countries also receive a higher grant component.

4. Empirical analysis

The analysis explores determinants of the grant–loan mix in a cross-sectional framework by focusing on the grant component over 10-year periods. For each 10-year period, grants and grant equivalent flows are aggregated by recipient country and expressed as a share of total aid over the period in question. Depending on data availability, the number of recipient countries included in the analysis ranges from 63 to 116.

4.1. *Indebtedness and poverty*

From a recipient country perspective, the principal question is whether more indebted and poorer countries receive a higher grant component of aid independent of the motives underlying the allocation. Therefore, the initial analysis solely explores the influence of indebtedness and income level on the grant component of aid. Although some poor countries are also heavily indebted, the correlation coefficient between income and indebtedness is rather low (see table in Appendix B), suggesting that the variables illustrate distinct dimensions of recipient need. To take the heterogeneity of concessional debt into account, the present value of the external debt stock expressed as a percentage of GDP is used as a measure of indebtedness. The income level is measured by the log of real GDP per capita. Both measures refer to the initial value of the variable.¹¹ Appendix C provides details of the variables in the analysis and their data sources.

Columns 1, 3, and 5 in Table 1 show the OLS estimation results using the grant component of aid as the dependent variable and initial indebtedness and initial income level as explanatory variables. Recipient country indebtedness and income level explain about 35 percent of the variation in the grant component of aid in the early period (column 1) and about 20 percent in the most recent period (column 5), suggesting that the influence is

¹¹ The initial value is the average of the five years preceding the period in question. For instance, the initial value for the period 1995 to 2005 refers to the average of the variable from 1990 to 1994.

reasonably strong but decreasing over time.¹² Thus, counter to expectations, the influence of recipient need appears to be weaker in the recent period. Although the grant–loan mix and debt sustainability have been the focus following the developing countries’ debt crisis, the importance of recipient need appears to be strongest prior to the crisis.

Table 1. Baseline regressions

Dependent variable: Grant component of bilateral aid flows						
	1975-1985		1985-1995		1995-2005	
	[1]	[2]	[3]	[4]	[5]	[6]
Initial debt ratio (GDP)	-0.516** [0.013]	-0.494** [0.012]	-0.003 [0.961]	-0.084 [0.249]	-0.002 [0.797]	-0.01 [0.119]
Ln(Initial GDP per capita)	-0.099*** [0.000]	-0.079*** [0.000]	-0.083*** [0.000]	-0.051*** [0.010]	-0.037*** [0.000]	-0.019** [0.043]
Bilateral aid/GDP		0.683** [0.018]		0.733*** [0.001]		0.485*** [0.001]
Observations	79	78	94	94	116	115
R-squared	0.354	0.401	0.239	0.327	0.191	0.253

Note: OLS estimation with robust standard errors. P values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Constant not reported.

The estimation results provide no evidence that more indebted countries receive more concessional aid. In fact, holding the income level constant, countries with a higher debt-to-GDP ratio receive significantly *less* concessional aid in the period from 1975 to 1985 (column 1). Prior to the outbreak of the debt crisis, more indebted countries appear to receive relatively more loans, suggesting that the aid flows contributed to the build up of the debt stock. In contrast, poorer countries receive significantly more concessional aid in all three periods. The effect is, however, rather limited as a 10 percent decrease in GDP per capita increases the grant share of aid no more than one percentage point in the first and second period (column 1 and 3), and even less in the most recent period (column 5).

As countries in need of more concessional aid are also in need of more aid in total, the association between income and the grant component of aid could be due to poorer

¹² The low variation in the grant component of aid from 1995 to 2005 (0.07 compared to 0.14 in 1975–1985) may, however, explain the lower explanatory power in the latest period to a certain extent.

countries receiving more aid rather than aid on more concessional terms. Columns 2, 4, and 6 therefore report the results adding total bilateral aid as a percentage of recipient countries' GDP as an explanatory variable. The inclusion of total aid slightly increases the explanatory power. As expected, countries receiving more aid receive significantly more concessional aid. Although the coefficient is somewhat lower, the outcome remains that poorer countries receive significantly more concessional aid in all periods, conditioned on indebtedness and the total level of aid.¹³

4.2. Recipient characteristics and donor interest

The analysis further explores recipient country characteristics influencing a country's ability to absorb new loans and grants effectively and thereby possibly determining the allocation of the grant–loan mix across recipient countries. As discussed earlier, the growth impact of aid composition may depend on the quality of policies and institutions (Cordella and Ulku, 2007; Iimi and Ojama, 2008). In addition, countries with weaker policies and institutions generally face debt-service problems at lower levels of debt because these countries tend to be more prone to misuse and mismanagement of funds (World Bank, 2006). Thus, countries with low quality institutions and bad policies may receive a higher grant component of aid. To capture the institutional quality of a country, the analysis includes the political rights and civil liberty index from Freedom House.¹⁴ The quality of recipient countries' policies is accounted for by including measures of trade openness and

¹³ The use of aid per capita rather than aid as a percentage of GDP yields similar results. Results are available from the author upon request.

¹⁴ The index is a widely recognized measure of institutional quality first used in Scully (1988) followed by for example Alesina and Dollar (2000) and Berthélemy (2006). The index measures freedom according to two broad categories: political rights and civil liberties. Whereas political rights enable people to participate freely in the political process, civil liberties allow for the freedoms of expression and belief. The index is a variable which takes values from 1 (highest level of freedom) to 7 (lowest level of freedom) (Freedom House, 2007).

inflation.¹⁵ The analysis further includes the log of recipient country population as previous aid allocation studies find that less populated countries tend to receive more aid (e.g. Alesina and Dollar, 2000; Berthélemy and Tichit, 2004; Easterly, 2007).

Columns 1, 7, and 13 in Table 2 report the results. GDP per capita is still negative and significant in all periods. Thus, conditioned on the quality of institutions and policies as well as population, poorer countries receive significantly more concessional aid. The inclusion of recipient characteristics, however, makes the coefficient of the debt-to-GDP ratio insignificant in the early period (column 1). Thus, the tendency of providing *less* concessional aid to more indebted countries is not robust to the inclusion of additional control variables.

The inclusion of recipient characteristics increases the explanatory power of the model, particularly in the latest period, suggesting that the influence of quality of institutions and policies has become more important over time. This finding may reflect the recently stronger institutional focus in policy making as suggested for example by Dollar and Levin (2006) with respect to the allocation of aggregate aid. In particular, the results show that countries with higher institutional quality, more open trade policies, and lower inflation receive relatively more loans, primarily in the latest period. In addition, the population coefficient is negative and significant in all periods, suggesting that less populated countries receive not only more aid but also relatively more grants. The coefficient of total aid flows becomes insignificant when including recipient country characteristics, suggesting that it previously captured a positive influence of good governance indicators on the total level of aid.

¹⁵ Trade openness is proxied by the sum of the recipient country's export and import as a percentage of the country's GDP. Inflation is a measure of the relative change in the consumer price index.

Table 2. Including recipient characteristics and donor interest

Dependent variable: Grant component of bilateral aid flows																		
	1975-1985						1985-1995						1995-2005					
Initial debt ratio (GDP)	-0.159	0.028	-0.167	-0.108	-0.19	-0.163	-0.011	0.049	0.007	-0.059	-0.034	-0.015	0.001	0.002	0.002	0	0.001	0.001
	[0.499]	[0.895]	[0.498]	[0.653]	[0.442]	[0.494]	[0.878]	[0.482]	[0.922]	[0.409]	[0.640]	[0.845]	[0.931]	[0.746]	[0.799]	[0.992]	[0.943]	[0.931]
Ln(Initial GDP per capita)	-0.120***	-0.122***	-0.118***	-0.140***	-0.117***	-0.122***	-0.107***	-0.108***	-0.100***	-0.130***	-0.092***	-0.107***	-0.046***	-0.051***	-0.041***	-0.047***	-0.042***	-0.048***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.002]	[0.000]
Bilateral aid/GDP	0.278	0.32	0.263	0.397	0.294	0.21	0.28	0.179	0.274	0.278	0.686***	0.27	-0.103	-0.144	-0.067	-0.095	0.039	-0.109
	[0.517]	[0.491]	[0.573]	[0.333]	[0.505]	[0.611]	[0.268]	[0.507]	[0.262]	[0.252]	[0.010]	[0.290]	[0.546]	[0.394]	[0.678]	[0.579]	[0.823]	[0.527]
Initial institutional quality	-0.009	-0.003	-0.008	-0.009	-0.008	-0.009	-0.020**	-0.011	-0.016*	-0.017*	-0.021**	-0.020**	-0.005	-0.003	-0.003	-0.005	-0.006	-0.006
	[0.343]	[0.723]	[0.470]	[0.330]	[0.380]	[0.330]	[0.043]	[0.202]	[0.085]	[0.065]	[0.034]	[0.045]	[0.363]	[0.537]	[0.636]	[0.389]	[0.331]	[0.314]
Openness	-0.033	-0.055	-0.038	-0.013	-0.03	-0.037	-0.011	-0.042	-0.035	0.024	-0.013	-0.012	-0.043**	-0.048**	-0.053***	-0.043**	-0.043**	-0.041**
	[0.645]	[0.407]	[0.604]	[0.835]	[0.686]	[0.619]	[0.837]	[0.428]	[0.593]	[0.656]	[0.814]	[0.836]	[0.026]	[0.011]	[0.008]	[0.030]	[0.030]	[0.035]
Ln(1+Inflation)	0.048**	0.021	0.048**	0.028	0.054**	0.049**	0.004	-0.013	0.004	-0.004	0.01	0.005	0.079**	0.052*	0.080***	0.079**	0.072**	0.084**
	[0.050]	[0.348]	[0.049]	[0.312]	[0.042]	[0.046]	[0.837]	[0.541]	[0.838]	[0.826]	[0.574]	[0.809]	[0.015]	[0.051]	[0.008]	[0.015]	[0.033]	[0.014]
Ln(Initial population)	-0.032**	-0.037***	-0.032**	-0.029**	-0.030**	-0.034**	-0.023***	-0.030***	-0.024***	-0.023***	-0.017**	-0.024***	-0.022***	-0.023***	-0.021***	-0.022***	-0.020***	-0.022***
	[0.013]	[0.006]	[0.013]	[0.022]	[0.027]	[0.011]	[0.004]	[0.000]	[0.004]	[0.003]	[0.042]	[0.004]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Former French colony		-0.085***						-0.087***						-0.037**				
		[0.001]						[0.004]						[0.012]				
Former British colony			0.009						0.036						0.031***			
			[0.818]						[0.179]						[0.004]			
Former Spanish colony				0.082**						0.107***						0.005		
				[0.021]						[0.010]						[0.794]		
Former Portuguese colony					-0.084**						-0.180***							-0.050**
					[0.049]						[0.000]							[0.034]
Egypt						0.073***						0.042						0.096***
						[0.010]						[0.128]						[0.000]
Observations	63	63	63	63	63	63	88	88	88	88	88	88	103	103	103	103	103	103
R-squared	0.509	0.566	0.51	0.555	0.514	0.513	0.453	0.504	0.463	0.51	0.488	0.454	0.431	0.468	0.464	0.432	0.444	0.447

Note: OLS estimation with robust standard errors. P values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Constant not reported.

Despite the stated aim of developmental motives for aid, other factors such as colonial past and political alliances have been empirically confirmed as determinants of total aid allocation. For instance, donors tend to provide more aid to former colonies (Berthelémy, 2006; Berthelémy and Tichit, 2004; Alesina and Dollar, 2000). As this preference for former colonies may also influence the allocation of the grant-loan mix, colonial ties are explored in Table 2. Following Berthelémy (2006), the analysis includes dummy variables for former colonies of France, Great Britain, Portugal and Spain.¹⁶ *Ceteris paribus*, former colonies of France and Portugal receive *less* concessional aid in all periods (see for example columns 14 and 17). On the contrary, former colonies of Great Britain and Spain receive a *higher* grant component of aid flows, although the coefficients are not significant in each time period (see for example columns 10 and 16). While previous studies show that former colonies receive more aid, this analysis suggests that the composition of aid differs across these countries. The explanation is not obvious. As France generally provides less concessional aid, while Portugal and Spain provide aid with similar concessionality rates, the average grant component of donors' aid flows does not fully explain this pattern.

To further account for specific strategic links between donors and certain recipients, the regressions include a dummy variable for Egypt. *Ceteris paribus*, previous aid allocation studies find that Egypt receives relatively more aid as a consequence of its strategic importance to the West and especially to the US (e.g. Berthelémy, 2006; Alesina and Dollar, 2000).¹⁷ Conditional on factors such as income level and indebtedness, Egypt also receives

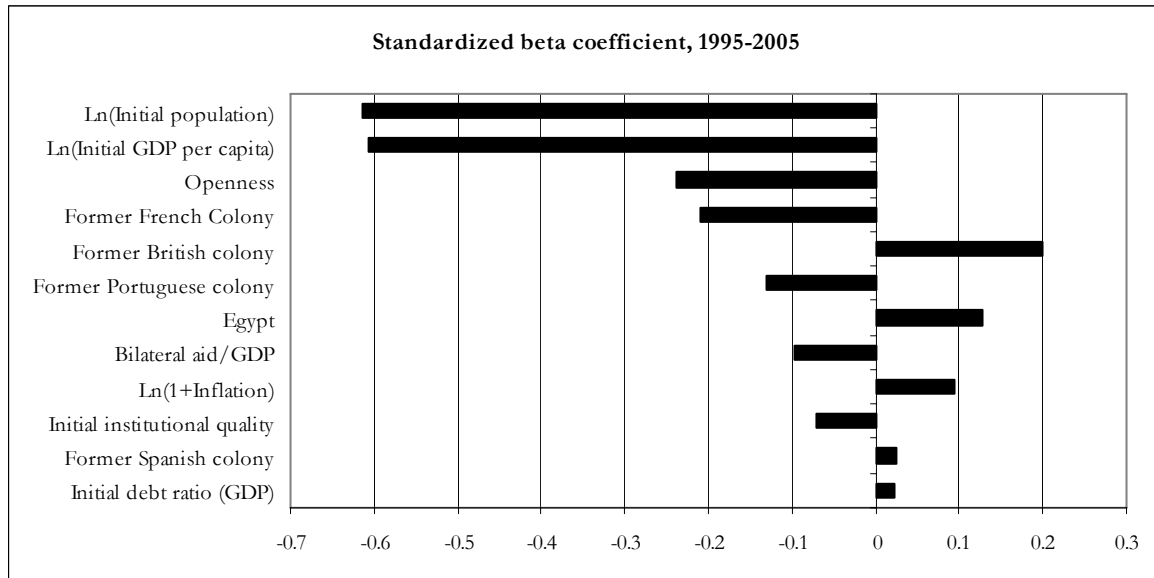
¹⁶ The analysis also included a dummy variable for former colonies of Belgium but it was never significant. The insignificant coefficient could possibly be due to the fact that the data is aggregated and Belgium aid flows do not influence the grant component as much as those from countries such as France or Great Britain.

¹⁷ Likewise, aid allocation studies generally include a dummy variable for Israel. However, as this study covers Part I countries from the DAC database, the sample does not include Israel.

more concessional aid – significantly more in the early (column 6) and late period (column 18). Based on the late period regression, Egypt receives a one percentage point higher grant component of aid.

Figure 2 shows the relative importance of each explanatory variable in the period from 1995 to 2005 using the standardized beta coefficient.¹⁸ Clearly, the income level is a relatively important determinant of the grant–loan mix allocation. In contrast, recipient country debt is a minor determinant. Besides income level, important determinants are a country’s population, its degree of openness, and its status as a former colony. For instance, being more open (one standard deviation above the mean) decreases the grant component of aid by more than 0.2 standard deviations, corresponding to approximately 1.5 percentage points. Similarly, a former French colony receives about a 1.5 percentage point lower grant component.

Figure 2. Relative importance of the explanatory variables



¹⁸ By using the standardized beta coefficient, the beta value shows the average change of the dependent variable in standard deviation units from a one standard deviation change in the explanatory variable. A variable is standardized by subtracting the mean value of the variable from its individual values and dividing the difference by the standard deviation of that variable.

4.3. Robustness

The results are confirmed using robustness tests along six dimensions. The dimensions include additional measures of indebtedness, alternative measures of the grant component of aid, different time periods, the use of the fractional logit estimation technique, the exclusion of outliers, and the exclusion of grant-only observations.

The first robustness check takes into account that indebtedness can be measured in various ways (cf. IMF, 2003). By relating the debt stock to GDP, the measure links the debt stock to the entire resource base in a country. Alternatively, the debt stock can be evaluated as a percentage of a country's exports, thereby linking it to the economy's basic source of external income. The amount of actual debt service payments is another measure of indebtedness, demonstrating not only the burden of debt but also the country's ability and willingness to service its debt. In contrast, the size of debt in arrears illustrates the degree to which a country has not been able to service its debt. Correlation coefficients confirm that the measures illustrate different dimensions of indebtedness (see Appendix B).

Table 3 reports regression results including the initial value of the alternative indebtedness measures. The estimations nevertheless fail to provide evidence that more indebted countries receive more concessional aid. Instead, the indebtedness coefficients are generally negative but insignificant in all specifications.¹⁹

As the focus of the analysis is on actual flows to recipient countries, the use of commitment data might influence the results. If aid commitments substantially diverge from actual disbursement, the measure may not reflect actual flows to recipients. As the CRS database essentially provides commitment data the analysis explores an alternative measure

¹⁹ The regressions yield similar results if donor interest variables are included as well.

Table 3. Alternative indebtedness measures

Dependent variable: Grant component of bilateral aid flows															
	1975-1985					1985-1995					1995-2005				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Initial debt ratio (GDP)	-0.159					-0.011					0.001				
	[0.499]					[0.878]					[0.931]				
Initial debt ratio (exp)		-0.012					-0.006					0			
		[0.802]					[0.720]					[0.838]			
Initial debt service (GDP)			-0.611					-0.38					-0.008		
			[0.376]					[0.385]					[0.957]		
Initial debt service (exp)				-0.268					-0.095					0.005	
				[0.192]					[0.305]					[0.907]	
Initial debt in arrears (GDP)					1.702					-0.125					0.008
					[0.538]					[0.784]					[0.505]
Ln(Initial GDP per capita)	-0.120***	-0.098***	-0.111***	-0.067	-0.114***	-0.107***	-0.106***	-0.097***	-0.096***	-0.105***	-0.046***	-0.046***	-0.047***	-0.047***	-0.048***
	[0.000]	[0.006]	[0.000]	[0.103]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]
Bilateral aid/GDP	0.278	1.202	0.223	1.539*	0.261	0.28	0.308	0.32	0.329	0.312	-0.103	-0.083	-0.076	-0.057	-0.103
	[0.517]	[0.135]	[0.610]	[0.077]	[0.533]	[0.268]	[0.181]	[0.228]	[0.178]	[0.189]	[0.546]	[0.598]	[0.646]	[0.732]	[0.528]
Initial institutional quality	-0.009	-0.014	-0.012	-0.017*	-0.012	-0.020**	-0.021**	-0.019**	-0.022**	-0.020**	-0.005	-0.007	-0.004	-0.005	-0.004
	[0.343]	[0.120]	[0.195]	[0.088]	[0.219]	[0.043]	[0.038]	[0.041]	[0.027]	[0.039]	[0.363]	[0.289]	[0.492]	[0.395]	[0.464]
Openness	-0.033	-0.111	-0.048	-0.157**	-0.052	-0.011	-0.027	-0.005	-0.041	-0.02	-0.043**	-0.044**	-0.042**	-0.042**	-0.043**
	[0.645]	[0.102]	[0.496]	[0.041]	[0.441]	[0.837]	[0.674]	[0.929]	[0.520]	[0.725]	[0.026]	[0.027]	[0.037]	[0.029]	[0.023]
Ln(1+Inflation)	0.048**	0.038	0.039*	0.038*	0.033	0.004	0.005	0.005	0.007	0.003	0.079**	0.077**	0.078**	0.076**	0.078**
	[0.050]	[0.127]	[0.084]	[0.086]	[0.138]	[0.837]	[0.814]	[0.820]	[0.755]	[0.883]	[0.015]	[0.015]	[0.022]	[0.025]	[0.022]
Ln(Initial population)	-0.032**	-0.029**	-0.036***	-0.025*	-0.034***	-0.023***	-0.023***	-0.020**	-0.020**	-0.023***	-0.022***	-0.021***	-0.021***	-0.020***	-0.021***
	[0.013]	[0.047]	[0.003]	[0.064]	[0.004]	[0.004]	[0.005]	[0.024]	[0.017]	[0.005]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	63	61	61	59	62	88	88	85	85	85	103	101	101	99	101
R-squared	0.509	0.539	0.511	0.562	0.507	0.453	0.447	0.477	0.47	0.468	0.431	0.43	0.446	0.445	0.448

Note: OLS estimation with robust standard errors. P values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Constant not reported.

of the grant component of aid from the World Bank as a robustness check (Chang *et al.*, 1998). The data covers disbursement data of bilateral effective development assistance (BEDA) for 133 countries from 1975 to 1995.²⁰ Similar to the previous grant component measure, BEDA combines total grants and the grant equivalents of official loans. In contrast, it covers a shorter time period and it includes the grant equivalent of all official loans rather than aid loans only while excluding technical assistance and debt relief grants.

Columns 1 and 2 in Table 4 report very similar results when using disbursement data rather than commitment data. Poorer countries still receive significantly more concessional aid while high debt countries do not receive more concessional aid. In the second period, the explanatory variables explain approximately 65 percent of the variation in the grant component of aid, compared to 45 percent using commitment data. This difference suggests that, to a greater extent, recipient country need and characteristics explain actual disbursements rather than commitments.

Aid statistics such as DAC online distinguish between pure grants and the face value of loans rather than considering grants and grant equivalents of loans. The analysis therefore also explores a measure of the grant component defined as the proportion of total aid disbursements in the form of pure grants. Thus, the measure does not take the concessionality of loans into account, but rather focuses on the determinants of pure grants relative to aid loans. Disbursement data of pure grants and loans are from the OECD/DAC database (Table 2a). Columns 3, 4 and 5 in Table 4 show that the determinants of pure grants relative to aid loans are similar to previous results. However, the negative indebtedness coefficient is now significant in the first period, suggesting that more indebted countries received significantly *less* pure grants as a share of total aid even when controlling

²⁰ The data is based on disbursement ODA data from the OECD/DAC (2009b).

Table 4. Alternative measures of grant component of aid

Dependent variable:	Grant component of aid (BEDA)		Pure grants as a share of bilateral aid		
	1975-1985	1985-1995	1975-1985	1985-1995	1995-2005
	[1]	[2]	[3]	[4]	[5]
Initial debt ratio (GDP)	-0.186 [0.540]	0.055 [0.440]	-1.104*** [0.005]	-0.067 [0.464]	0.016 [0.225]
Ln(Initial GDP per capita)	-0.166*** [0.000]	-0.144*** [0.000]	-0.068* [0.100]	-0.103*** [0.000]	-0.091*** [0.000]
Bilateral aid/GDP	1.602*** [0.000]	0.222 [0.446]	-0.395 [0.532]	0.308 [0.268]	-0.147 [0.688]
Initial institutional quality	0.008 [0.473]	0.003 [0.727]	0.022 [0.149]	-0.007 [0.518]	-0.003 [0.778]
Openness	-0.052 [0.379]	-0.042 [0.493]	-0.137 [0.128]	-0.077 [0.265]	-0.169*** [0.000]
Ln(1+Inflation)	0.001 [0.974]	0.005 [0.812]	0.075 [0.164]	0.027 [0.179]	0.083 [0.165]
Ln(Initial population)	-0.050*** [0.004]	-0.057*** [0.000]	-0.082*** [0.000]	-0.054*** [0.000]	-0.060*** [0.000]
Observations	63	88	63	88	103
R-squared	0.754	0.649	0.397	0.471	0.54

Note: OLS estimation with robust standard errors. P values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Constant not reported.

for recipient country characteristics.²¹ This result further supports the suggestion that aid composition contributed to the build up of debt sustainability problems.

In the case of a proportional dependent variable, the fitted values using OLS estimation are not necessarily restricted to the unit interval. Alternatively, a fractional logit model ensures that the predicted values fall within the unit interval, providing consistent estimates (Papke and Wooldridge, 1996). Therefore, as a robustness check, columns 1 to 3 in Table 5 report the regression results using the fractional logit model estimation.²² Reassuringly, the results are unchanged.

²¹ The result is similar when including donor interest variables as well.

²² The model is implemented in STATA within the Generalized Linear Models framework using the *glm* command with *family(binomial)* and *link(logit)* and robust standard errors. The model is estimated using maximum likelihood estimation. See Papke and Wooldridge (1996) for more details.

Table 5. Further robustness checks

	Dependent variable: Grant component of bilateral aid flows					
	Fractional logit ^a			Alternative time periods ^b		
	1975-1985	1985-1995	1995-2005	1975-1990	1990-2005	2000-2005
	(1)	(2)	(3)	(4)	(5)	(6)
Initial debt ratio (GDP)	-0.853	-0.434	-0.154	-0.221	-0.016	0.001
	[0.454]	[0.395]	[0.316]	[0.241]	[0.487]	[0.921]
Ln(Initial GDP per capita)	-0.705***	-0.760***	-0.818***	-0.125***	-0.062***	-0.031***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
Bilateral aid/GDP	1.963	3.349	1.722	0.319	0.024	-0.015
	[0.414]	[0.192]	[0.710]	[0.478]	[0.902]	[0.890]
Initial institutional quality	-0.032	-0.149***	-0.077	-0.014	-0.005	-0.003
	[0.482]	[0.007]	[0.374]	[0.146]	[0.493]	[0.405]
Openness	-0.327	-0.272	-0.514*	-0.002	-0.04	-0.040***
	[0.363]	[0.423]	[0.062]	[0.978]	[0.136]	[0.005]
Ln(1+Inflation)	0.274*	0.012	1.837*	0.061***	0.013	0.05
	[0.062]	[0.905]	[0.074]	[0.002]	[0.365]	[0.173]
Ln(Initial population)	-0.229***	-0.243***	-0.392***	-0.023*	-0.026***	-0.014***
	[0.000]	[0.000]	[0.000]	[0.057]	[0.000]	[0.001]
Observations	63	88	103	67	93	104
R-squared				0.484	0.46	0.352

Note: (a) Fractional logit estimation with robust standard errors (b) OLS estimation with robust standard errors. P values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5 also shows that the results are very similar when using different time periods. Columns 4 and 5 report the estimation results using 15-year periods rather than 10-year periods. In addition, column 6 reports results for the period 2000 to 2005. The latter is also a test to determine whether the allocation is different in the most recent years. In line with previous results, income level, but not indebtedness, influences the grant–loan mix.

Further tests show that the results are robust to excluding outliers identified by the Hadi procedure.²³ The results are also robust to excluding recipient countries receiving only grant flows and excluding donors providing only grants (Luxembourg, Ireland, Greece and Australia).²⁴

²³ The procedure is implemented in STATA with the `hadimvo` command that identifies multiple outliers in multivariate data using the method of Hadi (Hadi, 1994). The cut-off significance level chosen is 0.05.

²⁴ The results are available from the author upon request.

5. Conclusion

The grant component of bilateral aid has increased considerably over the last decades, reaching 97 percent in 2005. Although bilateral donors in general provide aid in the form of grants, the grant ratio varies greatly across recipient countries. Recipient need explains this variation of aid composition to a certain extent, as poorer countries appear to receive a higher grant component of aid between 1975 and 2005. However, the study finds no evidence that recipient country indebtedness explains the variation.

The latter finding is surprising as the recent grant versus loan debate focuses on debt sustainability in recipient countries. While the debt sustainability problems in developing countries have called for the initiation of wide debt relief programs, this study fails to provide evidence that the allocation of the bilateral grant–loan mix has been tailored to avoid future debt problems. In addition, the recent debate focuses on the shift from loans to grants for multilateral organizations such as the International Development Association of the World Bank (e.g. Meltzer commission report). This study shows, however, the importance of focusing not only on increasing grants but also on the allocation of the grant–loan mix.

Recipient need in terms of income level is nevertheless a significant determinant of the grant component of aid. Poorer countries receive a higher grant component in all three periods. This finding is in line with the suggestion of Radelet (2005) who argues that the income level of recipient countries should be the crucial factor in determining the allocation of the grant–loan mix as it avoids perverse incentives and provides a simple allocation rule. Although a significant determinant, the analysis shows that the effect of recipient country income level is rather limited. At most, a decrease in GDP per capita of 10 percent increases the grant component of aid by about one percentage point.

In all, the results suggest that the recent grant versus loan debate should focus not only on a total increase in the grant component of aid but also on the actual allocation of the grant–loan mix to recipient countries. The allocation of bilateral aid could be more selective in terms of recipient need. It could also be more selective in terms of factors such as institutional quality in recipient countries.

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Appendix A. Summary statistics

(a). Summary statistics, 1975–1985.

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Grant component of aid	78	0.77	0.14	0.43	1
Initial debt ratio (GDP)	78	0.09	0.06	0.00	0.27
Ln(Initial GDP per capita)	78	7.71	0.75	6.33	9.76
Bilateral aid/GDP	78	0.05	0.05	0.00	0.27
Initial institutional quality	63	4.58	1.66	1	7
Trade openness	63	0.61	0.34	0.14	1.56
Ln(1+inflation)	63	0.24	0.37	0.04	2.59
Ln(Initial population)	63	15.66	1.50	12.39	20.17
Initial debt ratio (exp)	61	0.48	0.36	0.07	2.03
Initial debt service ratio (GDP)	61	0.03	0.02	0.00	0.15
Initial debt service ratio (exp)	59	0.14	0.11	0.01	0.46
Initial debt in arrears (GDP)	62	0.00	0.00	0	0.03
Grant component of aid (BEDA)	63	0.62	0.22	0.10	0.95
Pure grant component of aid	63	0.64	0.20	0.24	0.99

(b). Summary statistics, 1985–1995.

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Grant component of aid	94	0.83	0.14	0.45	1
Initial debt ratio (GDP)	94	0.25	0.19	0.002	0.84
Ln(Initial GDP per capita)	94	7.80	0.82	6.06	9.58
Bilateral aid/GDP	94	0.07	0.07	0.001	0.34
Initial institutional quality	88	4.44	1.70	1	7
Trade openness	88	0.69	0.38	0.16	1.70
Ln(1+inflation)	88	0.32	0.67	0.01	3.43
Ln(Initial population)	88	15.40	2.04	10.70	20.73
Initial debt ratio (exp)	88	1.22	1.04	0.01	6.50
Initial debt service ratio (GDP)	85	0.05	0.04	0.0001	0.18
Initial debt service ratio (exp)	85	0.23	0.17	0.001	0.89
Initial debt in arrears (GDP)	85	0.02	0.03	0	0.14
Grant component of aid (BEDA)	88	0.74	0.20	0.17	0.98
Pure grant component of aid	88	0.73	0.19	0.31	1

(c). Summary statistics, 1995–2005.

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Grant component of aid	115	0.94	0.07	0.71	1
Initial debt ratio (GDP)	115	0.56	0.83	0.01	6.01
Ln(Initial GDP per capita)	115	7.87	0.88	5.90	9.60
Bilateral aid/GDP	115	0.05	0.05	0.00	0.24
Initial institutional quality	103	4.13	1.64	1	7
Trade openness	103	0.79	0.37	0.22	2.08
Ln(1+inflation)	103	0.10	0.13	0.003	1.18
Ln(Initial population)	103	15.62	1.99	10.64	20.88
Initial debt ratio (exp)	101	2.88	4.89	0.05	28.67
Initial debt service ratio (GDP)	101	0.05	0.04	0.00	0.17
Initial debt service ratio (exp)	99	0.20	0.14	0.00	0.69
Initial debt in arrears (GDP)	101	0.14	0.35	0	2.86
Pure grant component of aid	103	0.83	0.17	0.29	1

Note: Covers the observations included in the regression analysis.

Appendix B. Selected correlation coefficients.

	Grant compon- ent of aid	Initial debt ratio (gdp)	Ln (Initial GDP per capita)	Initial debt ratio (exp)	Initial debt service (gdp)	Initial debt service (exp)
<i>1975-1985</i>						
Initial debt ratio (GDP)	-0.29*	1				
Ln(Initial GDP per capita)	-0.48*	0.09	1			
Initial debt ratio (exp)	-0.10	0.52*	-0.08	1		
Initial debt service (gdp)	-0.31*	0.42*	0.38*	0.03	1	
Initial debt service (exp)	-0.40*	0.08	0.45*	0.42*	0.64*	1
Initial debt in arrears (edt)	0.19	0.04	-0.22*	0.12	-0.25*	-0.21
<i>1985-1995</i>						
Grant component of aid	1					
Initial debt ratio (GDP)	0.02	1				
Ln(Initial GDP per capita)	-0.46*	0.01	1			
Initial debt ratio (exp)	0.08	0.58*	-0.26*	1		
Initial debt service (gdp)	-0.31*	0.69*	0.34*	0.17	1	
Initial debt service (exp)	-0.32*	0.34*	0.20	0.54*	0.58*	1
Initial debt in arrears (edt)	0.18	0.41*	-0.34*	0.48*	-0.01	0.002
<i>1995-2005</i>						
Grant component of aid	1					
Initial debt ratio (GDP)	0.15	1				
Ln(Initial GDP per capita)	-0.35*	-0.33*	1			
Initial debt ratio (exp)	0.17	0.73*	-0.38*	1		
Initial debt service (gdp)	-0.09	0.40*	0.14	0.04	1	
Initial debt service (exp)	-0.04	0.46*	-0.16	0.44*	0.60*	1
Initial debt in arrears (edt)	0.14	0.62*	-0.30*	0.53*	-0.01	0.09

Note: * indicates significant at 5%

Appendix C. Data sources

Variable	Explanation	Source
Grant component of aid	(Grant element*commitments in constant 2007 USD dollars) / commitments	OECD/DAC 2009a: CRS online
Initial debt ratio	Present value of public and publicly guaranteed long-term external debt (% of GDP or % of exports)	Dikhanov 2006
Ln(Initial GDP per capita)	Logarithm of PPP converted GDP per capita in constant 2000 US dollars.	Heston et al 2006: PWT6.2
Bilateral aid/GDP	Gross aid: 201 Grants + 204 Loans extended from bilateral donors (% of GDP)	OECD/DAC 2009b: DAC online
Initial institutional quality	Political rights and civil liberties index which takes values from 1 (highest level of freedom) to 7 (lowest level of freedom).	Freedom House 2007 (Gastil)
Openness	(Export + Import) / GDP	World Bank 2007a: WDI
Ln(1+Inflation)	The logarithm of (1+ the consumer price inflation)	World Bank 2007a: WDI
Ln(Initial population)	The logarithm of total population	World Bank 2007a: WDI
Colonial dummies	1 if the country has been a colony of a particular country, 0 otherwise	CEPII 2009
Debt service payments	Total debt service paid (% of GDP or % of exports)	World Bank 2007b: GDF
Initial debt in arrears	Interest and principal payments in arrears (% of GDP)	World Bank 2007b: GDF
Grant component of aid (BEDA)	(Pure grants + grant equivalent of loans)/total BEDA	Chang et al. 1998
Pure grants as a share of bilateral aid	Grants as a share of gross bilateral aid: 201 Grants / (201 Grants + 204 Loans extended)	OECD/DAC 2009b: DAC online